Maharaja Ranjit Singh Punjab Technical University, Bathinda-151001

AGENDA

FOR THE 8TH MEETING OF FACULTY OF ENGINEERING AND TECHNOLOGY TO BE HELD ON 06.10.2023

MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
DABWALI ROAD, BATHINDA-151001
(Estb. by Govt. of Punjab Act 5(2015) & Approved u/s 2(f) & 12(b) of UGC Act, 1956)

www.mrsptu.ac.in

Ref. No.: HCED/431 **Date: 28.09.2023**

SUBJECT: INVITATION FOR 8TH MEETING OF FACULTY OF ENGINEERING & TECHNOLOGY TO BE HELD ON 06.10.2023

To

1. **Dr. SUNDAR SINGH** **Chairperson**
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2. **Dr. MANINDER SINGH** **Chairperson**
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30. Dr Shweta Rani **Member**
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40. Dr Sandeep Mann **Member**
Principal Scientist (APE) & HOD Transfer
of Technology Division, lCAR-Central Institute of Post-Harvest Engg. & Tech. Ministry of Agriculture and
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Sir/Madam,

It is to inform you that 8th offline/online Meeting of Faculty of Engineering & Technology of Maharaja Ranjit Singh Punjab Technical University has been scheduled on 06/10/2023 at 10:00 A.M.in the Committee Room of GZSCCET, MRSPTU Bathinda. You are requested to make it convenient to attend this meeting.

Member Secretary,
Faculty of Engg. & Tech.,
MRSPTU, Bathinda

Copy to:

1. PA to Vice Chancellor, MRSPTU, Bathinda for information to Vice Chancellor please.
2. Registrar, MRSPTU, Bathinda
3. Campus Director, GZSCCET, MRSPTU Bathinda
4. Professor I/C, Finance, MRSPTU, Bathinda
5. Dean Academic Affairs, MRSPTU, Bathinda

ITEM NO. 08.01 CONFIRMATION OF THE MINUTES OF 7TH MEETING OF FACULTY OF ENGG. & TECH. OF MRSPTU BATHINDA HELD ON 15/05/2023 ANNEXURE-I (Page No. 1-6)

Put up before Faculty of Engineering & Technology for confirmation please.

ITEM NO. 08.02 ACTION TAKEN REPORT OF 7th MEETING OF FACULTY OF ENGG. & TECH. OF MRSPTU BATHINDA HELD ON 15/05/2023

ITEM NO. 07.01 CONFIRMATION OF THE MINUTES OF 6TH MEETING OF FACULTY OF ENGG. & TECH. OF MRSPTU BATHINDA HELD ON 14/07/2022

DECISION: - Confirmed

ACTION TAKEN: No action required.

ITEM NO. 07.02 TO APPROVE THE MINUTES OF MEETING OF BOS OF COMPUTER SCIENCE AND ENGINEERING HELD ON 28/04/2023

DECISION: - Noted

ACTION TAKEN: No action required.

ITEM NO. 07.03 APPROVAL OF SYLLABI OF PG-ENGG. PROGRAMMES

DECISION: - It was unanimously decided for the above mentioned programs following criteria shall be followed:
For the project = 06 Credits & 12Hrs.
For Dissertation/Thesis = 16 Credits

ACTION TAKEN: In process.

ITEM NO. 07.04 APPROVAL OF SYLLABI OF UG-ENGG. PROGRAMMES

DECISION: - To be put up in the next meeting of Faculty of Engg. & Tech. of MRSPTU, Bathinda after incorporating the changes suggested by members.

ACTION TAKEN: Again put up in the meeting to be held on 06.10.2023.

ITEM NO. 07.05 TO APPROVE THE SYLLABUS OF OPEN ONLINE COURSES STARTING FROM 2K22.

DECISION: - To be put up in the meeting of Faculty of sciences of MRSPTU, Bathinda

ACTION TAKEN: As per the instructions from the office of Dean (Academic Affairs), the item should be approved from Faculty of Engg. & Technology

ITEM NO. 07.06 TO APPROVE THE CO-PO OF M.TECH. CSE AND B.TECH. CSE.

DECISION: - To be put up in the next meeting of Faculty of Engg. & Tech. of MRSPTU, Bathinda after incorporating the changes suggested by members.

ACTION TAKEN: Again put up in the meeting to be held on 06.10.2023.

ITEM NO. 08.03 APPROVAL OF SYLLABI OF PG-ENGG. PROGRAMMES

The Scheme and Syllabi of M.Tech. Regular and M.Tech. Part-time has been prepared and approved by the concerned BOS as per following details:

S. No.	ITEM	Annexure - II
		Page Nos.
08.03.01	Complete Scheme and Syllabus of **M.Tech. (Textile Engineering)** Regular and Part-time mode for Batch 2022 onwards with course objectives and course outcomes	7-36
08.03.02	Complete Scheme and Syllabus of **M.Tech. Electrical Engineering (Power System)** Regular and Part-time mode for Batch 2022 onwards with course objectives and course outcomes	37-86
08.03.03	Complete Scheme and First Semester Syllabus of **M.Tech. (Electronics and Communication Engineering)** Regular and Part-time mode for Batch 2022 onwards with course objectives and course outcomes	87-103

Put up before Faculty of Engineering & Technology for deliberations and approval for further recommending it to Academic Council please.

ITEM NO. 08.04 TO INFORM ABOUT THE EVALUATION OF M.TECH. DISSERTATION

As per the notification no. DAA/MRSPTU/Notifications/175 dated 11.09.2023 (**Annexure – III, Page No. - 104)**, the evaluation will not be letter grade/ marks/ credits. It shall be satisfactory/unsatisfactory.

However, all M.Tech. study schemes have certain no. of credits assigned to M.Tech. Dissertation in the 4th Semester of M.Tech. But in view of the above

notification the credits become redundant. Hence the credits are proposed to be dropped.

Put up before Faculty of Engineering & Technology for deliberations.

ITEM NO. 08.05 APPROVAL OF REVISED SCHEME/SYLLABI OF B.TECH. PROGRAMMES FOR 7TH AND 8TH SEMESTER (2020 BATCH OF GZSCCET STUDENTS ONLY) TO FACILITATE THE STUDENTS OPTING FOR INTERNSHIP IN THEIR LAST SEMESTER.

The revised scheme and syllabi of B.Tech. 7th and 8th sem. (2020 batch of GZSCCET students only) has been prepared and approved by the concerned BOS as per following details:

S. No.	ITEM	Annexure - IV
		Page Nos.
08.05.01	Revised Scheme of **B.Tech. (Textile Engineering)** 7th – 8th semester for Batch 2020 only	105-106
08.05.02	Revised Scheme of **B.Tech. (Electrical Engineering)** 7th – 8th semester for Batch 2020 only	107-109
08.05.03	Revised Scheme of **B.Tech. (Computer Science and Engineering)** 7th – 8th semester for Batch 2020 only	110
08.05.04	Revised Scheme of **B.Tech. (Mechanical Engineering)** 7th – 8th semester for Batch 2020 only	111-113
08.05.05	Revised Scheme of **B.Tech. (Civil Engineering)** 7th – 8th semester for Batch 2020 only	114-116
08.05.06	Revised Scheme of **B.Tech. (Electronics and Communication Engineering)** 7th – 8th semester for Batch 2020 only	117-121

Further, the minutes of meeting approved by the competent authority vide no. VC/260 dated 25.09.2023 (**Annexure – V, Page No. 122-123**), for finalizing the proposal to allow the B.Tech. final year students to join internship during their 8th semester of study is presented before the committee for information.

Put up before Faculty of Engineering & Technology for deliberations and approval for further recommending it to Academic Council please.

ITEM NO. 08.06 APPROVAL OF SYLLABI OF UG-ENGG. PROGRAMMES

The Scheme and Syllabi of B.Tech. Regular has been prepared and approved by the concerned BOS as per following details:

S. No.	ITEM	Annexure - VI
		Page Nos.
08.06.01	Scheme and Syllabus of B.Tech. Computer Science and Engineering (Artificial Intelligence and Machine Learning) (1st – 4th Sem.) for Batch 2K22 onwards along with course objectives and course outcomes.	124-162
08.06.02	Scheme and Syllabus of B.Tech. Computer Science and Engineering (Internet of Things and Cyber Security including Block Chain Technology) (1st – 2nd Sem.) for Batch 2K23 onwards along with course objectives and course outcomes.	163-182

Put up before Faculty of Engineering & Technology for deliberations and approval for further recommending it to Academic Council please.

ITEM NO. 08.07 TO APPROVE THE CO-PO OF B.TECH. CSE.

The complete scheme/syllabi with CO-PO of B.Tech. CSE has been received from the concerned BoS attached as **ANNEXURE-VII (Page No. 183-263)**

Put up before Faculty of Engineering & Technology for deliberations and approval for further recommending it to Academic Council please.

ITEM NO. 08.08 TO APPROVE THE SYLLABUS OF OPEN ONLINE COURSES STARTING FROM 2K22.

Scheme and syllabi of following online courses were approved by respective Board of Studies **ANNEXURE-VIII (Page No. 264-284)**

S.No.	ITEM
1.	AWS Cloud Practitioner
2.	Basics of C#
3.	Cyber Security and Ethical Hacking
4.	Database Management System
5.	Fundamental of Java
6.	Introduction to Cloud Computing
7.	Office Automation
8.	Operating System

9.	PHP
10.	Python for Data Science

Put up before Faculty of Engineering & Technology for deliberations and approval for further recommending it to Academic Council please.

ITEM NO. 08.09 Any other agenda Item/Items with the permission of the chair.

MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
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(Estb. by Govt. of Punjab Act 5(2015) & Approved u/s 2(f) & 12(b) of UGC Act, 1956)

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Ref. No.: HCED-190 **Date:** 15/05/23

MINUTES OF 7TH MEETING OF FACULTY OF ENGINEERING & TECHNOLOGY HELD ON 15.05.2023

A pre-scheduled 7th Meeting of Faculty of Engineering & Technology of Maharaja Ranjit Singh Punjab Technical University, Bathinda was held on 15.05.2023 at 11.00 AM onwards in offline as well as online mode. The following were present in offline mode.

1. **Prof. SUNDAR SINGH** — **Chairperson**
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3. **Dr Rajeev Kumar Varshney** — **Member**
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4. **Prof J S Tiwana** — **Member**
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5. **Dr Neeraj Gill** — **Member**
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10. **Dr Sanjiv Kumar Aggarwal** — **Member**
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12. **Dr Paramjeet Singh** — **Member**
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19. Dr Sandeep Mann **Member**
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Whereas following were present in online mode:

20. Dr Shaveta Rani **Member**
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21. Dr Kanwal Jit Singh **Member**
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SSingh

At the outset, after verifying the quorum of the meeting, the Chairperson welcomed all the members attending 7th Meeting of Faculty of Engg. & Tech. at Bathinda. Therafter he asked Member Secretary

to take up agenda items one for discussion. After detailed deliberations, the following unanimous decisions were arrived at:

ITEM NO. 07.01 CONFIRMATION OF THE MINUTES OF 6TH MEETING OF FACULTY OF ENGG. & TECH. OF MRSPTU BATHINDA HELD ON 14/07/2022 ANNEXURE-I (Page 1-4)

DECISION:- Confirmed

ITEM NO. 07.02 TO APPROVE THE MINUTES OF MEETING of BOS of Computer Science and Engineering held on 28/04/2023 - as per following details and are attached herewith as **ANNEXURE - II.**

S. No.	ITEM	Annexure - II
		Page No.
07.02.01	Minutes of Meeting of BOS of Computer Science and Engineering held on 28/04/2023	05

DECISION:- Noted

ITEM NO. 07.03 APPROVAL OF SYLLABI OF PG-ENGG. PROGRAMMES

The Scheme and Syllabi of M.Tech. Regular and M.Tech. Part-time has been prepared and approved by the concerned BOS as per following details:

S. No.	ITEM	Annexure - III
		Page Nos.
07.03.01	Complete Scheme and Syllabus of **M.Tech. (Textile Engineering)** Regular and Part-time mode for Batch 2022 onwards	06-35
07.03.02	Complete Scheme and Syllabus of **M.Tech. Electrical Engineering (Power System)** Regular and Part-time mode for Batch 2022 onwards	36-85
07.03.03	Complete Scheme and First Semester Syllabus of **M.Tech. (Electronics and Communication Engineering)** Regular and Part-time mode for Batch 2022 onwards	86-102

DECISION:- It was unanimously decided for the above mentioned programs following criteria shall be followed:
For the project = 06 Credits & 12Hrs.
For Dissertation/Thesis = 16Credits

ITEM NO. 07.04 APPROVAL OF SYLLABI OF UG-ENGG. PROGRAMMES

The Scheme and Syllabi of B.Tech. Regular has been prepared and approved by the concerned BOS as per following details:

S. No.	ITEM	Annexure - IV
		Page Nos.
07.04.01	Scheme and Syllabus of B.Tech. Computer Science and Engineering (Artificial Intelligence and Machine Learning) (3rd – 4th Sem.) for Batch 2K22 onwards	103-120

DECISION:- **To be put up in the next meeting of Faculty of Engg. & Tech. of MRSPTU, Bathinda after incorporating the changes suggested by members.**

ITEM NO. 07.05 TO APPROVE THE SYLLABUS OF OPEN ONLINE COURSES STARTING FROM 2K22.

Scheme and syllabi of following online courses were approved by respective Board of Studies **ANNEXURE-V (Page 121-141)**

S.No.	ITEM
1.	AWS Cloud Practitioner
2.	Basics of C#
3.	Cyber Security and Ethical Hacking
4.	Database Management System
5.	Fundamental of Java
6.	Introduction to Cloud Computing
7.	Office Automation
8.	Operating System
9.	PHP
10.	Python for Data Science

DECISION:- **To be put up in the meeting of Faculty of sciences of MRSPTU, Bathinda**

ITEM NO. 07.06 TO APPROVE THE CO-PO OF M.TECH. CSE AND B.TECH. CSE.

The revised CO-PO of M.Tech. CSE and B.Tech. CSE has been received from the concerned BoS attached as **ANNEXURE-VI (Page 142-172)**

DECISION:- **To be put up in the next meeting of Faculty of Engg. & Tech. of MRSPTU, Bathinda after incorporating the changes suggested by members.**

ITEM NO. 07.07 **Any other agenda Item/Items with the permission of the chair.**

DECISION:- **No other agenda item**

The Meeting ended with a vote of thanks to the Chair.

15/05/2023

Member Secretary
(Dr Manjeet Bansal)

S Singh 15/5/23

For Approval please
CHAIRPERSON
(Prof. SUNDAR SINGH)

Maharaja Ranjit Singh Punjab Technical University
Bathinda-151001

FACULTY OF ENGINEERING AND TECHNOLOGY

SYLLABUS

M. Tech. (Textile Engineering)

2022 BATCH ONWARDS

(For Full-Time and Part-Time Modes)

Mission and Vision of the Department

Vision

To strive to become a premier department in the field of Textile Engineering by providing quality technical education to the students to serve the needs of society.

Mission

The department is committed to nurture the students with best quality technical education in textile engineering and develop research aptitude.

To improve skill and knowledge through effective and participative teaching – learning process using latest educational techniques.

To boost up industry-institute interaction/ collaboration through MoUs, Internships and participative curriculum developments.

To enhance students exposure in multidisciplinary & interdisciplinary domain and professional ethics through collaborative case study/ project and related activities.

Programme Outcomes

Critical Thinking: Ability to analyse complex engineering problems and apply acquired knowledge in an innovative manner to provide societal acceptable solutions.

Research Skills: Creating a research temperament for achieving meaningful and long-lasting solutions in-line with the changing needs of the society.

Use of Modern Tools: Ability to develop appropriate models/simulated solutions by using available state-of-the-art tools and techniques.

Collaborate Multidisciplinary Work: Ability to achieve the laid objectives by maximizing the potential of co-team members and collaborating with other stakeholders.

Project Management and Finance: Ability to formulate economically viable solutions using acquired technical and allied knowledge base.

Research Ethics and Life Long Learning: Ability to exercise research ethics and enforce professional conduct in research, publications and life-long learning.

Effective Communication: Ability to acquire effective listening, oral and writing skills for executive presentations making complete use of available ICT platforms.

Environment and Sustainability: Analyse the impact of engineering solutions in societal and environmental contexts to address the needs for sustainable development.

Programme Specific Outcomes (PSOs)

Ability to evaluate the complex textile engineering problems and design optimal solutions and implement the same using cutting edge technologies.

Ability to develop research skill to explore new facts and dimensions which can help develop solutions which are sustainable and beneficial to the society.

Programme Educational Objectives (PEO) for M. Tech. (Textile Engineering)

Post graduates will be recognized by contribution in the workplace that involves creative and critical thinking in engineering challenges.

Teaming skill and effective communication in a professional environment.

Continuous learning through developmental opportunities by adapting to changing social, economic and technological environments.

Study Scheme for M. Tech Regular Programme

1st SEMESTER		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
MTEXS1-101	Advances in Yarn Production Technologies	4	0	0	40	60	100	4
MTEXS1-102	Advances in Fabric Production Technologies	4	0	0	40	60	100	4
MTEXS1-103	Apparel Technology	4	0	0	40	60	100	4
	DE- 1	4	0	0	40	60	100	4
MTEXD1-111	Process Control in Spinning and Weaving							
MTEXD1-112	Production Management in Textiles							
MTEXD1-113	Total Quality Management							
	DE- 2	4	0	0	40	60	100	4
MTEXD1-121	Textile Product Design							
MTEXD1-122	Physical Properties of Fibres							
MTEXD1-123	Coloration and finishing Technology							
MTEXS1-104	Advanced Mechanical Processing Laboratories	0	0	4	60	40	100	2
Total:		**20**	**0**	**4**	**260**	**340**	**600**	**22**

2nd SEMESTER		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
MTEXS1-201	Advances in Fibre Production Technologies	4	0	0	40	60	100	4
MTEXS1-202	Structural Mechanics of Yarns	4	0	0	40	60	100	4
MTEXS1-203	Structural Mechanics of fabrics	4	0	0	40	60	100	4
	DE- 3	4	0	0	40	60	100	4
MTEXD1-211	Knitting and Non-Woven Technology							
MTEXD1-212	Post Spinning Operation							
MTEXD1-213	Environmental Practices in Textiles							
	DE- 4	4	0	0	40	60	100	4
MTEXD1-221	High Performance Fibres and Composites							
MTEXD1-222	Advanced Garments Manufacturing Technology							
MTEXD1-223	Technical Textiles							
MTEXS1-204	Advanced Textile Testing Lab	0	0	4	60	40	100	2
Total:		**20**	**0**	**4**	**260**	**340**	**600**	**22**

3rd SEMESTER		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
XXXX	Open Elective- 1	3	0	0	40	60	100	3
MREMI0-101	RM & IPR	4	0	0	40	60	100	4
MTEXS1-302	Project	0	0	-	60	40	100	6
MTEXS1-303	Seminar	0	0	2	100	--	100	1
Total:		**7**	**0**	**2**	**240**	**160**	**400**	**14**

4th SEMESTER		Contact Hours			Marks		
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**
MTEXS1-401	Dissertation	--	--	--	**Satisfactory / Not Satisfactory as per CBCS-2016**		
Total:		**--**	**--**	**--**	**--**		

Study Scheme for M. Tech Part-Time Programme

SEMESTER-1		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
MTEXS1-101	Advances in Yarn Production Technologies	4	0	0	40	60	100	4
MTEXS1-102	Advances in Fabric Production Technologies	4	0	0	40	60	100	4
Department Elective- 1		4	0	0	40	60	100	4
MTEXD1-111	Process Control in Spinning and Weaving							
MTEXD1-112	Production Management in Textile							
MTEXD1-113	Total Quality Management							
Total:		**12**	**0**	**0**	**120**	**180**	**300**	**12**

SEMESTER-2		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
MTEXS1-103	Apparel Technology	4	0	0	40	60	100	4
Department Elective- 2		4	0	0	40	60	100	4
MTEXD1-121	Textile Product Design							
MTEXD1-122	Physical Properties of Fibres							
MTEXD1-123	Coloration and finishing Technology							
MTEXS1-104	Advanced Mechanical Processing Laboratories	0	0	4	60	40	100	2
Total:		**8**	**0**	**4**	**140**	**160**	**300**	**10**

SEMESTER-3		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
MTEXS1-201	Advances in Fibre Production Technologies	4	0	0	40	60	100	4
MTEXS1-202	Structural Mechanics of Yarn	4	0	0	40	60	100	4
Department Elective- 3		4	0	0	40	60	100	4
MTEXD1-211	Knitting and Non-Woven Technology							
MTEXD1-212	Post Spinning Operations							
MTEXD1-213	Environmental Practices in Textiles							
Total:		**12**	**0**	**0**	**120**	**180**	**300**	**12**

SEMESTER-4		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
MTEXS1-203	Structural Mechanics of fabrics	4	0	0	40	60	100	4
Department Elective- 4		4	0	0	40	60	100	4
MTEXD1-221	High Performance Fibres and Composites							
MTEXD1-222	Advanced Garments Manufacturing Technology							
MTEXD1-223	Technical Textiles							
MTEXS1-204	Advanced Textile Testing Lab	0	0	4	60	40	100	2
Total:		**8**	**0**	**4**	**140**	**160**	**300**	**10**

SEMESTER-5		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**	
XXXXX	Open Elective- 1	3	0	0	40	60	100	3
MREMI0-101	Research Methodology and IPR	4	0	0	40	60	100	4
MTEXS1-302	Project	0	0	-	60	40	100	6
MTEXS1-303	Seminar	0	0	2	100	--	100	1
Total:		**7**	**0**	**2**	**240**	**160**	**400**	**14**

SEMESTER-6		Contact Hours			Marks		
Subject Code	**Subject Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**
MTEXS1-401	Dissertation	-	-	-	**Satisfactory / Not Satisfactory as per CBCS-2016**		
Total:		-	-	-	--		

ADVANCES IN YARN PRODUCTION TECHNOLOGIES

Subject Code: MTEXS1-101 **LTPC** **Duration-60hrs**
4 0 0 4

Course Objectives:

CO1: To develop an ability to understand various yarn manufacturing parameters.
CO2: To equip students with knowledge about the machines used in various spinning technologies.
CO3: To make students understand about the structure and properties of yarn.
CO4: To impart knowledge of the quality requirement in various spinning systems.

Course Outcomes

CO1: To analyse the basics of fiber Quality Requirements, and Various spinning systems.
CO2: To understand and analyse the theory of textile machines and modern developments.
CO3: To understand the various new spinning methods.
CO4: Evaluate the structure, properties of spun yarn and various quality parameters.

UNIT – I (15 Hrs)

Fiber Quality Requirements for Different Spinning Technologies, Systems of Yarn Manufacture in Cotton, Worsted, Woollen and Semi Worsted System, Comparative Study of New Spinning Technologies, Concept of Opening and Cleaning

UNIT-II (15 Hrs)

Aerodynamics and its Role in Blow room, Theories of Cardin, Drafting Theories, Developments in Comber, Quality Aspects of Roving, Balloon Theory in Spinning, Significance of Modern Developments in Spinning Process, Modern High Speed Draft Spinning Systems

UNIT-III (15Hrs)

Machine and Process Variables Affecting the Structure and Properties of Spun Yarns,Introduction to Core Spinning, Cover Spinning, Siro-Spinning and Compact Spinning.

UNIT-IV (15 Hrs)

Processing of Wool and Man Made Fibres in New Spinning Systems, Non-Conventional Methods of Yarn Manufacture, Air-Vortex Yarn, Quality Standards of Different Yarns with Emphasis on USTER Standard

Recommended Books

1. P. Grosberg and C. Iype, "Yarn Production-Theoretical Aspects", 1st edition, The TextileInstitute, UK, 1999.
2. R. Chattopadhyay, "Advances in Technology of Yarn Production", 1st Edn., NCUTE, NewDelhi, 2002.
3. M.V.S. and A.B. Talele, "A Guide to Crimping / Texturing Technology", 1st Edn., NasnalPrinters and its Associates, Surat,1992.
4. Klein W, "Manual of Textile Technology-New Spinning Systems", Vol.5, 1st Edn., TheTextile Institute, UK, 1993.

ADVANCES IN FABRIC PRODUCTION TECHNOLOGIES

Subject Code: MTEXS1- 102 **LTPC** **Duration -60hrs**
4 0 0 4

Course Objectives:

CO1: To Understand science based manufacturing of Weaving.
CO2: Able to Learn mathematic Modelling of weaving process.
CO3: To understand and analyse the theory of textile Knitting machines.
CO4: Learn modelling of Non-woven manufacturing process and identifying the parameters in nonwoven production.

Course Outcomes

CO1: Understand mathematical logics behind weaving and winding process.
CO2: Understand the different aspects of unorthodox weaving.
CO3: understand the concepts of warp and weft knitting.
CO4: Understand different aspects of nonwoven technology and predictive measures of different properties of nonwoven fabric.

UNIT-I (15 Hrs)

Development Trends in Winding, Warping and Sizing Machines for Improving Quality of Preparation and Cost Reduction, Loom Development Trends and Objectives, Kinematics of Sley and Heald Motion with Reference to Shuttle Loom, Mechanics of Shuttle Checking, Analysis of Warp Tension during Weaving, Cloth Fell Position, Beat Up Force and Pick Spacing

UNIT-II (15Hrs)

Theoretical Analysis of Weft Insertion in Shuttleless Loom, Electronic Control of Different Motions of Loom, Techno-Economics of Different Methods of Fabric Production

UNIT-III (15 Hrs)

Weft Knitted Fabric Manufacturing by Circular Knitting and Flat Bed Knitting Machine, Warp Knitting Manufacturing

UNIT-IV (15 Hrs)

Classification and Areas of Application of Nonwoven Fabrics, Different Methods of Production of Nonwoven Fabrics, Effect of Machines, Fibre and Process Variables on Properties of Nonwoven Fabrics, Failure Mechanism of Nonwoven Fabrics. Prediction Of Needle Punched Nonwoven Fabric Behavior. Designing of Nonwoven For Engineering Applications. Developments In Nonwoven Machineries.

Recommended Books

1. R. Marks and A.T.C. Robinson, “Principles of Weaving”, Textile Institute, UK, 1986.
2. Ormerod, “Modern Preparation and Weaving Machinery”, Buttersworth & Co., UK,1983.
3. O. Talavasek and V. Svaty, “Shuttleless Weaving Machine”, Elsevier ScientificPublishing Co. Amsterdam, 1981.
4. J. Lunenschloss and W. Albrecht, “Nonwoven Bonded Fabrics”, Ellis and Harwood Ltd.UK, 1985.
5. W. Albrecht, H. Fuchs and Kittelmann, “Nonwoven Fabrics”, Wiley – VCH Weinheim.2003.
6. V. Mrstina and F. Fejgal, “Needle Punching Textile Technology”, ElsevierScientific Publishing Co. Amsterdam, 1990.
7. M.L. Gulrajani, “Book of Papers of International Conference on Nonwoven”, The TextileInstitute, UK, 1992.
8. D.J. Spencer, “Knitting Technology”, 2nd Edn.,, Pergamon Press, 1989.

APPAREL TECHNOLOGY

Subject Code: MTEXS1-103 **LTPC** **Duration-60hrs**
4 0 0 4

Course Objectives:

CO1: To enable students to understand different manufacturing processes of apparel such as pattern making, lay plan, spreading, cutting, bundling and ticketing.
CO2: To make students understand the detail of sewing room processes.
CO3: To learn different types of finishing in garment construction.
CO4: To create awareness about clothing culture.

Course Outcomes

CO1: Understanding different manufacturing processes of apparel such as pattern making, lay plan, spreading , cuttings bundling and ticketing
CO2: Understanding of detail of sewing room processes Understanding of finishing processes of apparel.
CO3: Knowledge of production, planning and control in apparel production.
CO4: Understanding of the property of the fabric with comfort to the clothing wearer

UNIT-I (10 Hrs)

Introduction:- Introduction to garment manufacturing and Indian apparel industry. Latest developments in apparel manufacturing and machinery.
Pattern Formation and Cutting - Pattern making – Draft construction – marker planning – fabric spreading - laying methods - fabric cutting. Advanced Pattern making, Spreading & cutting – Factors affecting spreading – Automatic systems - Marker planning - 3D body scanner for measurements.
Computerized cutting machines – easy match system - automatic ticketing and bundling Automatic pattern notcher.

UNIT-II (20 Hrs)

Sewing Machine Mechanisms & Accessories – Introduction to sewing m/c and its parts and working details, types of sewing m/c, Attachment of sewing m/c, Automation in industrial sewing machines, automatic placket feeder, Automatic pocket maker, auto button sewer, Electronic Sewing machines Application of robotics in sewing, LAN in Sewing machines, high speed stitching. Preparation of seamless garments and its applications, sewing room planning.
Sewing Needles and Threads - Needle – functions, special needles, Needle size, Needle points, sewing thread – construction, material, thread size and packages.
Seams & Stitches – Seams, Different types, Superimposed, lapped, bound, flat, decorative, edge neatening, addition to Garment edges, single piece addition, Stitches – lock stitch, chain stitch, hand stitch type, multi-thread chain stitch, over edge chain stitch and covering chain stitches.
Stitch formation Mechanics: - Mechanism of lock stitch formation, Factors affecting yarn tension and stitch length of a seam during stitching, Mathematical model of lock stitch,
Development of yarn tension during lock stitching, Modeling of take-up arm displacement

UNIT-III (10 Hrs)

Components and Trims - Labels – linings, interlinings, wadding, lace, braid, elastic, hock and loop fastening shoulder pads, eyelets and laces, Zip fasteners and buttons.
Garment finishing & Packing machines - CNC pressing machines, Quality control in apparel production.

UNIT-IV (20 Hrs)

Apparel Production parameters – control parameters, Product Development, Time management. Breakdown of operation sequence, Development of Flow process, Grid chart for operation sequence.

Manufacturing systems & Planning – Lay out planning, Bundling and ticketing, Evaluation of production systems Capacity planning & line balancing, Capacity calculation for cutting, sewing & finishing, Machine requirements – Line Balancing techniques. Work study method, motion & time study - computer Integrated production planning & management systems.

Recommended Books:

1. Jackb Solinger, "Apparel Manufacturing Handbook", Van Nostrand Reinhold company" 1980
2. Cooklin. G. "Introduction to clothing manufactures" Blackwell science . 1995.
3. Harold Carr & B. Latham, "The Technology of clothing manufacture - Blackwell sciences 1998
4. Churter. A.J, "Introduction to clothing production management", Oseney Mead.1995.
5. Mehta P V and Bhardwaj S K " Managing Quality in Apparel Industry", New Age International (P) Ltd., Delhi-2002
6. "Garment Technology NCUTE Series", Ed. Bhattacharya A, NCUTE- IIT, Delhi,2003.
7. Aldrich W, " Metric pattern cutting", Om Book Service, Delhi-1998.

PROCESS CONTROL IN SPINNING & WEAVING

Subject Code: MTEXD1-111 **LTPC** **Duration -60 hrs**
4 0 0 4

Course Objectives

CO1: To familiarize students with Process control in spinning
CO2: To equip students with knowledge about Plant Engineering in a textile Industry
CO3: To impart knowledge of Process control in weaving
CO4: To equip students with knowledge about Process control of Textile processes in special conditions

Course Outcomes

CO1: Optimisation of quality and cost of fibres though mixing/blending.
CO2: Able to apply process and quality control tools in yarn production.
CO3: Apply modern process and quality control parameters of yarns and fabrics in production.
CO4: Able to evaluate various process and quality parameters for fabric production.

UNIT - I (15 Hrs)

Process Control in Spinning: Optimum Fibre-Mix for Various End Use Requirements, Yarn Realization, Waste Control in Blow room and Card for All Types of Fibres Spun on Cotton System, Minimizing Lea Count Variation, Controlling Yarn Irregularity, Imperfections and Faults, Yarn Tenacity and Elongation, Hairiness. Production of High Quality Export Yarns

UNIT - II (15 Hrs)

Machinery Audit, Work Load, Life of Accessories, Work Load, Indices of Productivity, Temperature and Humidity Control & Its Effect on Performance.

UNIT - III (15 Hrs)

Process Control in Weaving: Principles for Control of Productivity in Different Sections, Contribution of Control in Yarn Winding, Warping, Sizing & Weaving to The Cost of Production in Fabric Manufacture, Splicing, Machine Allocation and Load Distribution,Control of Migration in Sizing, Size Droppings, Sizing Materials, Loom Allocation, Evaluation & Grading of Fabric Defects, Control of Loom Accessories, Control of Loss of Efficiency by Snap Study.

UNIT - IV (15 Hrs)

Process Control in Special Conditions: Controls in the Process of High Twist Yarns, Blended Yarns, Filament Yarns in Warp and Weft, Controls in The Winding for Processing Yarns for Dyeing & Knitting, Controlling Sloughing Off During Winding, Warping & Weaving, On- Line Data System and Its Use In Controls.

Recommended Books

1. ATIRA, “Process Control in Spinning”.
2. ATIRA, “Process Control in Weaving”.
3. R. Chattopadhyay, “Process Control in Spinning”, IIT, NCUTE, Delhi.
4. SITRA, “Quality Contro
5. l in Spinning”.

PRODUCTION MANAGEMENT IN TEXTILE

Subject Code - MTEXD1-112 **L T P C** **Duration – 60 Hrs**
4 0 0 4

Course Objectives

CO1: To create awareness about Operation management of different manufacturing and service systems
CO2: To familiarize students with decisions about Plant Location and Lay out
CO3: To make students understand about material Management
CO4: To develop understanding about Job Evaluation and waste management

Course Outcomes

CO1: Know and examine the concepts of operation management and operations planning control.
CO2: Analyse the various aspects of plant location and layout.
CO3: Evaluate critically the concepts of Material Management, objectives, planning, MRP calculation and material handling.
CO4: Judge the role and solutions of issues like Job Evaluation and Waste Management and different types of pollution.

UNIT – I (15Hrs)

Operation Management: Operations Management in Corporate Profitability and Competitiveness, Types and Characteristics of Manufacturing and Service Systems, Operations Planning Control: Planning Production in Aggregate Terms, Quality Assurance

UNIT – II (15Hrs)

Plant Location and Layout: Plant Layout: Features, Basic Principles, Types of Layout, MeritsAnd Demerits, Optimization Of A Product/Line Layout And Process Layout. Location of Facilities: Nature of Location Decision, Situations That Influence Location Decision, Backward Areas And Industrial Policy, Behavioral Aspects In Location Planning

UNIT – III (15 Hrs)

Material Management: Purchasing, Objectives, Value Engineering, Vendor Relations,Selection of Vendors, Material Requirement Planning, MRP Calculations, Material Handling

UNIT - IV (15Hrs)

Job Evaluation and Waste Management: Job Evaluation, Incentive Schemes, Job Redesign, Work Measurement Techniques, Different Types of Pollution: Water, Air, Solid Waste, Soil, Noise, Odours etc. Pollution Caused by Textile Industries, Waste Definition, Characteristics and Perspectives, Different Types of Waste

Recommended Books

M.R. Raymond, "Production and operations management", Mcgraw-Hill internationalEdition, New York, 1993.
S.E. Buffa and R. Sarin, "Modern Production/Operations Management", John Willey andSons, Delhi, 1995.
R. Collard, "Total quality", Jaico Publishing House, Mumbai, 1988.
S.K., Sharma, Sand Sharma T, "Industrial Engineering and Operations Management",S.K. Kataria and Sons, Delhi, 1996.
S. Asolekar, "Environmental Problems in Chemical Processing of Textiles"1st Edn., NCUTE, Department of Textile Technology, IIT-Delhi, 2000.

TOTAL QUALITY MANAGEMENT

Subject Code: MTEXD1-113 **LTPC** **Duration -60hrs**
4 0 0 4

Course Objectives

CO1: To familiarize students with various dimensions and concepts related to TQM
CO2: To develop understanding about various quality processes in an organization
CO3: To equip students with knowledge about tools and Techniques of Quality Improvement.
CO4: To familiarize students with Quality Management system under ISO.

Course Outcomes

CO1: Recognise importance and framework of TQM
CO2: Appreciate and analyze TQM principles
CO3: Comprehend and appraise Tools and Techniques of TQM
CO4: Demonstrate the understanding about implementation of Quality Management System

UNIT -I(15hrs)

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II(15hrs)

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III(15hrs)

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types. Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT IV(15hrs)

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001— Benefits of EMS.

Books recommended:

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.
2. Ross E, “Total Quality Management”, Kogan Page USA, 1989.
3. Raju S S M, “Total Quality Management”,Tata Mcgraw Hill Publishing Co., 1985.
4. FiegenbaumV A, “Total Quality Management”, Mcgraw Hill International, 1990.
5. Tenner R A and Detoro JI,“Total Quality Management”, Addison–Wesley Publishing Co., 1986.

TEXTILE PRODUCT DESIGN

Subject Code: MTEXD1-121 **L T P C** **Duration - 60 Hrs**
4 0 0 4

Course Objectives

CO1: To familiarize students with various dimensions and concepts related to TQM
CO2: To develop understanding about various quality processes in an organization
CO3: To equip students with knowledge about tools and Techniques of Quality Improvement.
CO4: To familiarize students with Quality Management system under ISO.

Course Outcomes

CO1: Conceptualise process of Product development & Design
CO2: Evaluate the role of Research in Product development and Its business aspects
CO3: Organise the ideas related to Design Conceptualization and Design analysis
CO4: Execute Design optimization

UNIT-I (15 Hrs)

Concepts of Engineering, Product Development and Design, Characteristics of SuccessfulProduct Design, Product Development Process Tools, Product Architecture. Evolution ofEngineering, Engineering Attributes and Concepts

UNIT-II (15Hrs)

Basic Concepts and Critical Factors for Product Development, Simplified View of Product Development, The Product Development Cycle, Business and Marketing Aspects Related To Product Development Product-Focus Versus User-Focus Product, Development Role OfResearch in Product Development, The Core Task in Product Development

UNIT-III (15 Hrs)

The Product Design Cycle, Design Conceptualization Design Analysis, Basic Differences between Design Conceptualization and Design Analysis, General Guidelines for Design Conceptualization Basic Tools of Design Conceptualization

UNIT-IV (15 Hrs)

Purpose of Design Analysis, Optimization Analysis: Linear programming, Product Design Economics.

Recommended Books

1. Kevin Otto, & Kristin Wood, "Product Design Techniques in Reverse Engineering and New Product Development", Pearson Education Publication, 1st Edn., 2006.
2. K.T. Ulrich, "Product Design and Development", Tata McGraw Hill, 3rd Edn., 2004.

PHYSICAL PROPERTIES OF FIBRES

Subject Code: MTEXD1-122 **L T P C** **Duration – 60 Hrs**
4 0 0 4

Course Objectives

CO1: To impart knowledge about various aspects of moisture absorption by Textile material.
CO2: To develop understanding about mechanical response of textile materials
CO3: To equip students with knowledge about textile behaviour towards various agencies like friction, heat etc.
CO4: To familiarize students with fibre structure and their electrical properties.

Course Outcomes

CO1: Analyze the mechanism of moisture absorption and its influence on fibre properties
CO2: Appreciate the fibre mechanical properties under different test conditions, their analysis and applications.
CO3: Apply the knowledge about the properties like thermal, electrical, frictional properties of Fibre.
CO4: Distinguish the structural features of fibres and application of structure analysis

UNIT – I (15 Hrs)

Moisture Absorption and Desorption of Fibres, Sorption Isotherms, Heat of Sorption and Theory of Sorption, Swelling of Fibres.

UNIT - II (15 Hrs)

Mechanism of Deformation of Fibres, Principles of Elasticity and Visco-Elasticity, Stress- Strain Behaviour of Textile Fibres, Creep and Stress Relaxation. Dynamic Mechanical Properties of Fiber, Model Theory, Time Temperature Superposition Principle, Thermodynamic Analysis of Deformation.

UNIT - III (15 Hrs)

Fiber Friction, Its Nature, Theory, Application and Measurement, Unibirefringence and Its Measurement, Thermal Transition and Its Importance

UNIT – IV (15 Hrs)

Dielectric Properties of Fiber, Static Electricity and Measurement of Static Charge in Fibres,Fiber Micro Structure, X-Ray Analysis, IR Spectroscopy and SEM

Recommended Books

1. R. Meredith, 'The Mechanical Properties of Textile Fibres', North HollandPublishing Co; Amsterdam, 1959.
2. W.E. Morton and J.W.S. Hearle,"Physical Properties of Textile Fibres", 1st reprint, The Textile Institute, Manchester, 1986.
3. V.B. Gupta and V.K. Kothari, "Manufactured Fibre Technology"1st Edn., Chapman and Hall, London, 1997.
4. J.W.1.S. Hearle, Polymers and their Properties, Vol. I, John Wiley and Sons, NY, 1982.

COLORATION AND FINISHING TECHNOLOGY

Subject Code: MTEXD1-123 **L T P C** **Duration: 60 hrs**
4 0 0 4

Course Objectives

CO1: To impart knowledge about preparatory chemical process for synthetic textile materials.
CO2: To develop understanding about dyeing and printing of textile materials and their blends
CO3: To familiarize students with various finishing treatments and quality control practices in Textile chemical processing.
CO4: To equip students with knowledge about effective management of energy, water and other resources in chemical processing of Textiles.

Course Outcomes

CO1: Understand technology behind preparatory processes for manmade textiles and their blends
CO2: Learn modern approaches for dyeing and printing of manmade fibres and blends
CO3: Grasp the latest techniques of finishing processes and garment processing
CO4: Appreciate energy management and effluent treatment techniques in textile industries

UNIT- I (15hrs)

Preparatory processes for synthetic textiles and their blends. Heat setting - Mechanism and effect on properties of textiles.

UNIT II(15hrs)

Developments in dyeing of synthetic textiles and their blends. Dyeing of micro-fibres. Mass coloration of synthetic textiles. Printing of synthetic/blended textiles in direct, resist and discharge styles. Transfer printing of polyester, cotton, wool and their blends.

UNIT -III(15hrs)

Anti-crease finishes and latest development in it. Controlled application techniques. Anti-stat, soil release and flame- retardant finishes. Garment processing. Quality control in chemical processing.

UNIT- IV (15hrs)

Energy conservation, minimization of wastage of energy during chemical processing of textiles, low temperature processing of textiles. Waste water load in various areas of chemical processing and ways to reduce it.

Recommended Books:

1. Peters R H, *"Textile chemistry",* Vol. – II and III, Elsevier Publishing Company, London, 1967.
2. Nunn D M, *"The dyeing of synthetic polymer and acetate fibres",* Dyers Company Publication Trust, London, 1979.
3. Miles L W C, *"Textile printing",* Dyers Company Publication Trust, Bradford, England, 1981.
4. Hall A J, *"Textile finishing",* Haywood Books, London, 1996.
5. Bird C L and Boston W S, "The theory of coloration of textiles", Dyers Company Publication Trust, Bradford, England, 1975.
6. Smethwurst G, " Basic water treatment", IBT Publications, Delhi, 1989.

ADVANCED MECHANICAL PROCESSING LABORATORIES

Subject Code: MTEXS1-104 **L T P C** **Duration: 60 Hrs**
0 0 4 2

Course Objectives

CO1: To gain knowledge about the various types of yarn manufacturing machines.
CO2: To impart skills to develop new products.
CO3: To develop presentation skills.
CO4: To understand about the various machine faults

Course Outcomes

CO1: To study and analyse the various machines.
CO2: Able to develop new products through process optimization.
CO3: Acquire the presentation skill
CO4: Develop an idea to analyse and correct the machine faults.

List of Experiments

Exploration of product development possibilities in Spinning laboratories.
Exploration of product development possibilities in weaving laboratories
Measurement of properties of the Ring spun yarns.
Measurement of properties of the Rotor, spun yarns.
Measurement of properties of the Friction spun yarns.
Measurement of properties of the Airjet yarns.
Preparation of Fabric Samples in knitting machines and measurement of Fabric properties.
Preparation of Fabric Samples in Weaving machines and measurement of Fabric properties.
Note: A minimum 6 Experiments should be performed by the student from the above given list of experiments or experiments relevant to syllabus.

ADVANCES IN FIBER PRODUCTION TECHNOLOGIES

Subject Code: MTEXS1-201 **L T P C** **Duration - 60 Hrs**
4 0 0 4

Course Objectives

CO1: To gain knowledge about the various types of yarn manufacturing machines.
CO2: To impart skills to develop new products.
CO3: To develop presentation skills.
CO4: To understand about the various machine faults.

Course Outcomes

CO1: Create the concept of man-made fibre production, principles and factors affecting.
CO2: Understand the raw materials, monomers, equipment, mechanism used in manmade fibre spinning.
CO3: Apply the basic principles in important manmade fibres production methods, polymerization and new developments.
CO4: Analyze the effect of variables on melt spinning and study high speed spinning, micro-fibre production, solution spinning and heat setting.

UNIT – I (15 Hrs)

General Definition of Man Made or Manufactured Fibres, Introduction to General Principles of Spinning and Spinning Processes, Basic Principles of Fluid Flow during Fiber Spinning, Factors Affecting Shear Viscosity. Elongational Flow, Spinnability and Flow Instabilities

UNIT - II (15 Hrs)

Extruder Design, Spin Head, Spinneret, Quench Chamber, Spin Finish Application, Wind Up Mechanism, Manufacture and Specifications of Raw Materials and Monomers.

UNIT - III (15Hrs)

Types, Methods of Manufacture, Mechanism of Polymerisation and Production Techniques of Viscose, Nylon 6 And 66, PET, PAN And PP, Introduction to New Developments, other Fibres including PU, PVA, PE, PVC and Polyvinylidene Chloride.

UNIT-IV (15 Hrs)

Primary and Secondary Variables and Their Effect on Melt Spinning, High Speed Spinning, Spinning of Microfibre, Solution Spinning Process: Dry and Wet Spinning, Heat-Setting of Fibres

Recommended Books

1. A.A. Vaidya, "Production of Synthetic Fibres", 1st Edn., Prentice Hall of India, NewDelhi, 1988.
2. V.B. Gupta and V.K. Kothari, "Manufactured Fibre Technology", 1st Edn., Chapman and Hall, London, 1997.
3. H.F. Mark, S.M. Atlas and E. Cernia, "Man Made Fibre Science and Technology", Vol. 1,2, 3, 1st Edn., Willey Inter Science Publishers, New York, 1967.
4. J.E. Macintyre, "Synthetic Fibres", Woodhead Fibre Science Series, UK, 2003.
5. F. Fourne, "Synthetic Fibres: Machines and Equipment, Manufacture, Properties", Hanser Publisher, Munich, 1999.

STRUCTURAL MECHANICS OF YARN

Subject Code: MTEXS1-202 **LTPC** **Duration-60hrs**
4 0 0 4

Course Objectives

CO1: Learn about yarn geometry and packing density
CO2: Understand migration of fibres in yarn and mechanics of blended yarn
CO3: Analysis of breaking mechanics of yarn and yarn strength and irregularity
CO4: Structure and properties relationship of yarn

Course Outcomes

CO1: To understand and analyse the yarn structure and measurements of various parameters pertaining to yarn structure.
CO2: Able to apply applications of theoretical aspects in problem solving.
CO3: Analysis of yarn structure and relation with properties.
CO4: Able to acquire presentation skill.

UNIT-I (15 Hrs)

Elements of Yarn Geometry, Geometry of Helix and Its Application to Yarn Structure, Geometry of Folded Yarn, Yarn Diameter and Density

UNIT-II (15 Hrs)

Theoretical Analysis of Effect of Fiber Properties and Their Geometrical Configuration onthe Tensile and Bending Properties of Yarn, Theories and Analysis of Yarn Strength and Irregularity

UNIT-III (15 Hrs)

Fiber Migration Characteristics of Continuous Filament and Spun Yarns, Breakage of Continuous Filament and Spun Yarns, Effect of Properties of Constituent Fibres and Blend Composition on Behavior of Composite Yarn.

UNIT-IV (15 Hrs)

Effect of Yarn Structure on Different Properties of Yarns, Structure and Property Relationship of Ring, Rotor, Air-Jet and Friction Spun Yarns

Recommended Books

1. J.W.S. Hearle, P. Grosberg and S. Backer, “Structural Mechanics of Fibres Yarns andFabrics”,
2. Wiley Interscience, New York, 1969.
3. B.C. Goswami, J.G. Martindale and F. Scardino, “structure and applications”, Wiley Interscience Publisher, New York, 1995.
4. J.W.S. Hearle, J.J. Thwaites and J. Amirbayat, “Mechanics of Flexible Fibre Assemblies”, Sijthff and Noordh off International Publishers BV, Alphen aan den Rijn, Netherlands, 1980.

STRUCTURAL MECHANICS OF FABRICS

Subject Code: MTEXS1-203 **LTPC** **Duration-60 hrs**
4 0 0 4

Course Objectives:

CO1: Develop the concept of Mechanics applicable to textile
CO2: Understand the anatomy of woven structure.
CO3: Analyse relation with property and structure of woven and knitted fabric.
CO4: Understand the mechanics of non-woven and woven fabric.

Course Outcomes

CO1: The concepts of fabric geometry and its application.
CO2: The concepts of fabric geometry with respect to yarn shapes.
CO3: The geometry of knitted structures,
CO4: The concepts of mechanical behaviors of woven structures.

UNIT-1 (15Hrs)

Fabric Cover Factor and Its Significance, Engineering Approach for Fabric Formation, Pierce's Cloth Geometry, Practical Aspect of Cloth Geometry, Graphical Relationship in Cloth Geometry for Plain, Twill and Sateen Weaves

UNIT-II (15 Hrs)

Concept of Jammed Structure, Analysis of Racetrack Section of Yarn in Cloth Geometry, Theoretical Investigation of Weavability Limit of Yarns, Elastic Thread Model for Fabric

UNIT-III (15 Hrs)

Concept of Fabric Relaxation for Knitted Fabrics, Geometry and Properties of Weft Knitted Fabrics – Importance of Doyle's and Munden's Research, K-Values and Pierce's Geometryof Knitted Fabrics

UNIT-IV (15 Hrs)

Tensile and tearing Behaviour of Fabric, Bending Deformation of Fabric, Bending Hysteresisof Woven Fabric, Buckling, Shear And Drape Behaviour of Woven Fabric, Mechanical Properties of Nonwoven Needle Punch and Stitch Bonded Fabric, Brief Study of Formability,Tailorability and Hand of Apparel Fabric.

Recommended Books

1. J.W.S. Hearle, P. Grosberg and S. Backer, "Structural Mechanics of Fibres Yarns and Fabrics", Wiley Interscience, New York, 1969.
2. F.T. Peirce and J.R. Womersley, "Cloth Geometry", The Textile Institute, Manchester,
3. 1978.
4. J.W.S. Hearle, J.J. Thwaites and J. Amirbayat, "Mechanics of Flexible Fibre Assemblies", Sijthff and Noordhoff International Publishers BV, Alphen aan den Rijn, Netherlands, 1980.
5. J. Hu, "Structural Mechanics of Fabrics", Woodhead Publishing Co., Cambridge, UK, 2006.

KNITTING AND NONWOVEN TECHNOLOGY

Subject Code: MTEXD1-211 **LTPC** **Duration 60 hrs**

4 0 0 4

Course Objectives:

CO1: Understand the dynamics of knitting process and mechanics of loop formation.
CO2: Understand the design and performance of high speed knitting cam.
CO3: Analyse the geometry and properties of knitted fabrics.
CO4: Understand effect of machine, fibre and process variables on properties of non-woven fabrics .

Course Outcomes

CO1: Understand mechanism behind knitting process
CO2: Understand different aspects of knitting cams.
CO3: Understand geometry of knitted structures and their applications.
CO4: Understand the effects of different parameters of nonwoven manufacturing process and latest developments in nonwoven manufacturing technologies.

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UNIT-I (15hrs)

Concepts of loop formation in weft and warp knitting. Different forces acting on the needle butt and mechanics of loop formation. Study of dynamics of knitting process. Study of different machines, process and yarn parameters affecting the yarn tension in knitting zone and loop length.

UNIT-II(15hrs)

Concept of Robbing Back of yarn in loop. Study of design and performance of high speed knitting cam and increase in machine production. Yarn feeding devices on circular knitting machines.

UNIT-III(15hrs)

Geometry and properties of weft knitted fabrics –k-values and Pierce‘s geometry. Outlines of process control in knitting. Use of electronics and computers and other developments in knitting. Features of warp knitted fabrics and their usesd friction spun yarns, Strength-length relation in yarn

UNIT IV(15hrs)

Different advanced methods of production of nonwoven fabrics. Effect of machines, fibre and process variables on properties of nonwoven fabrics. Designing of nonwoven for engineering applications. Development in nonwoven machineries. Developments in various nonwoven manufacturing techniques.

Recommended Books:

1. Spencer D J, “Knitting Technology” , 2nd Ed., Pergamon Press, 1989.
2. Russell, S J, “Handbook of Nonwovens”, Woodhead Publishing Limited, Cambridge, UK, 2007
3. Lunenschloss J and Albrecht W, “Non-Woven Bonded Fabric”, Ellis and Horwood Ltd., UK, 1985
4. Albrecht W, Fuchs H and Kittelmann, “Nonwoven Fabrics”, Wiley-VCH Weinheim, 2003.
5. Journals: Textile Research Journal, Princeton, USA and Journal of Textile Institute, Manchester, UK.

POST SPINNING OPERATIONS

Subject Code: MTEXD1-212 **L T P C** **Duration – 60Hrs**
4 0 0 4

Course Objectives

CO1: To understand the concept of drawing process and its influence on filament structure and properties.
CO2: To inculcate ability to evaluate the texturing process; material and process variables and their influence.
CO3: To develop the ability to analyze the heat setting process, parameters, equipment and degree of set.
CO4: To gain knowledge in depth about the sewing threads and post spinning operation used on multifilament sewing threads

Course Outcomes

CO1: Create the concept of drawing process and its influence on structure and properties of filament.
CO2: Evaluate the texturing process for fibres; material and process variables and their influence.
CO3: Analyze the heat setting process, parameters, equipment and degree of set.
CO4: Understand about the sewing threads, properties and post spinning operations

UNIT-I (15 Hrs)

Drawing: Drawing Process, Neck Drawing, Initiation and Propagation of Neck, Neck Stabilization. Natural Draw Ratio, Effect of Temperature and Strain Rate on Neck Drawing, Prediction of Neck Formation, Influence of Drawing on Structure and Properties of Filament,Spin - Draw process.

UNIT-II (15 Hrs)

Texturing: Texturing and Warping Process, Material and Process Variables in Texturing and Their Influence on Yarn Quality, Recent Advances in Texturing, Testing and Evaluation of Textured Yarn Properties of Fabrics Made from Textured Yarn.

UNIT-III (15Hrs)

Heat Setting: Heat Setting Process, Parameters for Heat Setting, Equipment for Heat Settingand Evaluation of Degree of Set.

UNIT-IV (15 Hrs)

Multifilament Sewing Threads: Post Spinning Operation on Multifilament Sewing Threads

Recommended Books

1. V.B. Gupta and V.K. Kothari, “Manufactured Fibre Technology”, 1st Edn., Chapman and Hall, London, 1997.
2. H.F. Mark, S.M. Atlas, E. Cernia, “Man Made fibre Science and Technology”, 1stEdn.,Vol. I, II, III, Willey Interscience Publishers, NewYork, 1967.
3. Macintyre J E, “Synthetic Fibres”, Woodhead Fibre Science Series, UK, 2003
4. F. Fourne, “Synthetic Fibres: Machines and Equipment, Manufacture, Properties”, Hanser Publisher, Munich, 1999.

ENVIRONMENTAL PRACTICES IN TEXTILES

Subject Code: MTEXD1-213 **L T P C** **Duration – 60 Hrs**
4 0 0 4

Course Objectives

CO1: To enable students to understand Environment Quality and role of an Environmental Engineer.
CO2: To create awareness about Types of pollution caused by Textile manufacturing proceses.
CO3: To gain knowledge about Different types of waste and its management in a Textile Plant.
CO4: To familiarize students with Characters of Textile effluents and their treatment.

Course Outcomes

CO1: Understand and Define the contribution of an engineer towards Environment Quality.
CO2: Get Acquainted with the types of pollution caused by Textile Industry.
CO3: Understand the types of Textile wastes and their disposal.
CO4: Appreciate the Textile Effluent treatment techniques.

UNIT – I (15 Hrs)

Introduction to Environment, The Impact of Human upon the Environment, Improvement of Environment Quality, Role of Environmental Engineer.

UNIT - II (15 Hrs)

Different Types of Pollution: Water, Air, Solid Waste, Soil, Noise, Odours etc. Pollution Caused by Textile Industries.

UNIT – III (15 Hrs)

Waste: Definition, Characteristics and Perspectives, Different Types of Waste. Waste Water Collection, Treatment and Disposal, Solid Waste Generation, Collection and Disposal.

UNIT-IV (15 Hrs)

The Textile Effluents, Textile Waste Characteristics, Textile Waste Water Problems,Chemicals Used in Textile Industry, Treatment of Textile Effluents and its Testing.

Recommended Books

1. S. Asolekar, “Environmental Problems in Chemical Processing of Textiles”,1st Edn.,NCUTE, Department of Textile Technology, IIT-Delhi, 2000.
2. V. Padma, “Textile Effluents” 1st Edn.,. NCUTE, Department of Textile Technology, IIT-Delhi, 2002.
3. B. Edmund, “The Treatment of Industrial Wastes” 2nd Edn., Tata McGraw-Hill, NewDelhi, 1976.
4. M.N. Rao, “Environmental Engineering” 2nd Edn., Tata McGraw-Hill, New Delhi,
5. 1993.

HIGH PERFORMANCE FIBRES AND COMPOSITES

Subject Code: MTEXD1-221 **L T P C** **Duration - 60 Hrs**
4 0 0 4

Course Objectives:

CO1: Understand the various techniques for development/fabrication of composite structure.
CO2: Learn the details about the fibres used for composite.
CO3: Gain Knowledge about Carbon based composites.
CO4: Understand the properties and applications of composite and Nano Composites.

Course Outcomes

CO1: Understand the concepts behind composites.
CO2: Understand the applications of different fibres as a preform in composites.
CO3: Understand the manufacturing of high-performance composites/
CO4: Understand the application of different nanomaterials in composites and their applications.

UNIT– I (15 Hrs)

Definition of Composite, General Introduction to Fibres and Resins for Composites,Composite Fabrication Techniques, Matrices and Inter phase.

UNIT– II (15 Hrs)

Polyamide Fibres: Aliphatic Polyamide (N6 and 66) and Their Application in Rubber Tyre.Fully Aromatic Polyamides or Aramid Fibres (Nomex And Kevlar), Their Manufacture, Structure, Properties and Applications

UNIT-III (15 Hrs)

Carbon Fibres: Different Precursors, Preoxidation, Carbonization, Graphitization, Structureand Properties. Application in Composite. Flexible Chain High Performance Fibres, Manufacture and Application in Composite. Glass fiber, Manufacture, Properties and Applications in Composite.

UNIT-IV (15 Hrs)

Nanocomposite: Introduction, Advantages and Different Nano-materials Commonly Used as Fillers Carbon Nanotubes, Carbon Nano-fibres and Nano Clay.

Recommended Books

1. N.G. Mc Crum, C.P. Buckley and C.B. Bucknall, “Principle of Polymer Engineering”, Oxford University Press, New York, 1990.
2. Ed. J.W. Stteare, “High Performance Fibres”, Woodhead Publishing Co., England, 2001.
3. D. Hull, “An Introduction to Composite Materials”,Cambridge University Press,UK, 1981.
4. H. Broody, “Synthetic Fiber Materials”, Longman Scientific and Technical, UK,
5. 1994.

ADVANCED GARMENTS MANUFACTURING TECHNOLOGY

Subject Code: MTEXD1-222 **LTPC** **Duration- 60 Hrs**
4 0 0 4

Course Objectives:

CO1: To enable students to understand the importance of automation in cutting and stitching machines.
CO2: To give knowledge various finishing machines used in garment construction.
CO3: To enable students to understand the importance of automation in material handling.
CO4: To enable students to understand the importance of robotics in garment construction process.

Course Outcomes

CO1: Acquire details about basic designing and pattern making, Discuss the process and machineries for the marker planning, spreading and lay planning automation in sewing machine.
CO2: To understand and analyse the importance of automation in apparel finishing
CO3: To understand and analyse the importance of automation in Material handling.
CO4: To understand and analyse the importance of robotics in apparel Industruy.

UNIT-I(20hrs)

AUTOMATION IN APPAREL DESIGNING AND FIT ANALYSIS

Automated elements in clothing production - cutting of fabric - cutting by water jet, laser, plasma - automated sewing machines - Types of driving mechanism of sewing machines – single needle lock stitch machine, over lock and flat lock machine. Automation in special machines – bar tack, pocket making and patterning machines, button holing and sewing machines.

UNIT-II (10hrs)

AUTOMATION IN APPAREL FINISHING:

Automation in fusing, pressing and folding machines. Automation in apparel packing equipments.

UNIT-III(15hrs)

AUTOMATION IN MATERIAL HANDLING

Types of equipment- Automated storage and retrieval systems- Overview of conceptions of “Work Robots” and “Manipulators”. Conveyor systems – UNIT production systems. Ply separation; Transportation - position and orientation, pick and place – clamping grippers and pinch grippers.

UNIT-IV(15hrs)

ROBOTICS IN APPAREL INDUSTRY

Robotics in spreading and cutting; Robotics in sewing – double lock stitching, one side stitching, Tufting; Robotics for material handling; Robots as 2D and 3D folding machines.

Recommended Books:

1. Cooklin Gerry, “Garment Technology for fashion Designers”, Om Book Service Delhi,1997.
2. Carr Harold and Barbara, “The Technology of clothing Manufacture”,Om Book Service,Delhi,1998
3. Mehta P V and Bhardwaj S K “ Managing Quality in Apparel Industry”, New Age International (P) Ltd., Delhi-2002
4. “Garment Technology NCUTE Series”, Ed.Bhattacharye A, NCUTE- IIT, Delhi,2003.
5. Aldrich W, “ Metric pattern cutting”, Om Book Service, Delhi-1998.
6. Wilson J, “ Hand book of Textile Design”, Woodhead publishing Ltd., UK, 2002.

TECHNICAL TEXTILES

Subject Code: MTEXD1-223 **LTPC** **Duration- 60 Hrs**
4 0 04

Course Objectives

CO1: To understand the current scenario of technical textile.
CO2: To familiarize students with various application of technical textile.
CO3: To able to design and develop a product as per end use.
CO4: To impart knowledge regarding the performance and its analysis of technical Textile.

Course Outcomes

CO1: To analyse the role of technical textiles in modern are
CO2: To apply Technical Textiles in diversified fields.
CO3: Ability to design a product as per the specific requirements for end uses.
CO4: Characterization of products and their performance.

UNIT-I(15hrs)

Definition and Scope for Technical Textiles, Brief Idea about Technical Fibres, Role of Yarn and Fabric Construction. Filtration Textiles: Definition of Filtration Parameters, Filtration Requirements

UNIT-II(15hrs)

Geotextiles: Brief Idea about Geosynthtics and Their Uses, Essential Properties of Geotextiles, Geotextiles Testing and Evaluation, Application Examples of Geotextiles. Medical Textiles: Classification of Medical Textiles, Description of Different Medical Textiles.

UNIT-III(15hrs)

Protective Clothing: Brief Idea about Different Type of Protective Clothing, Functional Requirement of Textiles in Defence including Ballistic Protection Materials and Parachute Cloth, Flame Retardant Clothing, Chemical Protective Clothing, Sports Textiles, functional requirement of sports textiles.

UNIT-IV(15hrs)

General Technical Textile: Textiles in Agriculture, Electronics, Power Transmission Belting, Hoses, Canvas Covers and Tarpaulins.

Recommended Books:

1. “Handbook of Technical Textiles”, Ed. A R Horrocks and S C Anand, Woodhead Publication Ltd., Cambridge, 2000.
2. “Wellington Sears Handbook of Industrial Textiles”, Ed. Sabit Adanaur, Technimic Publishing Company, Inc., Pennsylavania, USA, 1995.
3. Shukla S K, Yin Jian-hua, Fundamentals of Geosynthetic Engineering, Taylor & Francis, 2006, UK.
4. “Modern Textile Characterization Methods”, Ed. M Raheel, Marcel Dekker, Inc., 1996.
5. Nonwoven Fabrics; Ed. W. Albrecht, H. Fuchs, and W. Kittelmann, WLLEY VCH Publication, 2003, UK.

ADVANCED TEXTILE TESTING LAB

Subject Code: MTEXS1-204 **LPTC** **Duration-60 hrs**
0 0 4 2

Course Objectives.

CO1: To develop understanding of different quality parameters and its applications.
CO2: To impart knowledge of modern instruments for testing of fibre and yarn.
CO3: To impart knowledge of modern instruments for fabric testing.
CO4: To able to implement various quality tools.

Course Outcomes

CO1: To evaluate various aspects of quality parameters and its role in modern era.
CO2: To access fibre and yarn quality by modern instruments for domestic and international market.
CO3: To estimate various fabrics quality parameters by modern instruments.
CO4: Able to implement various quality control tools.

No. of Experiments

Evaluation of tensile and compressional characteristics of different woven fabric.
Evaluation of tensile and compressional characteristics of different nonwoven fabric.
Assessment of yarn diameter, yarn structure using image analysis method.
Evaluation and analysis of HVI data for differently graded cotton material.
Evaluation and analysis of tearing strength of fabric using universal tester
Evaluation and analysis of tearing strength of fabric using Elmendrof tear tester.
Evaluation and analysis of AFIS data for differently graded cotton material
Evaluation and analysis of Classimate data for differently graded cotton material

Note: A minimum 6 Experiments should be performed by the student from the above given list of experiments or experiments relevant to syllabus.

RESEARCH METHODOLOGY AND IPR

Subject Code - MREMI0-101 **LTPC** **Duration-60 hrs**
4 0 0 4

Course Objectives: To make the students to:

CO1: Understand that how to formulate a research problem, analyze research related information, follow research ethics, and to design experiments.
CO2: To learn to collect or sample data, process it and validate results etc.
CO3: Do effective literature studies and develop a research proposal.
CO4: Understand the need of information about Intellectual Property Right (IPR) in general & engineering in particular.
CO5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D.

Course Outcomes: At the end of this course, students will be able to:

CO1: Formulate a research problem, analyze research related information, and follow research ethics and design experiments.
CO2: Collect, sample, scale, validate and process data.
CO3: To do literature survey effectively and develop a good research proposal.
CO4: Motivated to do research work and invest in R & D to create new and better products for economic growth and social benefits.

UNIT-I (15 Hrs.)

Research Problem: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, Approaches of investigation of solutions for research problems, Data collection, Analysis, Interpretation, Necessary instrumentation.
Design of Experiment: Basic Principal of Experimental Design, Randomized Block, Completely Randomized Block, Latin Square, Factorial Design.
Hypothesis: Types, Formulation of Hypothesis, Feasibility, Preparation and Presentation of Research Proposal.

UNIT-II (15 Hrs.)

Sources of Data: Primary and Secondary, Validation of Data
Data Collection Methods: Questionnaire Designing, Construction
Sampling Design & Techniques – Probability Sampling and Non Probability Sampling.
Scaling Techniques: Meaning & Types.
Reliability: Test–Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability.
Validity: Content Validity, Criterion Related Validity and Construct Validity.
Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation.

UNIT-III (10 Hrs.)

Literature Survey: Importance of literature survey - Sources of information - Assessment of quality of journals and articles - Information through internet. Literature Review: Need of review - Guidelines for review - Record of research review.
Effective Literature Studies Approaches: Analysis Plagiarism, Research ethics, Effective technical writing, Essentials of report writing, Report Format, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-IV (20 Hrs.)

Nature of Intellectual Property: Patents, Designs, Trade and Copyright, Process of Patenting and Development: Technological research, Innovation, Patenting, development, Introduction to international Scenario on Intellectual Property, Procedure for grants of patents, Patenting under PCT.

Patent Rights: Scope of Patent Rights, Licensing and transfer of technology, Patent information and databases, Introduction to patent searching and World Intellectual Property Organization (WIPO).

New Developments in IPR: Administration of Patent System. New developments in IPR: introduction to IPR of Biological Systems, Computer Software etc. Traditional Knowledge Case Studies, IPR or IITs.

Recommended Books:

1. Stuart Melville and Wayne Goddard, 'Research Methodology: An Introduction for Science & Engineering Students', Juta & Co. Ltd., 1996.
2. Ranjit Kumar, 2nd Edn., 'Research Methodology: A Step by Step Guide for Beginners'.
3. C.R Kothari, "Research Methodology, Methods & Techniques", New Age International Publishers, New Delhi, 2004.
4. R. Ganesan, 'Research Methodology for Engineers', MJP Publishers, Chennai, 2011.
5. Ratan Khananabis and Suvasis Saha, "Research Methodology", Universities Press, Hyderabad, 2015.
6. Vijay Upagade and Aravind Shende, 'Research Methodology', S. Chand & Company Ltd., New Delhi, 2009.
7. G. Nageswara Rao, 'Research Methodology and Quantitative methods', BS Publications, Hyderabad, 2012.
8. Debora J. Halbert, 'Resisting Intellectual Property', Taylor & Francis Ltd., 2005, DOI https://doi.org/10.4324/9780203799512.
9. Robert P. Merges, Peter S. Menell, Mark A. Lemley, 'Intellectual Property in New Technological Age', 2016.
10. T. Ramappa, 'Intellectual Property Rights Under WTO', S. Chand, 2008.

PROJECT

Subject Code: MTEXS1-302

L	T	P	C
0	0	-	6

Course Objectives: To learn, practice, and critique effective scientific writing and to formulate the research objectives clearly, state claims and evidence clearly, assess validity of claims, evidence, outcomes, and results.

Course Outcomes:

1. Execute a meaningful research project that demonstrates spatial thinking and uses the knowledge and skills.
2. Able to learn effectively record data and experiments so that others can understand them.
3. Communicate the findings by means of a thesis, written in the format specified by the department/institute.

Each student will be required to complete a Dissertation and submit a written report on the topic on any of the areas of modern technology related to Textile Engineering including interdisciplinary fields in the final semester of M. Tech Course.

SEMINAR

Subject Code: MTEXS1-303

L	T	P	C
0	0	2	1

Course Outcomes

Student should undertake in depth independent study of a topic. The study should be carried out under the guidance of a faculty member. The subject area chosen by the student should be sufficiently different from the area of project being pursued by the student. The evaluation will be based on the report, seminar and viva- voce.

Maharaja Ranjit Singh Punjab Technical University
Bathinda-151001

FACULTY OF ENGINEERING AND TECHNOLOGY

SYLLABUS

FOR

M.TECH. ELECTRICAL ENGINEERING (POWER SYSTEM)
2022 BATCH ONWARDS

(For Full-Time and Part-Time Modes)

Study Scheme for M.Tech Regular Programme

1st Semester		Contact Hrs.			Marks			Credits
Subject Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-101	Advanced Power System Analysis	4	0	0	40	60	100	4
MELES2-102	Electrical Power Distribution System	4	0	0	40	60	100	4
MELES2-103	Electric and Hybrid Vehicles	4	0	0	40	60	100	4
MELES2-104	Power System Lab - I	0	0	4	60	40	100	2
Departmental Elective-I		4	0	0	40	60	100	4
MELED2-111	Restructured Power Systems							
MELED2-112	Energy Management and Energy Auditing							
MELED2-113	Artificial Intelligence Techniques							
Departmental Elective-II		4	0	0	40	60	100	4
MELED2-121	Industrial Load Modeling and Control							
MELED2-122	Advanced AC/DC LV/MV Drive Systems							
MELED2-123	Power System Transients							
Total		**20**	**0**	**4**	**260**	**340**	**600**	**22**

2nd Semester		Contact Hrs.			Marks			Credits
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-201	Advanced Protection of Power System	4	0	0	40	60	100	4
MELES2-202	Power System Dynamics & Stability	4	0	0	40	60	100	4
MELES2-203	Smart Grids	4	0	0	40	60	100	4
MELES2-204	Power System Lab-II	0	0	4	60	40	100	2
Departmental Elective-III		4	0	0	40	60	100	4
MELED2-211	Power Quality							
MELED2-212	FACTS and Custom Power Devices							
MELED2-213	Digital Transformation in Industry							
Departmental Elective-IV		4	0	0	40	60	100	4
MELED2-221	Renewable Energy System and Distributed Generation							
MELED2-222	SCADA System and Applications							
MELED2-223	Optimization Techniques for Power Engineering							
Total		**20**	**0**	**4**	**260**	**340**	**600**	22

3rd Semester		Contact Hrs.			Marks			Credits
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-301	Project	0	0	--	60	40	100	6
MELES2-302	Seminar	0	0	2	100	--	100	1
MREMI0-101	Research Methodology & IPR	4	0	0	40	60	100	4
XXXXXX	Open Elective – (To be selected from the list of PG open electives from emerging technical areas and not from Humanities and Social Sciences)	3	0	0	40	60	100	3
Total		**7**	**0**	**2**	**240**	**160**	**400**	14

4th Semester		Contact Hrs.			Marks		
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext**	**Total**
MELES2-401	Dissertation	--	--	--	**Satisfactory / Not Satisfactory as per CBCS-2016**		
Total		**--**	**--**	**--**	**--**		

Study Scheme for M.Tech. Part-Time Programme

1st Semester		Contact Hrs.			Marks			Credits
Subject Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-102	Electrical Power Distribution System	4	0	0	40	60	100	4
MELES2-103	Electric and Hybrid Vehicles	4	0	0	40	60	100	4
Departmental Elective-I		4	0	0	40	60	100	4
MELED2-111	Restructured Power Systems							
MELED2-112	Energy Management & Energy Auditing							
MELED2-113	Artificial Intelligence Techniques							
Total		**12**	**0**	**0**	**120**	**180**	**300**	**12**

2nd Semester		Contact Hrs.			Marks			Credits
Subject Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-101	Advanced Power System Analysis	4	0	0	40	60	100	4
MELES2-104	Power System Lab - I	0	0	4	60	40	100	2
Departmental Elective-II		4	0	0	40	60	100	4
MELED2-121	Industrial Load Modeling and Control							
MELED2-122	Advanced AC/DC LV/MV Drive Systems							
MELED2-123	Power System Transients							
Total		**8**	**0**	**4**	**140**	**160**	**300**	10

3rd Semester		Contact Hrs.			Marks			Credits
Subject Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-201	Advanced Protection of Power System	4	0	0	40	60	100	4
MELES2-203	Smart Grids	4	0	0	40	60	100	4
Departmental Elective-III		4	0	0	40	60	100	4
MELED2-211	Power Quality							
MELED2-212	FACTS and Custom Power Devices							
MELED2-213	Digital Transformation in Industry							
Total		**12**	**0**	**0**	**120**	**180**	**300**	**12**

4th Semester		Contact Hrs.			Marks			Credits
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-202	Power System Dynamics & Stability	4	0	0	40	60	100	4
MELES2-204	Power System Lab-II	0	0	4	60	40	100	2
Departmental Elective-IV		4	0	0	40	60	100	4
MELED2-221	Renewable Energy System & Distributed Generation							
MELED2-222	SCADA System & Applications							
MELED2-223	Optimization Techniques for Power Engineering							
Total		**8**	**0**	**4**	**140**	**160**	**300**	**10**

5th Semester		Contact Hrs.			Marks			Credits
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MELES2-301	Project	0	0	--	60	40	100	6
MELES2-302	Seminar	0	0	2	100	--	100	1
MREMI0-101	Research Methodology & IPR	4	0	0	40	60	100	4
XXXXXX	Open Elective – (To be selected from the list of PG open electives from emerging technical areas and not from Humanities and Social Sciences)	3	0	0	40	60	100	3
Total		**7**	**0**	**2**	**240**	**160**	**400**	**14**

6th Semester		Contact Hrs.			Marks		
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**
MELES2-401	Dissertation	--	--	--	**Satisfactory / Not Satisfactory as per CBCS-2016**		
Total		**--**	**--**	**--**	**--**		

ADVANCED POWER SYSTEM ANALYSIS

Subject Code: MELES2-101 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: Students will be able to:
Study various methods of load flow and their advantages and disadvantages.
Understand how to analyze various types of faults in power system.
Understand power system security concepts and study the methods to rank the contingencies.
Understand need of state estimation and study simple algorithms for state estimation.
Study voltage instability phenomenon.
Course Outcomes: Students will be able:
To do load flow analysis using various methods and economic operation of power system.
To calculate fault currents.
To know about automatic generation and voltage control.
To rank various contingencies according to their severity for security analysis.
To estimate state of power system by various methods.

UNIT-I (15 Hrs.)

Load Flow: Network modeling, Overview of Newton-Raphson, Gauss-Siedel, Decoupled and Fast decoupled methods, convergence properties, three-phase load flow, AVR in load flow.
Economic operation of Power System:
Economic dispatch including transmission losses using lambda iteration method, Solution of Coordination Equations, Formulation of optimal power flow-solution by Gradient Method, Newton's method.
Unit Commitment: Constraints in unit commitment (UC), Methods for UC; Priority list method and Dynamic programming.

UNIT-II (15 Hrs.)

Fault Analysis: Analysis of balanced and unbalanced three phase faults, Fault calculations, Short circuit faults, Open circuit faults, Generalized method of fault analysis.
Digital Techniques in Fault Calculations: Algorithm for formulation of bus impedance matrix, Equations and Flow chart for short circuit studies, Calculation of line currents, mutually coupled branches in Z_{BUS}.

UNIT-III (15 Hrs.)

Automatic generation control: Introduction, Load frequency control (single area and Two area) and economic dispatch control, Optimal load frequency control, Load frequency control with generation rate constraints,
Voltage Control: Effect of reactive power transmission on voltage, Surge impedance loading and voltage stability limit, P-V curve and V-Q curve, Voltage collapse, Prevention of voltage collapse, Voltage collapse proximity indices, Automatic voltage control of alternator.

UNIT- IV (15 Hrs.)

Security Analysis: Factors affecting power system security, Security state diagram, Contingency analysis, Sensitivity factors; generator shift distribution factors, line outage distribution factors, multiple line outages, Overload performance index ranking.
State Estimation: Introduction to power system state estimation, Weighted least squares estimation, State estimation of an AC network, State estimation by orthogonal decomposition and its algorithm, Detection and identification of bad measurements, Virtual and pseudo measurements, network observability and Pseudo-measurements, Application of power systems state estimation.

Recommended Books:

1. A.J. Wood, Bruce F. Wollenberg, 'Power Generation, Operation and Control', John Wiley, **2009.**
2. D.P. Kothari & I.J. Nagrath, Modern Power System Analysis, Tata McGraw Hill, 2012.
3. J.J. Grainger and W.D. Stevenson, 'Power System Analysis', McGraw Hill, **2003**.
4. R. Bergen and Vijay Vittal, 'Power System Analysis', Pearson, **2000**.
5. L.P. Singh, 'Advanced Power System Analysis and Dynamics', New Age International, 2006.
6. G.L. Kusic, 'Computer aided Power System Analysis', Prentice Hall India, **1986**.
7. P.M. Anderson, 'Faulted Power System Analysis', IEEE Press, **1995**.
8. J. Arrillaga and C.P. Arnold, 'Computer Analysis of Power Systems', John Wiley and Sons, NewYork, 1997.
9. M.A. Pai, 'Computer Techniques in Power System Analysis', Tata McGraw hill, New Delhi, 2006.
10. Dr. B.R. Gupta, Power System Analysis and Design, S. Chand & Company, 2014.

ELECTRICAL POWER DISTRIBUTION SYSTEM

Subject Code: MELES2-102 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: Students will be able to:
Learning about power distribution system.
Learning of SCADA System.
Understanding Distribution Automation.
Course Outcomes: Students will be able to:
Understand of power distribution system.
Study of Distribution automation and its application in practice.
To learn SCADA system.

UNIT-I (15 Hrs.)

System Planning: Introduction, Distribution system planning, Factors affecting system planning, present planning techniques, planning models, Introduction to optimum line network, future trends in planning, systems approach, distribution automation.
Load Characteristics: Basic definitions, Relation between load and loss factors, Maximum diversified demand, Distribution of Power, Management, Power Loads, Load Forecasting Short-term & Long- term, Power system loading, Technological forecasting.

UNIT-II (15 Hrs.)

System Design and Operation: Criteria, system developers, dispersed generation, distribution systems, economics and finance, mapping, Design of substation and feeder, Operation criteria voltage measurements, harmonics, load variations, system losses, Introduction to energy management.
Calculation of Optimum Number of Switches, Capacitors, Optimum Switching Device Placement in Radial Distribution Systems, Sectionalizing Switches – Types, Benefits, Bellman's Optimality Principle, Remote Terminal Units, Energy efficiency in electrical distribution & Monitoring.

UNIT-III (20 Hrs.)

Distribution Automation: Advantages of Distribution Management System (D.M.S.) Definition, Restoration/Reconfiguration of Distribution Network, Different Methods and Constraints, Power Factor Correction.
Maintenance of Automated Distribution Systems: Difficulties in Implementing Distribution, Automation in Actual Practice, Urban/Rural Distribution, Energy Management, introduction to AI techniques applied to Distribution Automation.
Voltage Regulation and Automation: Quality of Service and Voltage Standards, Voltage Control, Line Drop Compensation, Distribution capacitor automation, Voltage fluctuations,
SCADA and Communication with Load Dispatch Centers: Interconnection of Distribution, Control & Communication Systems, Remote Metering, Smart meter and Automatic Meter Reading and its implementation.

UNIT-IV (10 Hrs.)

Distribution System Protection: Objective of distribution system protection, high impedance faults coordination of protective devices: fuse to fuse co-ordination, re-closer to re-closer coordination, re-closer to fuse coordination, re-closer to substation transformer high side fuse coordination, fuse to circuit breaker coordination, re-closer to circuit breaker coordination, Lightning protection.

Recommended Books:

1. A.S. Pabla, 'Electric Power Distribution', 6th Edn., Tata McGraw Hill Publishing Co. Ltd., 2011
2. M.K. Khedkar, G.M. Dhole, 'A Text Book of Electrical Power Distribution Automation', University Science Press, New Delhi.
3. Anthony J. Panseni, 'Electrical Distribution Engineering', CRC Press.
4. James Momoh, 'Electric Power Distribution, Automation, Protection & Control', CRC Press.
5. Gonen, Turan, 'Electric Power Distribution System Engineering', CRC PRESS, Third Indian Reprint, **2012**.
6. Thomas Allen Short , 'Electric Power Distribution Handbook'**.**

ELECTRIC AND HYBRID VECHILES

Subject Code: MELES2-103 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: Students will be:
Introduced to conventional and hybrid electric vehicles.
Introduced to the Electric Propulsion unit and DC/AC drives.
Made familiar with electric and hybrid drive trains and sizing of the drive system.
Able to learn about energy storage in Hybrid and Electric Vehicles.
Course Outcomes: Students will be able to:
Acquire knowledge about conventional and hybrid electric vehicles.
Acquire knowledge about Electric Propulsion unit and DC/AC drives.
Match the electric machine and the internal combustion engine.
Estimate about energy storage requirements in Hybrid and Electric Vehicles.

UNIT-I (10 Hrs.)

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, Mathematical models to describe vehicle performance.
Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II (20 Hrs.)

Electric Propulsion Unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives.
Introduction to DC Motor Drives: Review of Four quadrant operation of a DC machine; Steady-state operation of multi-quadrant chopper fed DC drive, regenerative braking, Introduction to various PM motors, BLDC and PMSM drive configurations and their speed and torque control.
Introduction to AC Motor Drives: Voltage fed inverter control-V/f control, Vector control, direct torque and flux control (DTC) of induction machines, Open loop v/f control, vector control, direct torque control of synchronous motor drives.

UNIT-III (15 Hrs.)

Electric Drive-Trains: Basic concept of electric traction, Various electric drive-train topologies, Power flow control in electric drive-train topologies, Fuel efficiency analysis.
Hybrid Electric Drive-Trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.
Sizing the Drive System: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology.

UNIT-IV (15 Hrs.)

Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices.
Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies.

Recommended Books:

1. Iqbal Hussain, 'Electric and Hybrid Vehicles', CRC Press, 2nd Eddition, 2010.
2. A.K. Babu, 'Electric and Hybrid Vehicles', Khanna Publishers, 2019.
3. Sira -Ramirez, R. Silva Ortigoza, 'Control Design Techniques in Power Electronics Devices', Springer.
4. Siew-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, 'Sliding Mode Control of Switching Power Converters'.

POWER SYSTEM LAB-I

Subject Code: MELES2-104 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives: To make the students able:
To do the load flow analysis using various methods.
To plan the economic operation of power systems by finding optimum loading schedule of the generators and to optimally commit the generating units.
To calculate fault currents.
To evaluate transient stability of single/ multi-machines connected to infinite bus.
To simulate automatic generation and voltage control and load frequency control.
Course Outcomes: Students will be able to use the relevant software for programming:
To do the load flow analysis using various methods.
To plan the economic operation of power systems by finding optimum loading schedule of the generators and optimal unit commitment.
To calculate fault currents. Also, to evaluate transient stability of machines connected to infinite bus.
To simulate automatic generation control and load frequency control.

LIST OF EXPERIMENTS
NOTE: Students should be made familiar with one or more available programming language/software like MATLAB, ETAP, GAMS, Power System Toolbox, Power world Simulator, Network Simulator, LABVIEW, etc. so as to develop programs using one or more of these for:

1. Review of basics of the available programming language.
2. Load flow analysis by using Gauss Seidel (G-S) method.
3. Load flow analysis by using Newton-Raphson (N-R) method.
4. Load flow analysis by using decoupled and fast decoupled N-R method.
5. Short circuit Fault analysis.
6. Economic dispatch of power generation.
7. To find optimum loading of generators neglecting transmission losses.
8. To find optimum loading of generators with penalty factors.
9. Optimal unit commitment.
10. Simulink model of single area load frequency control with and without PI controller.
11. Simulink model for two area load frequency control.
12. Simulink model for evaluating transient stability of single/multi machine connected to infinite bus.
13. Simulation of automatic generation control.

RESTRUCTURED POWER SYSTEM

Subject Code: MELED2 – 111 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: To make the students to:
To introduce the concept of restructuring of the electricity market and its components
To make the students familiar about the deregulation of the electricity market
To introduce the concept of the Competitive Wholesale Electricity Markets
To make the students familiar about Transmission Open Access in electricity markets
Course Outcomes: Students will be able to:
To describe the process of restructuring of the electricity market
To understand the process of deregulation of the electricity market
To understand concept, types and challenges in Competitive Wholesale Electricity Markets
To understand the concept of Transmission Open Access in electricity markets

UNIT-I (15 Hrs.)

Components of Restructured Power System
Introduction, The Traditional Power Industry, Motivations for Restructuring the Power Industry, Unbundling Generation, Transmission and Distribution, Components of Restructured Power System (BOT Plant Operators & Contracted IPPs, Discos & Retailers, Transmission Owners (TOs), Independent System Operator (ISO), Power Exchange (PX), Scheduling Coordinators (SCs), PX Functions and Responsibilities, California Power Exchange, ISO Functions and Responsibilities, Classification of ISO types.

UNIT-II (15 Hrs.)

Deregulation of Electric Utilities
Introduction of Deregulation, Traditional Central Utility Model, Reform Motivations, Separation of Ownership and Operation, Central Dispatch Versus Market Solution, Competition and Direct Access in the Electricity Market (Energy Market and Auction Mechanisms), Direct Access/Wheeling, Independent System Operator (Pricing and Market Clearing, Risk Taking), Retail Electric Providers, Different Experiences of deregulation of England & Wales, Norway, California, Scotland, The European Union and Germany and New Zealand.

UNIT-III (15 Hrs.)

Competitive Wholesale Electricity Markets:
Introduction, Wholesale Electricity Market Characteristics (Small Test System, Central Auction, Bidding, Market Clearing and Pricing, Market Timing, Sequential and Simultaneous Markets, Bilateral Trading, Scheduling, Gaming, Ancillary Services, Physical and Financial Markets), Market models (Maximalist ISO, Minimalist ISO Model), Challenges (Market Power Evaluation and Mitigation, System Capacity, Reliability, Technical Issues).

UNIT-IV (15 Hrs.)

Transmission Open Access
Introduction, Trading Arrangements (The Pool, Pool and Bilateral Trades, Multilateral Trades) Transmission Pricing in Open-access Systems (Introduction, Rolled-in Pricing Methods. Incremental/ Marginal Pricing Methods, Embedded Cost Recovery, Transmission Pricing Method in the NGC & UK), Open Transmission System Operation, Dispatch, Transmission Loss Compensation (System Control, Ancillary Service Provision), Congestion Management in Open-access Transmission Systems (Normal Operation, Integrated Transmission Dispatch Strategy, Illustration Using a Small Power System), Open Access Coordination Strategies (Price Elasticity, ISO Executed Price Signalling, Coordination between Transactions, Illustration of Transaction Procedure and Integrated Coordination Procedure)

Recommended Books:

1. Loi Lei Lai, 'Power System Restructuring and Deregulation', John Wiley & Sons Ltd., 2002.
2. Lorrin Philipson, H. Lee Willis, 'Understanding Electric Utilities and De-regulation', Marcel Dekker, 1998.
3. **Gan Donghan Feng; Jun Xie, 'Electricity Markets And Power System Economics by; T&F India.**
4. Kankar Bhattacharya, Jaap E. Daadler, Math H.J. Boolen, 'Operation of Restructured Power Systems', Kluwer Academic Pub.,2001.
5. Mohammad Shahidehpour, Muwaffaq Alomoush, 'Restructured Electrical Power Systems: Operation, Trading and Volatility', Marcel Dekker.

ENERGY MANAGEMENT AND ENERGY AUDITING

Subject Code: MELED2 – 112 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: Students will be able to:
To understand the need for energy auditing
Understanding of various loads involved based on power consumption for auditing
To know about different audit instruments used in practice.
Course Outcomes: Students will be able:
To acquire the skills and techniques required to implement energy management. Able to perform Basic Energy Audit in an Organization.
To calculate different types of losses and hence evaluate and improve the energy efficiency of electric motors and transformers.
To apply Energy Efficient Technologies in Electrical Systems. Energy saving opportunities with energy efficient motors
Identify and quantify the energy intensive business activities in an organization.

UNIT – I (15 Hrs.)

Energy Scenario: Commercial and non-commercial energy, Primary energy resources, Commercial energy production, Final energy consumption, Energy needs of growing economy, Long term energy scenario, Energy pricing, Energy sector reforms, Energy and environment, Energy security, Energy conservation and its importance, Restructuring of the energy supply sector, Energy strategy for the future, Air pollution, Climate change, Energy Conservation Act-2001 and its features.
Energy Management and Audit: Definition, Energy audit, Need, Types of energy audit, Energy management (audit) approach, Energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel & energy substitution, Energy audit instruments, Material and energy balance, Methods for preparing process flow and Material and energy balance diagrams.

UNIT – II (15 Hrs.)

Electric motors: Energy efficient controls and starting efficiency, Motor Efficiency and Load, Analysis Energy efficient /high efficient Motors, Load Matching and selection of motors, Losses in induction motors, Factors affecting motor performance, Rewinding and motor replacement issues, Energy saving opportunities with energy efficient motors
Transformer: Loading/Efficiency analysis, Feeder/cable loss evaluation, case study, Reactive Power management-Capacitor, Sizing-Degree of Compensation-Capacitor losses, Location-Placement, Maintenance, Case study.

UNIT- III (15 Hrs.)

Energy Efficiency in Electrical Systems: Electrical system, Electricity tariffs, Electricity billing, Electrical load management and maximum demand control, Power factor improvement and its benefit, Selection and location of capacitors, Performance assessment of PF capacitors.
Energy Efficient Technologies in Electrical Systems: Maximum demand controllers, Automatic power factor controllers, Energy efficient motors, Soft starters with energy saver, Variable speed drives, Energy efficient transformers, Electronic ballast, Occupancy sensors, Energy efficient lighting controls, Energy saving potential of each technology.

UNIT – IV (15 Hrs.)

Electric loads of Air conditioning &Refrigeration: Energy conservation measures- Cool storage, Types-Optimal operation, case study.
Electric water heating: Geysers-Solar Water Heaters, Power Consumption in Compressors, Energy conservation measures, Electrolytic Process, Computer Controls- software-EMS

Energy Efficiency in Industrial Systems: Types, Performance evaluation, Efficient system operation, Flow control strategies and energy conservation opportunities in Fans and Blowers, Pumps and pumping system, Cooling tower.

Recommended Books:

1. Anthony J. Pansini, Kenneth D. Smalling, .Guide to Electric Load Management., Pennwell Pub; (1998)
2. Howard E. Jordan, .Energy-Efficient Electric Motors and Their Applications., Plenum Pub Corp; 2ndedition (1994)
3. Giovanni Petrecca, .Industrial Energy Management: Principles and Applications., The Kluwerinternational series -207,1999
4. Y P Abbi and Shashank Jain, Handbook on Energy Audit and Environment Management , TERI,2006
5. Albert Thumann, William J. Younger, Terry Niehus, Handbook of Energy Audits 2009

ARTIFICIAL INTELLIGENCE TECHNIQUES

Subject Code: MELED2 – 113 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: To make the students to:
To understand basics of AI & Soft computing techniques.
Learn the concepts of biological foundations of artificial neural networks.
Understand Genetic Algorithm and Evolutionary programming.
Understand, fuzzy logic and fuzzy neural networks.
Learn to apply these techniques to practical problems.
Course Outcomes: The students will acquire the skills:
To apply artificial neural networks in various electrical and electronics engineering applications.
To apply Genetic Algorithm and Evolutionary programming to solve engineering problems.
To take up fuzzy systems approach to solve applications in engineering.
Required to innovate and build, smart and intelligent applications in industrial control systems by using all these methods.

UNIT-1 (15 Hrs.)

Artificial Neural Networks: Artificial Neuron models, Types of activation functions, Neural network architectures, Neural Learning: Correlation, Competitive, Feedback based weight adaptation, Evaluation of networks, Generalizability, Computational resources, Supervised learning: Perceptron's, linear separability, Multilayer networks, Back propagation algorithm and its variants, Unsupervised learning, Winner–take all networks, Adaptive resonance theory, Self-organizing maps, Hopfield networks, Typical application in identification, Optimization, and other industrial control methods.

UNIT-II (15 Hrs.)

Fuzzy Logic: Fuzziness vs probability, Crisp logic vs fuzzy logic, Fuzzy sets and systems, Operations on sets, Fuzzy relations, Membership functions, Fuzzy rule generation, Defuzzification, Mamdani and Takagi-Sugeno Model, Fuzzy controllers.
Database – rule base – Inference engine.
Genetic Algorithm (GA): Introduction, Working principle, Coding of variables, Fitness function, Comparison with traditional methods, Constraints and penalty function, GA operators; reproduction, cross over, mutation, Real coded GA, Applications of GA in optimization and to practical problems.

UNIT-III (15 Hrs.)

Evolutionary Computation: Introduction to optimization problem, Constraints, Objective functions, Unimodal / multimodal problems, Classical v/s Evolutionary computational techniques, Genetic Algorithms and its Operators,
Introduction to Advanced AI techniques: Particle Swarm Optimization, Ant Colony Optimization, Differential Evolution Hybrid techniques; Fuzzy Genetic, Genetic-Neural networks etc.

UNIT-IV (15 Hrs.)

Associative Models And Control Schemes In Nn
Auto & hetero associative memory – bi-directional associative memory – Self organizing feature Maps-Hopfield Networks-Neural Networks for non – linear system – Schemes of Neuro control – System identification – forward model and – Inverse model – Case studies.
Applications: Applications of Neural network, Fuzzy system & Genetic algorithms for power systems and power electronics Systems-Designing of controllers using Simulation Software, NN tool box & Fuzzy Logic Toolbox.
Recommended Books:

1. N.P. Padhy, 'Artificial Intelligence and Intelligent Systems', Oxford University Press, 2005.
2. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.
4. J.M. Zurada, 'An Introduction to ANN', Jaico Publishing House, West, **1992**.
5. Simon Haykins, 'Neural Networks', Pearson Prentice Hall, **2005.**
6. Awrence Fausatt, 'Fundamentals of Neural Networks', Prentice Hall of India, New Delhi, **1994**.
7. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', McGraw Hill International Edition, USA, **1997**.
8. Driankov, Dimitra, 'An Introduction to Fuzzy Control', Narosa Publication.
9. Davis E. Goldberg, 'Genetic Algorithms in Search, Optimization, and Machine Learning', Adison Willey Publishing Company, **1989**.
10. Siva Nandam, 'Introduction to Fuzzy Logic using MATLAB', Springer Science & Business Media, **2006**.

INDUSTRIAL LOAD MODELING AND CONTROL

Subject Code: MELED2-121 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: To acquaint the students with:
The energy demand scenario.
The modeling of load and to study load demand industrially.
To know electricity pricing models.
Study reactive power management in industries.
Course Outcomes: Students will be able to:
Manage load and pricing in industries.
Manage reactive power in industries and apply different energy saving opportunities in cooling and heating loads.
Apply load management to reduce demand of electricity during peak time.
Knowledge about load control techniques in industries and its application.

UNIT-I (15 Hrs.)

Industrial Load Management: Electric Energy Scenario, Demand side management, Load curves, Load Shaping Objectives, Methodologies, Barriers, Classification of industrial loads, Continuous and Batch processes, Load modeling.
Pricing and Control: Electricity pricing, Dynamic and spot pricing Models, Direct load control, Interruptible load control, Bottom up approach, Scheduling, Formulation of load Models, Optimization and control algorithms, Case studies.

UNIT– II (15 Hrs.)

Reactive Power Management in Industries: Power quality problems and Reactive power compensation at distribution level, Controls, Power quality impacts, Choice of filters, Application of filters, Energy saving in industries.
Cooling and Heating Loads: Load profiling, Modeling cool storage, Types, Control strategies, optimal operation, Problem formulation, Case studies.

UNIT-III (10 Hrs.)

Energy banking, industrial cogeneration and Captive power units: Operating and control strategies, Power Pooling, Operation models, Selection of Schemes, Optimal operating strategies, Peak load saving, Constraints problem formulation, Case study

UNIT– IV (20 hrs)

Integrated Load Control for Industries: Design of Multi-loop Controllers: Interactions and decoupling of control loops, Design of cross controllers and selection of loops using Relative Gain Array (RGA).
Advanced Control Schemes: Structure, analysis and application of Cascade control, Selective control, Ratio Control, Design of steady state and dynamic feed forward controller, Feed forward combined with feedback control, Structure, analysis and applications of inferential control, Dead time and inverse response compensators, Concepts and applications of Adaptive control.

Recommended Books:

1. C.O. Bjork, 'Industrial Load Management - Theory, Practice and Simulations', Elsevier, the Netherlands, **1989.**
2. C.W. Gellings and S.N. Talukdar, 'Load Management Concepts', IEEE Press, New York, 1986.
3. Y. Manichaikul and F.C. Schweppe, 'Physically based Industrial load', IEEE Trans. on PAS, April, **1981.**
4. H.G. Stoll, 'Least Cost Electricity Utility Planning', Wiley Interscience Publication, USA,

1989.
5. I.J. Nagarath and D.P. Kothari, Modern Power System Engineering., Tata McGraw Hill publishers, NewDelhi, 1995
6. IEEE Bronze Book- 'Recommended Practice for Energy Conservation and Cost Effective planning in Industrial Facilities', IEEE Inc., USA.

ADVANCED AC/DC LV/MV DRIVE SYSTEMS

Subject Code: MELED2-122 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objects: To make the students aware about:
The power electronic converters and their control strategies used for DC and AC motor speed control.
The principles of speed-control of DC motors and to apply these methods for speed control of DC drives.
The principles of speed-control of induction motors and to apply these methods for speed control of AC drives.
The principles of speed-control of Synchronous Motor Drives, Permanent Magnet Motor Drives, Switched Reluctance Motor Drives.
Course Outcomes: students will demonstrate the ability to:
Use the power electronic converters and their control strategies for DC and AC motor speed control.
Understand the principles of speed-control of DC motors and to apply these methods for speed control of DC drives.
Understand the principles of speed-control of induction motors and to apply these methods for speed control of AC drives.
Understand the principles of speed-control of Synchronous Motor Drives, Permanent Magnet Motor Drives, Switched Reluctance Motor Drives.

UNIT – I (15 hours)

Review of DC Motor Characteristics: Review of e.m.f and torque equations, and torque-speed characteristics of separately excited DC motor, Effect of change in armature voltage and load on torque-speed characteristics, Armature voltage control for varying motor speed, flux weakening for high speed operation.
Chopper Fed DC Drives: Review of DC chopper and duty ratio control, Chopper fed DC motor for speed control and its Steady state operation, Armature current waveform and ripple, Calculation of losses in DC motor and chopper, efficiency of DC drive, smooth starting.

UNIT – II (15 hours)

Multi-quadrant DC Drive: Review of motoring and generating modes operation of a separately excited DC machine, Four quadrant operation of DC machine; single-quadrant, two-quadrant and four-quadrant choppers; Steady-state operation of multi-quadrant chopper fed DC drive, regenerative braking.
Closed-loop control of DC Drive: Control structure of DC drive, Inner current loop and outer speed loop, Dynamic model of DC motor – dynamic equations and transfer functions.

UNIT – III (15 hours)

Review of Induction Motor characteristics: Review of induction motor equivalent circuit and torque-speed characteristic, variation of torque-speed curve with (i) applied voltage, (ii) applied frequency and (iii) applied voltage and frequency, Impact of rotor resistance on the torque-speed curve of slip ring induction motor, Power electronic based rotor side control of slip ring motor, Slip power recovery, Operating point, constant flux operation, flux weakening operation.
Induction Motor Drives: Different transformations and reference frame theory, modeling of induction machines, Voltage fed inverter control-V/f control, Vector control, direct torque and flux control (DTC).
Scalar Control or Constant V/f Control of Induction Motor: Review of three-phase voltage source inverter, generation of three-phase PWM signals, sinusoidal modulation, space vector theory, conventional space vector modulation; constant V/f control of induction motor, steady-state performance analysis based on equivalent circuit, speed drop with loading, slip regulation.

UNIT – IV (15 hours)

Synchronous Motor Drives: Modeling of synchronous machines, open loop v/f control, vector control, direct torque control, CSI fed synchronous motor drives.

Permanent Magnet Motor Drives: Introduction to various PM motors, BLDC and PMSM drive configuration, comparison, block diagrams, Speed and torque control in BLDC and PMSM.

Switched Reluctance Motor Drives: Evolution of switched reluctance motors (SRM), various topologies for SRM drives, comparison, Closed loop speed and torque control of SRM.

Recommended Books:

1. G. K. Dubey, "Power Semiconductor Controlled Drives", Prentice Hall, 1989.
2. R. Krishnan, "Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall, 2001.
3. R. Krishnan, " Permanent Magnet Synchronous and Brushless DC motor Drives", CRC Press, 2009.
4. G. K. Dubey, " Fundamentals of Electrical Drives", CRC Press, 2002.
5. W. Leonhard, "Control of Electric Drives", Springer Science & Business Media, 2001.
6. B. K. Bose, "Modern Power Electronics and AC Drives", Pearson Education, Asia, 2003.

POWER SYSTEM TRANSIENTS

Subject Code: MELED2-123 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: To make the students aware about:
The occurrence of transients in a power system.
The fundamental circuit analysis of electrical transients to know about change in parameters like voltage and frequency during transients.
The Generation of over-voltages on transmission lines due to lightning and switching phenomenon etc. and protection against these over voltages.
About insulation coordination.
Course Outcomes: Students will be able to:
Knowledge of various transients that could occur in power system.
Model the power system for transient analysis.
To design various protective devices in power system for protecting equipment and personnel against over-voltages.
Coordinating the insulation of various equipment in power system.

UNIT- I (15 Hrs.)

Surge parameters of plant: Equivalent circuit representations, Lumped and distributed circuit transients, Types of system transients, Travelling waves and propagation of surges, Reflection and Refraction of travelling waves, Attenuation and distortion of travelling waves, Traveling waves in distributed parameter multi-conductor lines, parameters as a function of frequency, Determination of system voltages produced by travelling waves.
Line energization and de-energization transients: Earth and earth wire effects, Current chopping in circuit breakers, Short line fault condition and its relation to circuit breaker duty, Trapped charge effects, Effect of source and source representation in short line fault studies, Control of transients.

UNIT- II (15 Hrs.)

Fundamental circuit analysis of electrical transients: Laplace Transform method of solving simple Switching transients, Damping circuits, Abnormal switching transients, Three-phase circuits and transients.
Computation of power system transients: Principle of digital computation, Matrix method of solution, Modal analysis, Z transform- Computation using EMTP (electromagnetic transients program).

UNIT- III (15 Hrs.)

Generation of over-voltages on transmission lines: Lightning, switching and temporary over voltages, Physical phenomena of lightning, Effect of lightning on power transmission system, Influence of tower footing resistance and earth resistance, switching: Short line or kilometric fault, energizing transients - closing and re-closing of lines, line dropping, load rejection, over voltages induced by faults.
Protective devices: Protection of system against over voltages, Surge diverters, Lightning arresters, Neutral grounding, Substation earthing, Simulation of surge diverters in transient analysis.

UNIT- IV (15 Hrs.)

Switching of HVDC line: travelling waves on transmission line, Circuits with distributed parameters wave equation, Reflection, Refraction, Behavior of Travelling waves at the line terminations, Lattice Diagrams – attenuation and distortion, Multi-conductor system and Velocity wave.
Insulation Co-ordination: Over voltage limiting devices, dielectric properties, breakdown of gaseous insulation, tracking and erosion of insulation, high current arcs, and metallic contacts.

Principle of insulation co-ordination in Air Insulated substation (AIS) and Gas Insulated Substation (GIS), Coordination between insulation and protection level, Statistical approach.

Recommended Books:

1. Allan Greenwood, 'Electrical Transients in Power System', Wiley & Sons Inc. New York, 1991.
2. J. Arrillaga and C.P. Arnold, 'Computer Aided Power System', John Wiley and Sons, **1994**.
3. Sunil S. Rao, 'Switch Gear Protection and Power System', Khanna Publishers, **2008.**
4. V.A. Vanikov, 'Transients in Power System', Mir Publications, Moscow.
5. L.V. Bewley, 'Traveling Waves on Transmission Lines', Dover Publications Inc., New York.
6. Ravindera Arora and Mosch Wolfgang, 'High Voltage Insulation Engineering', New AgeInternational Publishers Limited

2nd Semester

ADVANCED PROTECTION OF POWER SYSTEM

Subject Code: MELES2-201 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: To make the students familiar to:
Numerical and digital relays.
Mathematical approach towards protection.
The development of algorithms for numerical protection.
The Application of Artificial Intelligence Based technique for digital protection.
Course Outcomes: Students will be able:
To learn the evolution of Digital Relays.
To apply Mathematical approach for numerical protection.
To develop various Protection algorithms for use in digital relays.
Learn to apply Artificial Intelligence Based Numerical Protection.

UNIT-1 (10 Hrs.)

Fundamentals: Classification of protective schemes; Overcurrent, Distance, and Differential protection, Review of basic components of a conventional protection system; Current (CT) and Voltage (VT) transformers, Relays, circuit breakers and trip circuit, Essential qualities of protection, Classification of relays based on their function, Phase and amplitude comparators. Static Comparators.
Evolution of digital relays from electromechanical relays**,** Performance and operational characteristics of digital protection**,** Recent Advances in Digital Protection of Power Systems.

UNIT-II (20 Hrs.)

Numerical Protection: Block diagram of a typical numerical relay, Advantages of numerical relays, Data acquisition system, Mathematical background to protection algorithms; Sample and first derivative (Mann and Morrison) technique, Differential equation based technique,
Discrete Fourier transform (DFT) technique; Fourier series with real and complex coefficients, Discrete Fourier Transform (DFT), Extraction of Fundamental frequency components; Full-cycle window algorithm, Half-cycle window algorithm, Computation of apparent impedance.
Walsh-Hadamard transform technique and its algorithm, Block pulse functions technique, Wavelet transform technique based algorithms**,** Numerical overcurrent protection, Numerical distance protection, and Numerical differential protection.

UNIT-III (20 Hrs.)

Microprocessor Based Numerical Protective Relays: Basic elements of digital protection; IC elements and circuits for interface, A/D converter, Analog multiplexer, Sample and Hold circuit, Their interfacing with microprocessor, Signal conditioning, the sampling theorem, signal aliasing**,** Error, Digital filtering concepts.
Digital relays: Digital relays as a unit consisting of hardware and software, digital Overcurrent relay, digital Impedance relay, digital Directional relay, digital Reactance relay, Generalized mathematical expression for distance relays, Measurement of Resistance (R) and Reactance (X), Digital Mho relay, Quadrilateral relay, Generalized interface for distance relays.

UNIT-IV (10 Hrs.)

Artificial Intelligence Based Numerical Protection: Artificial Neural Network, Fuzzy logic, Application of Artificial Intelligence to power system protection, **Application of ANN and Fuzzy Logic to:** Overcurrent protection, Transmission line protection, Power transformer protection, Generator protection, Directional relay, ANN modular approach for fault detection, classification and location.

Recommended Books:

1. Badri Ram, D N Vishwakarma, 'Power System Protection and Switchgear', Tata McGraw-Hill, 2011.
2. A.G. Phadke and J.S. Thorp, 'Computer Relaying for Power Systems', Wiley/Research Studies Press**, 2009.**
3. A.T. Johns and S.K. Salman, 'Digital Protection of Power Systems', IEEE Press, 1999.
4. Gerhard Zeigler, 'Numerical Distance Protection', Siemens Publicis Corporate Publishing, 2006.
5. S.R. Bhide, 'Digital Power System Protection', PHI Learning Pvt. Ltd., 2014.
6. T.S. Madhava Rao, 'Power System Protection: Static Relays: with Microprocessor Applications', 2017.
7. B. Ravindra Nath M. Chander, 'Power System Protection and Switch Gear', John Wiley Eastern,1989.
8. Sunil S. Rao, 'Power System Protection and Switch Gear', Khanna Publishers, 1989.

POWER SYSTEM DYNAMICS & STABILITY

Subject Code: MELES2-202 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: Students will be able to:
Study of system dynamics and its physical interpretation.
Development of mathematical models for synchronous machine and induction machines.
Understand small signal and large signal stability problems, and carry out stability analysis with and without power system stabilizer (PSS).
Analyze the effect of small speed changes in synchronous machines and voltage regulator governor system, and to enhance voltage stability margin of power system.
Course Outcomes: Students will be able to:
Develop mathematical models for synchronous machine.
Develop Models of induction motor.
Understand the system dynamics and analyze the stability of dynamic systems and voltage stability problem.
Implement modern control strategies for improving stability of the power system.

UNIT-I (15 Hrs.)

Modeling of Synchronous Machines: Simplest Model of the Synchronous Machine, Equations in Physical Quantities, Inductance of Synchronous Machine, Park's Transformation to dqO components, Phasor Diagram, Equivalent Circuit and Phasor Diagram, Excitation Systems, Sub-synchronous resonance, Significance of SCR, Synchronous machine dynamics (Electromechanical transients).

UNIT-II (15 Hrs.)

Basic load modeling concepts: Static load models, Dynamic load models.
Modeling of induction motors: Equations of an induction machine, Steady-state characteristics, and Alternative rotor constructions.

UNIT-III (15 Hrs.)

Fundamental Concepts of Stability of Dynamic Systems: Stability definitions, State-space representation, Stability of dynamic system, Analysis of stability, Small signal stability of single machine infinite bus system: Generator represented by the classical model, Effects of synchronous machine field circuit dynamics.
Voltage stability: Basic concepts related to voltage stability, classification of voltage stability, Transmission system characteristics, Generator characteristics, Load characteristics, Characteristics of reactive compensating device, Multi-Machine Stability.
Voltage collapse: Typical scenario of voltage collapse, General characteristics based on actual incidents, Prevention of voltage collapse.

UNIT-IV (15 Hrs.)

Methods of Improving Stability: Automatic voltage regulator, Power system stabilizers, Active power and frequency control: Fundamental of automatic generation control, Implementation of AGC, Under frequency load shedding. Reactive power and voltage control: Production and absorption of reactive power, Method of voltage control, Shunt reactors, shunt capacitors, series capacitors, synchronous condensers, static VAR systems.

Recommended Books:

1. P. Kundur,'Power System Stability and Control'Mc GrawHill, 1994.
2. L. P. Singh, 'Adavanced power systems Analysis and Dynamics', New Age International Publishers.
3. C. W. Taylor, 'Power System Voltage Stability' McGraw Hill.
4. P. M. Anderson and A. A. Fouad,'Power System Control and Stability', IEEE Press.
5. E. Kimbark,'Power System Stability', Vol.I, II & III, IEEEPress, 2002.
6. J. Machowski, J. Bialek and J.R.W. Bumby, 'Power System Dynamics and Stability', John Wiley & Sons, **1997.**
7. L. Leonard Grigsby (Ed.), 'Power System Stability and Control', 2nd Edn., CRC Press, 2007.

SMART GRIDS

Subject Code: MELES2-203 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: Students will be able to:
To understand concept of Smart Grid and its Advantages and its metering.
To understand Smart Grid technologies.
To understand about Micro grid and power quality.
To understand about communication in smart grid and distribution management system.
Course Outcomes: Students will be able to:
To describe concept of Smart Grid and its Advantages and its metering.
To describe Smart Grid technologies.
To know about Micro grid and power quality.
To describe about communication in smart grid and distribution management system.

UNIT-I (10 Hrs.)

Introduction to Smart Grid: Evolution of Electric Grid, Concept of Smart Grid, Definitions and Necessity of Smart Grid, Today's Grid versus the Smart Grid, Functions of Smart Grid Components, General View of the Smart Grid Market Drive, Concept of Robust & Self-Healing grid, Present Development & International Policies in Smart Grid.

UNIT-II (20 Hrs.)

Introduction to Smart Metering: Evolution of Smart Metering, Key components of Smart metering, Real Time Pricing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Smart Substations, Substation Automation, Feeder Automation.
Smart Grid Technologies: Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, Superconducting Magnetic Energy Storage (SMES), Pumped Hydro, Compressed Air Energy Storage (CAES), Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU).

UNIT-III (15 Hrs.)

Micro-Grid: Concept, Necessity & Applications of Micro-Grid, Formation of Micro-Grid, Issues of Interconnection, Operation, Control & Protection of Micro-Grid. Plastic & Organic solar cells, Thin film solar cells, Variable Speed Wind Generators, Fuel-cells, micro- turbines, Captive power plants, Integration of renewable energy sources.
Power Quality: Electromagnetic Compatibility (EMC) of Smart Grid, Power Quality Issues of Grid Connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit.

UNIT-IV (15 Hrs.)

Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN), Bluetooth, Zig-Bee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Basics of CLOUD Computing & Cyber Security for Smart Grid, Broadband over Power line (BPL), IP based protocols, Communication through GPRS and Power Line Carrier Communication, Internet of Things (IoT) based Protocols.
Distribution Management System:-Introduction, Substation automation equipment, Faults in distribution system, Fault location & isolation and restoration, Components of fault isolation and restoration, Voltage regulation.

Recommended Books:

1. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong Wu and Nick Jenkins, 'Smart Grid: Technology and Applications', Wiley Online Library, 2012.
2. James A. Momoh, "Smart Grid:-Fundamental of design and Analysis", IEEE Press, Wiley Publication.
3. Lars T.Berger, Krzyszt of, "Smart Grid:- Application, Communication, and Security", Wiley Publication.
4. Ali Keyhani, 'Design of Smart Power Grid Renewable Energy Systems', 2nd Edn., Wiley IEEE Press.
5. Clark W. Gellings, 'The Smart Grid: Enabling Energy Efficiency and Demand Response', CRC Press, **2009**.
6. Stuart Borlase, 'Smart Grid: Infrastructure, Technology and solutions', CRC Press.

POWER SYSTEM LAB-II.

Subject Code: MELES2-204 **L T P C** **Duration: 60 Hrs.**
0 0 4 2

Course Objectives: To make the students aware about:

The various parameters that affect the output of solar panels and wind turbines.
The operation, control and protection aspects of micro-grids and the methods to enhance power quality of power system.
The smart grid technologies, metering and application of real time pricing.
The use of communication technologies for advanced metering Infrastructure.

Course Outcomes: Students will be able:

To know the various parameters affecting the solar panel output and wind turbine output.
To operate, control and protect micro-grids.
To know methods to enhance power quality of power system.
To know about smart grid technologies, metering and to apply real time pricing.
To use communication technologies for advanced metering Infrastructure.

LIST OF EXPERIMENTS

1. Power Curves.
2. Build a Wind Farm.
3. Test the Capabilities of the Hydrogen Fuel Cells and Capacitors.
4. Effect of Temperature on Solar Panel Output.
5. Variables Affecting Solar Panel Output.
6. Effect of Load on Solar Panel Output.
7. Wind Turbine Output: The Effect of Load.
8. Test the Capabilities of Solar Panels and Wind Turbines.
9. Grid integration of solar power output using power electronics interfaces.
10. Application of real time pricing in smart grids.
11. Operation, control and protection of micro-grids.
12. Power quality analysis and enhancement of power system.
13. Use of communication technologies for advanced metering Infrastructure.

POWER QUALITY

Subject Code: MELED2-211 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: To make the students aware about:
Review definitions and standards of common power quality phenomena.
Understand power quality monitoring and classification techniques.
Investigate different power quality phenomena causes and effects.
Understand different techniques for power quality problems mitigation.
Course Outcomes (COs): The students will be able to:
Acquire knowledge about the parameters of power quality and harmonics in power systems.
Acquire knowledge about the voltage sags and interruptions and their influence on various components.
Be able to model networks and components for power quality analysis and to apply harmonics filtering techniques.
Apply various methods for power quality monitoring.

UNIT-I (10 Hrs.)

Introduction: Definition of Electric Power Quality, Power Quality -- Voltage Quality, Power Quality Evaluation Procedure
Terms & Definitions: General Classes of Power Quality Problems, Transients, Long Duration Voltage Variations, Short-Duration Voltage Variations, Voltage Imbalance, Waveform Distortion, Voltage Fluctuations, Power Frequency Variations, Power Quality Terms.

UNIT-II (20 Hrs.)

Voltage Sags & Interruptions: Sources of Sags and Interruptions, Estimating Voltage Sag Performance: (i) Area of Vulnerability (Weakness, Exposure), (ii) Types of Equipment Sensitivity to Voltage Sags, (iii) Transmission system sag performance evaluation, (iv) Utility distribution system sag performance evaluation, Fundamental Principles of Protection, Solutions at the End-User Level, Voltage Sag Mitigation Technologies, Motor Starting Sags: (i) Motor-starting methods, (ii) Estimating the sag severity during full-voltage starting.

UNIT-III (20 Hrs.)

Transient Over Voltages: Sources of Transient Over Voltages: (i) Capacitor switching, (ii) Magnification of capacitor-switching transients, (iii) Lightning, (iv) Ferroresonance, Principle of Over Voltage Protection, Voltage Swell Mitigation Technologies, Utility Capacitor-Switching Transients, Utility System Lightning Protection, Switching Transient Problems with Loads.
Fundamentals of Harmonics: Harmonic Distortion, Voltage Versus Current Distortion, Harmonics Versus Transients, Power System Quantities under Non-sinusoidal Conditions, Harmonic Indices, Harmonic Sources from Commercial Loads, Locating Harmonic Sources, Effects of Harmonic Distortion, Harmonic Distortion Evaluations, Principles for Controlling Harmonics, Devices for Controlling Harmonic Distortions.

UNIT-IV (10 Hrs.)

Long Duration Voltage Variations: Principles of Regulating the Voltage, Devices for Voltage Regulation, Utility Voltage Regulator Application, Capacitors for Voltage Regulation, End-User Capacitor Application, , Flicker.
Power Quality Monitoring: Monitoring Considerations**,** Power Quality Measurement Equipments, Assessment of Power Quality Measurement Data, Application of Intelligent Systems, Power Quality Monitoring Standards.

Recommended Books:

1. Roger C. Dugan, Surya Santoso, Mark F. McGranaghan, H. Wayne Beaty, 'Electrical Power Systems Quality', McGraw Hill Professional, **2002.**
2. Angelo Baggini, 'Handbook of Power Quality', Wiley, **2008**.
3. G.T. Heydt, 'Electric Power Quality', McGraw Hill Professional, **2007.**
4. Math H. Bollen, 'Understanding Power Quality Problems', IEEE Press, **2000.**
5. J. Arrillaga, 'Power System Quality Assessment', John Wiley, **2000**
6. J. Arrillaga and N. R. Watson, 'Power System Harmonics', Wiley.
7. George J. Wakileh, 'Power Systems Harmonics', Springer.

FACTS AND CUSTOM POWER DEVICES

Subject Code: MELED2-212 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: To make the students:
To learn the active and reactive power flow control in power system.
To understand the need for static compensators.
To develop the different control strategies used for compensation.
Course Outcomes: Students will be able to:
Acquire knowledge about the fundamentals of Reactive Power Flow Control in Power Systems.
Acquire knowledge about the fundamental principles of passive and active reactive power compensation schemes at transmission and distribution level in power systems.
Learn various Static shunt and series VAR Compensation devices.
To develop analytical modeling skills needed for modeling and analysis of such Static VAR Systems.

UNIT-I (15 Hrs.)

Reactive Power Flow Control in Power Systems: Control of dynamic power unbalances in Power System, Power flow control, Constraints of maximum transmission line loading, Benefits of FACTS Transmission line compensation, Uncompensated line shunt compensation, Series compensation, Phase angle control, Reactive power compensation, Shunt and Series compensation principles, Reactive compensation at transmission and distribution level.

UNIT-II (15 Hrs.)

Static versus passive VAR compensator, Static shunt compensators: Static VAR compensator (SVC) and Static compensator (STATCOM), Operation and control of Thyristor switched capacitor (TSC), Thyristor controlled reactor (TCR) and STATCOM, Compensator control, Comparison between SVC and STATCOM, Multilevel inverter based DSTATCOM (Distributed Static Compensator) and its applications.

UNIT-III (15 Hrs.)

Static Series Compensation: Thyristor switched series capacitor (TSSC), Static synchronous series compensator (SSSC), Static voltage and phase angle regulators, Thyristor controlled voltage regulators (TCVR) and phase angle regulators (TCPAR): Operation and Control, Applications.
Unified power flow controller (UPFC), Circuit arrangement, Operation and control of UPFC, Basic Principle of active power (P) and reactive power (Q) control, Independent real and reactive power flow control- Applications, Comparison of UPFC and UPQC (unified power quality conditioner).

UNIT-IV (15 Hrs.)

Interline power flow controller (IPFC) & FACTS: Introduction to IPFC and FACTS, Modeling and analysis of FACTS controllers, Simulation of FACTS controllers, Power quality problems in distribution systems, Comparison of various custom power devices and their applications.
Recent Trends: Application of basic active filters, multilevel and multi-pulse converters and Z-source inverter in various FACTS and FACDS devices for improving the performances of transmission system network and distribution system network, respectively.

Recommended Books:

1. K.R. Padiyar, 'FACTS Controllers in Power Transmission and Distribution', New Age International Publishers, **2007.**
2. X.P. Zhang, C. Rehtanz, B. Pal, 'Flexible AC Transmission Systems- Modelling and Control', Springer Verlag, Berlin, **2006.**
3. N.G. Hingorani, L. Gyugyi, 'Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems', IEEE Press Book, Standard Publishers and Distributors, Delhi, **2001**.
4. K.S. Sureshkumar, S. Ashok, 'FACTS Controllers & Applications', e-book Edn., Nalanda Digital Library, NIT Calicut, **2003.**
5. Y.H. Song and A.T. Johns, 'Flexible AC Transmission Systems', IEEE Press, **1999**.
6. R.M. Mathur and R.K. Verma, 'Thyristor based FACTS controllers for Electrical TransmissionSystems', IEEE Press, **2002**.

DIGITAL TRANSFORMATION IN INDUSTRY

Subject Code: MELED2-213 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: To make the students to:
To learn about Industry 4.0 and its foundation for the digital transformation term
To understand the concepts of digital supply chains and smart factory.
Learn basics of block chain technology and its application for crypto currency.
To acquire knowledge about real cases from different industries to know that how industries are evolving with the changes and to learn how to overcome the challenges of digital transformation projects.
Course outcomes: The students will be able:
To review the basic concepts about Industry 4.0 and its foundation for the digital transformation term.
To understand digital supply chains and smartly operate a factory.
To understand block chain technology and its application for crypto currency.
To acquire knowledge to learn to overcome the challenges of digital transformation projects.

UNIT-1 (12 Hrs.)

Introduction: Introduction to Industry 4.0, History of Industry 4.0, Industry 4.0 terminologies definition, Industrial Internet, First stages of maturity, The next maturity stages, Society 5.0, Society 5.0: breaking down 5 walls, The Various Industrial Revolutions: Evolution of Industrial Revolutions, INDUSTRY 4.0 - Drivers, Enablers, Challenges and Benefits.

UNIT-II (18 Hrs.)

Smart Factory: Traditional Supply Chains, Digital Supply Chains and Smart Factory, Characteristics of Smart Factory: Connected, Optimized, Transparency, Proactive, Agile
Introduction to Cloud technology, IoT and overview of deployment models (SaaS, PaaS, IaaS), Introduction to Horizontal and Vertical Integration
Digital Twin: Computer Simulation, Introduction to Augmented reality (AR), Virtual reality (VR) and Mixed Reality (MR) and Comparison of AR, VR and MR.
Role of Artificial intelligence & Machine learning in Industry 4.0.

UNIT-III (15 Hrs.)

Block Chain: Overview, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public v/s Private Block chain, Basic crypto currency, Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain, Basic Crypto Primitives: Cryptographic Hash Function and its Properties, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography.
Understanding Crypto Currency with Block Chain: Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and
block relay, Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW).

UNIT-IV (15 Hrs.)

Digital Transformation: Introduction, Digital business transformation, Causes of disruption and transformation, Digital transformation myths and realities, Digital Transformation and customer experience, 4 pillars in customer experience transformation; IT uplift, Digitizing operations, Digital marketing and Digital businesses. -
Applications of Digital transformation:
Applications of Digital transformation across various industries, Retail industry, Government and the public sector, Insurance industry, Healthcare, Banking: Royal Bank of Scotland case

study, Fintech: Travelex case study, Public Sector: The MET office case study.

Recommended Books:

1. Srinivas R Pangali, Shankar Prakash, Jyothi R Korem, 'Digital Transformation Strategies', Sage publications, 2021
2. Thomas M Siebel, 'Digital Transformation', Rosettabooks, 2019.
3. Antony Lewis, 'The Basics of Bitcoins and Blockchain', Mango Media Incorporation, 2018.

RENEWABLE ENERGY SYSTEM AND DISTRIBUTED GENERATION

Subject Code: MELED2-221 **L T P C** **Duration: 60 Hours**
4 0 0 4

Course Objectives: Students will be able to:
To learn various renewable energy sources.
To gain understanding of integrated operation of renewable energy sources.
To understand Power Electronics Interface with the Grid.
To understand about Distributed Generation.
Course Outcomes: Students will be able to:
Know about various renewable energy sources, especially solar and wind energy in detail.
Know that how to tap hydro energy and energy from biomass.
Know the means and methods to harness energy from tides, waves, and geothermal energy as well as working of fuel cells.
Know the distributed generation system in autonomous/grid connected modes and its impact on Power System.

UNIT-I (15 Hrs.)

Introduction to Renewable Energy Resources: World Energy Future, Conventional Energy Sources, Non-Conventional Energy Sources, Prospects of Renewable Energy Sources, Types, Advantages, Limitations & scope of renewable energy resources.
Solar Energy: Introduction to Solar Radiation and its measurement, Introduction to Solar Energy Collectors and Storage, Solar Electric Power Generation, Solar Photo-Voltaic, Solar Cell Principle, Semiconductor Junctions, Conversion efficiency and power output, Basic Photovoltaic System for Power Generation.
Wind Energy: Introduction to Wind Energy Conversion (WEC), Wind data and energy estimation, Site selection considerations, Basic Components of a Wind Energy Conversion System, Classification of WEC Systems, Schemes for Electric Generation using Synchronous Generator and Induction Generator, Wind energy Storage.

UNIT-II (15 Hrs.)

Hydro Energy: Site selection, Types of power stations, Major components & their working.
Biomass Energy: Biomass conversion technologies, photosynthesis, Bio-gas generation, types of bio-gas plants, Biomass as a Source of Energy: Method for obtaining energy from Bio-mass, Biological Conversion of Solar Energy.

UNIT-III (15 Hrs.)

Tidal Energy: Basic principles of tidal energy, Tidal power generation systems.
Wave Energy: Wave energy conversion devices, Advantages and Disadvantages of wave energy.
Geothermal Energy: Origin and nature of geothermal energy; Classification of geothermal resources; Schematic of geothermal power plants.
Fuel Cells: Schematic of fuel cell, Characteristics, Working of different types of fuel cells.

UNIT-IV (15 Hrs.)

Distributed Generation: Introduction, Distributed v/s central station generation, Technologies of distributed generation as sources of energy such as Micro-turbines, Micro combined heat power, Rooftop solar PV, Solar and wind hybrid system, Impact of distributed generation on power grid reliability.
Distributed Generators: Introduction, Various types of distributed generators, such as, Permanent magnet generator, Self-excited Induction generators, Power Electronic Interface of distributed Generators with the Grid, Analysis of Effect of Distributed Generation on Transmission System Operation, Protection of Distributed Generators, Economics Issues of

Distributed Generation, Case Studies on distributed generations for electric vehicle and energy storage integration.

Recommended Books:

1. D.P. Kothari, K.C. Singal and Ranjan Rakesh, 'Renewable Energy Sources and Emerging Technologies', 2nd Edn., Prentice Hall of India, **2011**.
2. Math H. Bollen, Fainan Hassan, 'Integration of Distributed Generation in the Power System', Wiley-IEEE Press, **2011**.
3. Loi Lei Lai, Tze Fun Chan, 'Distributed Generation: Induction and Permanent Magnet Generators', Wiley-IEEE Press, **2007**.
4. A.Roger, Messenger and Jerry Ventre, 'Photovoltaic System Engineering', 3rd Edn., **2010.**
5. James F. Manwell, Jon G. McGowan and Anthony L. Rogers, 'Wind Energy Explained: Theory Design and Application', 2nd Edn., John Wiley and Sons **2010**.
6. G.D. Rai, 'Non-Conventional Sources of Energy', Khanna Publishers.
7. David Boyles, 'Bio Energy', Elis Horwood Ltd.
8. N.K. Bansal and M. Kleemann, M. Heliss, 'Renewable Energy Sources and Conversion Technology', Tata McGraw Hill, **1990**.
9. O.P. Vimal and P.D. Tyagi, 'Bio Energy Spectrum', Bio Energy and Wasteland DevelopmentOrganization.

SCADA SYSTEM AND APPLICATIONS

Subject Code: MELED2-222 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: To make the students to get insight into the:
Basic architecture and components of SCADA.
Functions and communication in SCADA.
Applications of SCADA.
Course Outcomes: Students will be able to:
Describe the basic tasks of supervisory control and data acquisition systems (SCADA) as well as their typical applications.
Acquire knowledge about SCADA architecture, various advantages and disadvantages of each system.
Knowledge about single unified standard architecture IEC 61850.
To learn about SCADA system components: remote terminal units, PLCs, intelligent electronic devices, HMI systems, SCADA server.
Learn and understand about SCADA applications in transmission and distribution sector, industries etc.

UNIT-I (15 Hrs.)

Introduction to SCADA, Data acquisition systems, Evolution of SCADA, Building blocks of SCADA systems, SCADA System Components, Classification of SCADA systems, Communication technologies, Monitoring and supervisory functions, SCADA applications in Industries and Utility Automation.

UNIT-II (15 Hrs.)

Remote Terminal Unit (RTU) and its components, Intelligent Electronic Devices (IED), Programmable Logic Controller (PLC), Logic subsystem, Termination subsystem, Testing and human-machine interface (HMI) subsystem, Power supplies, Advanced RTU functionalities, Data concentrators and merging units, Master Station: Master station software components, Master station hardware components, SCADA Server, SCADA/HMI Systems, Server systems in the master station, Global positioning systems (GPS), Master station performance.

UNIT-III (15 Hrs.)

SCADA Architecture, Various SCADA architectures, advantages and disadvantages of each system, Single unified standard architecture -IEC 61850.
SCADA Communication, Communication Network, Communication subsystem, various industrial communication technologies, wired and wireless methods and fiber optics, Open standard communication protocols, comparison with wide area monitoring system (WAMS).

UNIT-IV (15 Hrs.)

SCADA Applications: Utility applications, Transmission and distribution sector operations, monitoring, analysis and improvement, Situational awareness, Intelligent alarm filtering: Need and technique, Alarm suppression techniques, Operator needs and requirements, Industries - oil, gas and water, Case studies, Implementation, Simulation exercises.

Recommended Books:

1. Stuart A. Boyer, 'SCADA-Supervisory Control and Data Acquisition', Instrument Society of America Publications, USA, 2004.
2. Gordon Clarke, Deon Reynders, 'Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems', Newnes Publications, Oxford, UK, 2004.
3. William T. Shaw, 'Cyber-security for SCADA Systems', Penn Well Books, 2006.

4. David Bailey, Edwin Wright, 'Practical SCADA for Industry', Newnes, 2003.
5. Michael Wiebe, 'A Guide to Utility Automation: AMR, SCADA, and IT Systems for Electric Power', Penn Well Books, 1999.
6. Bela G. Liptak, Halit Eren, 'Instrument Engineers Process Software and Digital Networks', 4th Edn., Vol.-3, 2016.

OPTIMIZATION TECHNIQUES FOR POWER ENGINEERING

Subject Code: MELED2-223 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives: - To introduce the students:
To learn about basics of optimization and essential optimization techniques for applying to day to day problems.
To learn about linear and non-linear programming problems and apply the methods for solving these problems in various fields of engg. and technology.
To acquaint them with unconstrained and constrained multivariable optimization nonlinear programming problems.
To non-conventional optimization methods such as, Genetic Algorithm, Particle swarm optimization etc. and their applications in power system.
Course Outcomes: Students will be able:
To gain knowledge about basics of optimization.
To apply linear and non-linear programming for solving problems in various fields of Engg. and Tech.
To acquire skills to solve unconstrained and constrained multivariable optimization nonlinear programming problems.
To apply non-conventional optimization methods such as Simulated annealing method, Genetic Algorithm, Particle swarm optimization etc.

UNIT-I (10 Hrs.)

Introduction to Optimization: Statement of an optimization problem, Classification of optimization problems, Classical Optimization techniques, Single variable optimization, Multivariable optimization, Optimization with and without inequality constraints, Single objective and multi objective optimization, Engineering applications of optimization.

UNIT-II (20 Hrs.)

Linear Programming (LP): Standard form of linear programming, Simplex method, Revised simplex method, Computer implementation of the Simplex method, Duality theory, Constrained Optimization, Theorems and procedure, linear programming, mathematical model, solution technique, duality.
Non-Linear Programming (NLP): One–Dimensional Minimization Methods: Unimodal function, Dichotomous search, Fibonacci search, Golden Section, Cubic interpolation method, Direct root, Newton Raphson Method.
Transportation Problem: North-West Corner rule, least cost method, Vogel approximation method, testing for optimality.

UNIT-III (15 Hrs.)

Unconstrained Multivariable Optimization Techniques: Random search method, Steepest descent method, Conjugate gradient method, Sequential quadratic programming, Newton Raphson Method, Evolutionary search, Hooke-Jeeves Method, Simplex search Method.
Constrained Optimization Techniques: Interior Penalty function method, Exterior penalty function method, Method of Multipliers, KKT Conditions.
Dynamic Programming (DP): Multistage decision processes, concept of sub-optimization and principle of optimality, Recursive relations, Integer Linear programming, Branch and bound algorithm.

UNIT-IV (15 Hrs.)

Further Topics in Optimization: Critical path method (CPM), Program evaluation and review technique (PERT), Multi-objective Optimization Techniques, Weighting method, ε- constraint method, Genetic Algorithm, Particle swarm optimization.

Genetic Algorithm (GA): Introduction to Genetic Algorithm, working principle, coding of variables, fitness function, GA operators; Similarities and differences between GA and traditional methods; Unconstrained and constrained optimization using genetic Algorithm, real coded GA, Advanced GA, Applications to power system.

Recommended Books:

1. S.S. Rao, 'Optimization: Theory and Application', Wiley Eastern Press, 2nd Edn., **1984**.
2. Deb Kalyanmoy, 'Optimisation for Engineering Design - Algorithms and Examples', Prentice Hall India, **1998.**
3. H.A. Taha, 'Operations Research - An Introduction', Prentice Hall of India, **2003**.
4. R.L. Fox, 'Optimization Methods for Engineering Design', Addition Welsey, **1971**.

A. Ravindran, K.M. Ragsdell and G.V. Reklaitis, 'Engineering Optimization: Methods and Applications', Wiley, **2008**.

5. Godfrey C. Onwubolu, B.V. Babu, 'New Optimization Techniques in Engineering', Springer, **2004**.
6. D.P. Kothari & J.S. Dhillon, 'Power System Optimization', Prentice-Hall of India, **2010**.

3rd & 4th Semester

PROJECT

Subject Code: MELES2-301 **L T P C**
0 0 6 3

The object of Project is to enable the student to take up investigative study in the broad field of Electrical Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis under the guidance of a supervisor from the department alone or jointly with a supervisor drawn from R&D laboratory/Industry. This is expected to provide a good initiation for the student in R&D work. The assignment to normally include:

Survey and study of published literature on the assigned topic.

Define the objective, formulate the problem and prepare an action plan for conducting the investigation.

Then perform the required Experiment/Develop a Simulation Model/Solve the Problem/Develop a Design/Explore the feasibility/Conduct a survey etc. depending upon the action plan.

Analyze the results and prepare a written report on the study conducted for presentation to the Department.

Final seminar, as oral presentation before a departmental committee.

SEMINAR

Subject Code: MELES2-302 **L T P C**
0 0 2 1

Course Objectives:

To identify, understand and discuss current advanced research topics.
To gain experience in the critical assessment of the available scientific literature
To practice the use of various resources to locate and extract information using offline & online tools, journals

Course Outcomes:

An ability to utilize technical resources
An ability to write technical documents and give oral presentations related to the work completed.
To learn preparation and presentation of scientific papers in an exhaustive manner
Each student will be required to prepare a Seminar Report and present a Seminar on a topic in any of the areas of modern technology related to Electrical Engineering including interdisciplinary fields.

NOTE: Seminar will carry 1 credit. It will be done on any topic within/outside the curriculum. Its evaluation will be done as under:

Sr. No.	Parameters for Evaluation	Internal Marks	External Marks
1	Depth & Coverage of Topic	40	-
2	PPT Presentation & Report	20	-
3	Presentation	20	-
4	Questions & Answers	20	-
Total		**100**	**-**

RESEARCH METHODOLOGY AND IPR

Subject Code - MREMI0-101 **LTPC** **Duration-60 hrs**
4 0 0 4

Course Objectives: To make the students to:

1. Understand that how to formulate a research problem, analyze research related information, follow research ethics, and to design experiments.
2. To learn to collect or sample data, process it and validate results etc.
3. Do effective literature studies and develop a research proposal.
4. Understand the need of information about Intellectual Property Right (IPR) in general & engineering in particular.
5. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D.

Course Outcomes: At the end of this course, students will be able to:

1. Formulate a research problem, analyze research related information, and follow research ethics and design experiments.
2. Collect, sample, scale, validate and process data.
3. To do literature survey effectively and develop a good research proposal.
4. Motivated to do research work and invest in R & D to create new and better products for economic growth and social benefits.

UNIT-I (15 Hrs.)

Research Problem: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, Approaches of investigation of solutions for research problems, Data collection, Analysis, Interpretation, Necessary instrumentation.

Design of Experiment: Basic Principal of Experimental Design, Randomized Block, Completely Randomized Block, Latin Square, Factorial Design.

Hypothesis: Types, Formulation of Hypothesis, Feasibility, Preparation and Presentation of Research Proposal.

UNIT-II (15 Hrs.)

Sources of Data: Primary and Secondary, Validation of Data

Data Collection Methods: Questionnaire Designing, Construction

Sampling Design & Techniques – Probability Sampling and Non Probability Sampling.

Scaling Techniques: Meaning & Types.

Reliability: Test–Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability.

Validity: Content Validity, Criterion Related Validity and Construct Validity.

Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation.

UNIT-III (10 Hrs.)

Literature Survey: Importance of literature survey - Sources of information - Assessment of quality of journals and articles - Information through internet. Literature Review: Need of review - Guidelines for review - Record of research review.

Effective Literature Studies Approaches: Analysis Plagiarism, Research ethics, Effective technical writing, Essentials of report writing, Report Format, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-IV (20 Hrs.)

Nature of Intellectual Property: Patents, Designs, Trade and Copyright, Process of Patenting and Development: Technological research, Innovation, Patenting, development, Introduction to international Scenario on Intellectual Property, Procedure for grants of patents, Patenting under PCT.

Patent Rights: Scope of Patent Rights, Licensing and transfer of technology, Patent information

and databases, Introduction to patent searching and World Intellectual Property Organization (WIPO).

New Developments in IPR: Administration of Patent System. New developments in IPR: introduction to IPR of Biological Systems, Computer Software etc. Traditional Knowledge Case Studies, IPR or IITs.

Recommended Books:

1. Stuart Melville and Wayne Goddard, 'Research Methodology: An Introduction for Science & Engineering Students', Juta & Co. Ltd., 1996.
2. Ranjit Kumar, 2nd Edn., 'Research Methodology: A Step by Step Guide for Beginners'.
3. C.R Kothari, "Research Methodology, Methods & Techniques", New Age International Publishers, New Delhi, 2004.
4. R. Ganesan, 'Research Methodology for Engineers', MJP Publishers, Chennai, 2011.
5. Ratan Khananabis and Suvasis Saha, "Research Methodology", Universities Press, Hyderabad, 2015.
6. Vijay Upagade and Aravind Shende, 'Research Methodology', S. Chand & Company Ltd., New Delhi, 2009.
7. G. Nageswara Rao, 'Research Methodology and Quantitative methods', BS Publications, Hyderabad, 2012.
8. Debora J. Halbert, 'Resisting Intellectual Property', Taylor & Francis Ltd., 2005, DOI https://doi.org/10.4324/9780203799512.
9. Robert P. Merges, Peter S. Menell, Mark A. Lemley, 'Intellectual Property in New Technological Age', 2016.
10. T. Ramappa, 'Intellectual Property Rights Under WTO', S. Chand, 2008.

DISSERTATION

Subject Code: MELES2-401 **L T P C**
0 0 --

Note: Students should be advised to go through maximum research papers and conclude a particular domain to work further. Each student will be required to complete a Dissertation and submit a written report on the topic on any of the areas of modern technology related to Electrical Engineering including interdisciplinary fields in the final semester of M. Tech Course.

Course Objectives: To learn, practice, and critique effective scientific writing and to formulate the research objectives clearly, state claims and evidence clearly, assess validity of claims, evidence, outcomes, and results.

Course Outcomes:

Design a meaningful research project that demonstrates spatial thinking and uses the knowledge and skills.
Define and analyze a problem in latest research areas.
Formulate and write a research proposal.
Synopsis and its Presentation.
Execute a meaningful research project that demonstrates spatial thinking and uses the knowledge and skills.
Able to learn effectively record data and experiments so that others can understand them.
Communicate the findings by means of a thesis, written in the format specified by the department/institute.

The Dissertation will carry 20 credits and will be evaluated as under:

Sr. No.	Parameters for Evaluation	Internal Marks	External Marks
1.	Originality	12	08
2.	Presentation	12	08
3.	Contents & Volume of work	18	08
4.	Discussion (Contribution of the Candidate)	18	08
5.	Any research publication related to the thesis	-	08
Total		**60**	**40**

Maharaja Ranjit Singh Punjab Technical University
Bathinda-151001

FACULTY OF ENGINEERING AND TECHNOLOGY

SYLLABUS

M.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

2022 BATCH ONWARDS

(For Full-Time and Part-Time Modes)

SCHEME FOR M.TECH. (ECE) FULL-TIME MODE

SEMESTER-I		Contact Hours			Marks			Credits
Sub Code	Subject Name	L	T	P	Int	Ext	Total	
MECES1-101	Advanced Communication Systems	4	0	0	40	60	100	4
MECES1-102	Advanced Digital Circuit Design	4	0	0	40	60	100	4
MECES1-103	Soft Computing	4	0	0	40	60	100	4
Department Elective – I (Select Any One)								
MECED1-111	Antenna System Design	4	0	0	40	60	100	4
MECED1-112	Microcontrollers & Embedded Systems							
MECED1-113	IoT & its Applications							
Department Elective – II (Select Any One)								
MECED1-121	Information Theory & Coding	4	0	0	40	60	100	4
MECED1-122	Digital Image Processing							
MECED1-123	AI & Machine Learning							
MECES1-104	Research Lab-I	0	0	4	60	40	100	2
Total:		**20**	**0**	**4**	**260**	**340**	**600**	**22**

SEMESTER-II		Contact Hours			Marks			Credits
Sub Code	Subject Name	L	T	P	Int	Ext	Total	
MECES1-201	Wireless Adhoc & Sensor Networks	4	0	0	40	60	100	4
MECES1-202	Advanced Digital Signal Processing	4	0	0	40	60	100	4
MECES1-203	Wireless & Mobile Communications	4	0	0	40	60	100	4
Department Elective – III (Select Any One)								
MECED1-211	VHDL: Design, Synthesis & Simulation	4	0	0	40	60	100	4
MECED1-212	Advanced Computer Architecture							
MECED1-213	Deep Learning							
Department Elective – IV (Select Any One)								
MECED1-221	Optical Communication Systems	4	0	0	40	60	100	4
MECED1-222	Cloud Computing							
MECED1-223	Big Data Analytics							
MECES1-204	Research Lab-II	0	0	4	60	40	100	2
Total:		**20**	**0**	**4**	**260**	**340**	**600**	**22**

SEMESTER-III		Contact Hours			Marks			Credits
Sub Code	Sub Name	L	T	P	Int.	Ext.	Total	
XXXXX	Open Elective	3	0	0	40	60	100	3
WWWWW	Research Methodology and IPR	4	0	0	40	60	100	4
MECES1-301	Project	0	0	--	60	40	100	6
MECES1-302	Seminar	0	0	2	100	--	100	1
Total:		**7**	**0**	**2**	**240**	**160**	**400**	**14**

SEMESTER-IV		Contact Hours			Marks		
Sub Code	Sub Name	L	T	P	Internal	External	Total
MECES1-401	Dissertation #	--	--	--	Satisfactory / Not Satisfactory as per CBCS-2016		
Total:		--	--	--	--		

Note: In addition, it is proposed that:

1. Seminar shall be preferably on the Literature survey of the proposed Thesis work.
2. Project work shall preferably be related to work to be undertaken in the Thesis work.

SCHEME FOR M.TECH. (ECE) PART-TIME MODE

SEMESTER-I		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int**	**Ext**	**Total**	
MECES1-101	Advanced Communication Systems	4	0	0	40	60	100	4
MECES1-102	Advanced Digital Circuit Design	4	0	0	40	60	100	4
Department Elective–I (Select Any One)								
MECED1-111	Antenna System Design	4	0	0	40	60	100	4
MECED1-112	Microcontrollers & Embedded Systems							
MECED1-113	IoT & its Applications							
Total:		**12**	**0**	**0**	**120**	**180**	**300**	**12**

SEMESTER-2		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int**	**Ext**	**Total**	
MECES1-103	Soft Computing	4	0	0	40	60	100	4
Department Elective – II (Select Any One)								
MECED1-121	Information Theory & Coding	4	0	0	40	60	100	4
MECED1-122	Digital Image Processing							
MECED1-123	AI & Machine Learning							
MECES1-104	Research LAB-I	0	0	4	60	40	100	2
Total:		**8**	**0**	**4**	**140**	**160**	**300**	**10**

SEMESTER-III		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int**	**Ext**	**Total**	
MECES1-201	Wireless Adhoc & Sensor Networks	4	0	0	40	60	100	4
MECES1-202	Advanced Digital Signal Processing	4	0	0	40	60	100	4
Department Elective – III (Select Any One)								
MECED1-211	VHDL: Design, Synthesis & Simulation	4	0	0	40	60	100	4
MECED1 -212	Advanced Computer Architecture							
MECED1 -213	Deep Learning							
Total:		**12**	**0**	**0**	**120**	**180**	**300**	**12**

SEMESTER-IV		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int**	**Ext**	**Total**	
MECES1-203	Wireless & Mobile Communications	4	0	0	40	60	100	4
Department Elective – IV (Select Any One)								
MECED1-221	Optical Communication Systems	4	0	0	40	60	100	4
MECED1-222	Cloud Computing							
MECED1-223	Big Data Analytics							
MECES1-204	Research LAB-II	0	0	4	60	40	100	2
Total:		**8**	**0**	**4**	**140**	**160**	**300**	**10**

SEMESTER-V		Contact Hours			Marks			Credits
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int**	**Ext**	**Total**	
XXXXX	Open Elective	3	0	0	40	60	100	3
WWWWW	Research Methodology and IPR	4	0	0	40	60	100	4
MECES1-301	Project	0	0	--	60	40	100	6
MECES1-302	Seminar	0	0	2	100	--	100	1
Total:		**8**	**0**	**8**	**240**	**160**	**400**	**14**

SEMESTER-IV		Contact Hours			Marks		
Sub Code	**Sub Name**	**L**	**T**	**P**	**Internal**	**External**	**Total**
MECES1-401	Dissertation #	--	--	--	**Satisfactory / Not Satisfactory as per CBCS-2016**		
Total:		**--**	**--**	**--**	**--**		

Note: In addition, it is proposed that:

1. Seminar shall be preferably on the Literature survey of the proposed Thesis work.
2. Project work shall preferably be related to work to be undertaken in the Thesis work.

ADVANCED COMMUNICATION SYSTEM

Subject Code: MECES1-101 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives

This course is meant to give knowledge to students for understanding of the various advanced concepts & techniques and applications in Communication Systems

1. To familiarize the students with digital communication systems.
2. To understand about bandlimited channels and estimation techniques.
3. To familiarize with fading and fading channels.
4. To understand OFDM and other 4G techniques.

Course Outcomes

1. To understand the concept of complex baseband representation and orthogonalization procedure.
2. To analyze the performance of band-limited channels.
3. To evaluate the receiver performance in fading channels.
4. To differentiate b/w various OFDM issues.

UNIT-I (15 Hrs)

Introduction: Digital Communication System (Description of different modules of the block diagram), Complex baseband representation of signals, Gram-Schmidt Orthogonalization procedure. M-ary orthogonal signals, bi-orthogonal signals, Simplex signal waveforms.

UNIT-II (15 Hrs)

Band-limited channels: Pulse shape design for channels with ISI: Nyquist pulse, Partial response signaling (Duobinary and modified Duobinary pulses), demodulation, Maximum likelihood estimation technique.

UNIT-III (15 Hrs)

Communication over fading channels: Characteristics of fading channels, Rayleigh and Rician channels, Receiver performance-average SNR, outage probability, Amount of Fading and Average Bit/Symbol Error Rate. Statistical channel modeling of Rayleigh and Rician fading channels.

UNIT-IV (15 Hrs)

4G Technology /OFDM: Introduction to OFDM, Multicarrier Modulation and Cyclic Prefix, BER performance over AWGN and Rayleigh fading, OFDM Issues like PAPR, Frequency and Timing Offset.

Recommended Books:

1. G. Proakis and M. Salehi, 'Fundamentals of Communication Systems', Pearson Education, 2005**.**
2. S. Haykins, 'Communication Systems', 5th Edn., John Wiley, **2008**.
3. M.K. Simon, S.M. Hinedi and W.C. Lindsey, 'Digital Communication Techniques: Signaling and detection', PHI, **1995**.
4. W. Tomasi, 'Advanced Electronic Communication Systems'. 4th Edn., Pearson Education, 1998**.**
5. M.K. Simon and M.S. Alouini, 'Digital Communication over Fading Channels', **2000**.

ADVANCED DIGITAL CIRCUIT DESIGN

Subject Code: MECES1-102 **L T P C** **Duration: 60 Hrs**
4 0 0 4

Course Objectives:
This course shall provide the understanding to students about various conceptual techniques and their applications leading to Advanced Digital Circuit Design:

1. To understand codes, logic families and realization of logic gates.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the realization of circuit using multiplexers, decoders and PLDs

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Design of canonical functions based on composite gates.
2. Evaluate the minimization techniques, including VEM & glitches remedy.
3. Develop and analyze, combinational and sequential circuits.
4. Formulate and investigate PLD based lgic design.

UNIT-I (15 Hrs)

Weighted and non-weighted codes: Properties & Applications. Error detection & correction. Parity check and Hamming code, Canonical functions based array design, Positive/Negative logic based gates and their properties. Composite gates – XOR/AOI/OAI & applications. Multilevel NAND/NOR realizations.

UNIT-II (15 Hrs)

Switching algebra & theorems. Duality & its applications. Mapping/ Kitty corner/Offset adjacencies. Analytical simplification. VEM upto 6-variables. Analysis and synthesis of combinational circuit design. CLA. Design using Decoders/ Multiplexers. Scaling. Glitches/ Hazards & remedies in combinational circuit design.

UNIT-III (15 Hrs)

Debounce switch, Flip-flop conversions. Racing & remedies. Analysis and synthesis of synchronous/asynchronous sequential circuit design using characteristics equations, excitation tables & state transition diagrams. Mealy and Moore models. Registers & their applications. Analysis and synthesis of 4-bit asynchronous and synchronous counters.

UNIT-IV (15 Hrs)

A/D conversion mechanism, characteristics and comparisons. Realization of circuit using PLDs: PAL/PLA, their performance comparison. FPGA based design. Comparative aspects of IC logic family: TTL/CMOS & their variants. Interfacing of TTL and CMOS. FSM/ASM. 555-timer applications. Digital twin technology. Emerging technologies. Digital India applications.

Text/Reference Books:

1. Switching and Finite Automata Theory-Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.
2. Modern Digital Electronics - R. P. Jain, 3rd Edition, 2007 - Tata McGraw-Hill
3. Digital Design - Morris Mano, PHI, 4th Edition,2006
4. Introduction to Switching Theory and Logic Design - Fredriac J. Hill, Gerald R. Peterson, 3rd Ed., John Wiley & Sons Inc.
5. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.
6. Switching Theory and Logic Design - A. Anand Kumar, PHI, 2013.

SOFT COMPUTING

Subject Code: MECES1-103 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

This course is meant to give knowledge to students for understanding of the various concepts, techniques and applications in Soft Computing

1. To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
2. To implement soft computing based solutions for real-world problems.
3. To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.

Course Outcomes: After completion of course, students would be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
3. Apply genetic algorithms to combinatorial optimization problems.
4. Evaluate and compare solutions by various soft computing approaches for a given problem.

UNIT – I (15 Hrs)

Soft Computing: Introduction of soft computing, soft computing vs. hard computing, varioustypes of soft computing techniques, applications of soft computing.

Fuzzy Logic: Fuzzy set versus crisp set, basic concepts of fuzzy sets, membership functions,basic operations on fuzzy sets and its properties. Fuzzy relations versus Crisp relation,

Fuzzy rule base system: Fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, Fuzzy Inference Systems (FIS) – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models, Fuzzification and Defuzzification, fuzzy decision making & Applications of fuzzy logic.

UNIT – II (15 Hrs)

Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN and its applications. Neural Network architecture: Single layer and multilayer feed forward networks and recurrent networks. Course rules and equations: Perceptron, Hebb's, Delta, winner take all and out-star Course rules. Supervised Course Network: Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neuron, Back Propagation Network, Associative memory networks, Unsupervised Course Networks: Competitive networks, Adaptive Resonance Theory, Kohnen Self Organizing Map

UNIT – III (15 Hrs)

Genetic Algorithm: Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modelling: selection operator, cross over, mutation operator, Stopping Condition and GA flow, Constraints in GA, Applications of GA, Classification of GA.

UNIT – IV (15 Hrs)

Hybrid Soft Computing Techniques: An Introduction, Neuro-Fuzzy Hybrid Systems,Genetic Neuro-Hybrid systems, Genetic fuzzy Hybrid and fuzzy genetic hybrid systems

Recommended Books

1. S. Rajasekaran & G.A. Vijayalakshmi Pai, 'Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications', PHI Publication, 2011.
2. S.N. Sivanandam & S.N. Deepa, 'Principles of Soft Computing', WileyPublications, 2007.

Reference Books

1. Michael Negnevitsky, 'Artificial Intelligence', Pearson Education, New Delhi, 2008.
2. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', Wiley, 2010.

ANTENNA SYSTEM DESIGN

Course Code: MECED1-111 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. This course is meant to give knowledge to students for understanding of the various concepts, techniques and applications in Antenna System Design.
2. Study of propagation of waves through different media.
3. To study various types of antennas, antenna arrays and associated antenna parameters.
4. Familiarize the students with different design parameters of antennas.

Course Outcomes: After completion of course, students would be able to:

1. Review of EM wave propagation in free space & different media and radiating elements.
2. Analysis and characterization of antenna parameters.
3. Design and analysis of antennas arrays.
4. Design and analysis of antennsa for broadband applications.

UNIT-I (15 Hrs)

Review of electromagnetic fields, Displacement current, Maxwell's equations in free space, plane wave & uniform plane wave in free space. Electromagnetic radiations, Physical concept of radiation, Retarded potential, Radiation from a Hertizian dipole, monopole and a half wavedipole, Fields in the vicinity of an antenna and far field approximation.

UNIT-II (15 Hrs)

Antenna Parameters: Radiation pattern, Gain, Directive gain, Directivity, Reciprocity theorem & its applications, effective aperture, radiation resistance, terminal impedance, noise temperature, elementary ideas about self & mutual impedance, front-to-back ratio, antenna beam width, antenna bandwidth, antenna beam efficiency, antenna beam area or beam solid angle, polarization, antenna temperature.

UNIT-III (15 Hrs)

Antenna Arrays: Various forms of antenna arrays, arrays of point sources, non-isotropic but similar point sources, multiplication of patterns, arrays of n-isotropic sources of equal amplitude and spacing, Dolph-Tchebysceff arrays, continuous arrays, rectangular arrays.

UNIT-IV (15 Hrs)

Broadband Antennas: Travelling wave antennas helical antennas, Biconical antennas Sleeve antennas, and Principles of frequency independent antennas, Spiral antennas, and Log - periodic antennas.

Aperture antennas, scanning antennas, smart antennas. Long Wire antenna, folded dipole antenna, Yagi-Uda antenna, Slot antenna, Micro Strip or Patch antennas, Antenna measurements.

Recommended Books

1. J.D. Krauss, 'Antennas', McGraw Hill Inc., New York, **1991.**
2. Balanis A. Constantine, 'Antenna Theory, Analysis and Design', Wiley, New York.
3. K.D. Prasad, 'Antenna and Wave Propagation', 3rd Edn., Satya Prakashan, New Delhi.
4. W.L. Stutzman, G.A. Thieele, 'Antenna Theory and Design', Wiley, New York.

MICROCONTROLLERS AND EMBEDDED SYSTEMS

Subject Code: MECED1-112 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives

1. This course is meant to give knowledge to students for understanding of the various concepts, techniques and applications in Microcontrollers and Embedded Systems
2. To familiarize the students with typical embedded system.
3. To acquaint the students with ability to design and develop embedded system.
4. To introduce the students about ARM architecture and programming.

Course Outcomes

1. To understand and model a typical embedded system.
2. Design, development and analysis of embedded system.
3. To understanding of ARM architecture and ARM processor family.
4. Designing and programming of ARM processor.

UNIT-I (15 Hrs)

Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components. Characteristics and Quality Attributes of Embedded Systems: Hardware Software Co-Design and Program Modelling: Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modelling Language, Hardware Software Trade-offs.

UNIT-II (15 Hrs)

Embedded Hardware Design and Development: EDA Tools, how to Use EDA Tool, Schematic Design – Place wire, Bus, port, junction, creating part numbers, Design Rules check, Bill of materials, Netlist creation, PCB Layout Design – Building blocks, Component placement, PCB track routing.

UNIT-III (15 Hrs)

ARM Architecture: ARM Design Philosophy, Registers, Program Status Register,Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. ARM Programming Model – I: Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, ConditionalInstructions. ARM Programming Model – II: Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load- Store Instructions, Stack, Software Interrupt Instructions

UNIT-IV (15 Hrs)

ARM Programming: Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops

Memory Management: Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

Recommended Books:

1. Andrew N. Sloss, Dominic Symes, Chris Wright, 'ARM Systems Developer's Guides-Designing & Optimizing System Software', 1st Edn., Elsevier, **2008**.
2. K.V. Shibu, 'Introduction to Embedded Systems', 1st Edn., Tata McGraw Hill Education Private Limited, **2009**.

Reference Books:

1. Jonathan W. Valvano – Brookes / Cole, 'Embedded Microcomputer Systems, Real Time Interfacing', 1st Edn., Thomas Course, **1999**.
2. James K. Peckol, 'Embedded Systems – A contemporary Design Tool', 2nd Edn., John Weily, **2008**.

IoT & ITS APPLICATIONS

Subject Code: MECED1-113 **L T P C** **Duration: 60 Hrs**
4 0 0 4

Course Objectives:

1. This course is meant to give knowledge to students for understanding of the various concepts, techniques and applications of Internet of Things:
2. To learn the definition and significance of the Internet of Things.
3. To understand about SDN and data handling methods.
4. To explore the relationship between IoT and cloud computing.
5. To acquire knowledge about the different application-domain.

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Explore the interconnection and integration of the physical world and the cyber space.
2. Develop skills to build machine to machine communication.
3. Design and develop of IoT Devices.
4. Identify how IoT differs from traditional data collection systems.

UNIT-I (15 Hrs)

Introduction to Internet of Things (IoT): Definition, Characteristics, Evolution, Applications, IoT versus M2M (Machine to Machine) and IoT versus WoT (Web of Things). Sensing, Actuation, Sensors-Definition, Features, Classes. Sensor versus Transducers, Sensor Networks, UAV Networks, Actuator-Definition, Types (Hydraulic, Pneumatic, Electrical, Thermal, Magnetic and Mechanical).
IoT Networking: IoT Components, IoT Categories (Industrial and Consumer).
Connectivity Technologies: LAN, WAN, Node, Gateway and Proxy, IPv4 versus IPv6. Communication Protocols.

UNIT-II (15 Hrs)

Machine-to-Machine Communications: Introduction, Applications, Features.
Interoperability in IoT: Current Challenges in IoT, Requirement, Types (User and Device).
IoT Platform Overview: Features and Types of Arduino Board. Integration of Sensors and Actuators with Arduino, Introduction to Python and Raspberry Pi.

UNIT-III (15 Hrs)

Software-Defined Networking (SDN): Current Network and its limitations, Introduction to SDN, Current Network to SDN, SDN Architecture, Components of SDN, SDN for IoT, Benefits of Integrating SDN in IoT, Data Handling and Analytics.
Cloud Computing: Recent Trends in Computing, Components of Cloud Computing, Service Models, Comparison of Different Service Models.

UNIT-IV (15 Hrs)

Fog Computing: Introduction, its Need, Architecture and working of Fog, Advantages, Challenges and Applications of Fog.
IoT Applications: Smart Cities and Smart Homes-IoT Challenges in Smart Cities, Data Fusion and its Opportunity in IoT, Stages of Data Fusion. Connected Vehicles-Introduction, Challenges, Vehicle-to-Everything (V2X) Paradigm. Smart Grid-Introduction, Benefits of Smart Grid, Smart Grid Architecture. Industrial IoT.
Case Study: Agriculture, Healthcare and Activity Monitoring.

Text/Reference Books:

1. Raj Kamal, "Internet of Things - Architecture and Design Principles" McGrawHill
2. Mayur Ramgir, "Internet of Things - Architecture, Implementation, and Security", First Edition, Pearson Education.
3. Olivier Hersent, David Boswarthick and Omar Elloumi, "The Internet of Things: Key Applications and Protocols", 2nd Edition, Wiley.
4. Arsheep Bahga and Vijay Madisetti "Internet of Things: A Hands-On Approach" Orient Blackswan Publishers.

MOOCs Course Mapping:

"Introduction to Internet of Things" by Prof. Sudip Misra, Department of Computer Science and Engineering, IIT Kharagpur ***(https://nptel.ac.in/courses/106/105/106105166/)***

INFORMATION THEORY AND CODING

Subject Code: MECED1-121 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. This course is meant to provide the knowledge to students for understanding of the various concepts, techniques and applications of Information Theory & Coding:
2. To understand channel and source coding schemes.
3. To learn baseband and bandpass sampling theorems.
4. To understand various digital modulation techniques and its applications.
5. To understand waveform coding techniques and its uses.

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Apply various channel and source coding schemes.
2. Differentiate between baseband and bandpass sampling theorems.
3. Performance evaluation of various digital modulation techniques.
4. Applications of waveform coding techniques.

UNIT-1 (15 Hrs)

Elements of Information Theory: Source coding theorem, Huffman coding, Channel coding theorem, channel capacity theorem, Shenonfano theorem, entropy

UNIT-2 (15 Hrs)

Sampling Processes: Base band and band pass sampling theorems reconstruction from samples, Practical aspects of sampling and signal recovery TDM

UNIT-3 (15 Hrs)

Waveform Coding Techniques: PCM Channel noise and error probability DPCM and DM Coding speech at low bit rates Prediction and adaptive filters. Base band shaping for data transmission, PAM signals and their power spectra Nyquist criterion ISI and eye pattern Equalization.

UNIT- 4 (15 Hrs)

Digital Modulation Techniques: Binary and M-ary modulation techniques, Coherent and non-coherent detection, Bit Vs symbol error probability and bandwidth efficiency. Bit error analysis, using orthogonal Signalling. Error Control Coding Rationale for coding Linbear block codes, cyclic codes and convolution codes Viterbi decoding algorithm and trellis codes.

Recommended Books

1. J. Dass., S.K. Malik & P.K. Chatterjee, 'Principles of Digitals Communication', Wiley-Blackwel, **1991**.
2. Vera Pless,'Introduction to the Theory of Error Correcting Codes', 3rd Edn., **1998.**
3. Robert G. Gallanger, 'Information Theory and Reliable Communication', McGraw Hill, 1992**.**

DIGITAL IMAGE PROCESSING

Subject Code: MECED1-122 **L T P C** **Duration: 60 Hrs.**
4 0 0 4

Course Objectives:

1. This course is meant to provide the in depth knowledge to students for understanding of the various concepts, techniques and applications of Digital Image Processing:
2. To understand image transforms for image manipulations.
3. To learn different operations on image processing for many applications.
4. To understand the concept of image compression along with spatial and frequency domain techniques.
5. To understand various image processing applications.

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Apply various image transforms for image manipulations.
2. Deal with different operations on image processing for real time applications.
3. Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.
4. Develop various image processing applications.

UNIT I (15 Hrs)

D**igital Image Fundamentals:** Digital Image Processing: Definition, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Elements of visual perception – Image sampling and Quantization, Basic relationship between pixels – Basic geometric transformations - Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar.

UNIT II (15 Hrs)

Image Enhancement Techniques: Spatial Domain methods: Basic grey leveltransformation, Histogram Equalization, Image Subtraction, Image averaging, Spatial filtering: Smoothing, sharpening filters – Laplacian filters, Frequency domain filters: Smoothing – Sharpening filters, Homomorphic filtering.

UNIT III (15 Hrs)

Image Restoration: Model of Image Degradation/restoration process, Noise models, Inverse filtering, least mean square filtering, Blind image restoration, Singular value decomposition.

UNIT IV (15 Hrs)

Image Compression and Segmentation: Lossless compression: Variable length coding, LZW coding, bit plane coding, Predictive coding-DPCM, Lossy Compression: Transform coding, Wavelet coding, Basics of Image compression standards: JPEG, MPEG, Edge detection, Thresholding, Region Based segmentation.

Recommended Books

1. R.C. Gonzalez and R.E. Woods, 'Digital Image Processing', Pearson Education, **2002**.
2. G.A. Baxes, 'Digital Image Processing', Indian Edn., John Wiley, **1994.**
3. R.J. Schalkoff, 'Digital Image Processing and Computer Vision', John Wiley, **1989**.
4. Sid Ahmed, 'Image Processing', McGraw Hill, **1994**.
5. William K. Pratt, 'Digital Image Processing', John Willey, **2001**.
6. Millman Sonka, Vaclav Hlavac, Roger Boyle, 'Image Processing Analysis and Machine Vision', Broos/colic, Thompson Course, **1999**.
7. A.K. Jain, 'Fundamentals of Digital Image Processing', PHI, **2002**.
8. Chanda Dutta Magundar, 'Digital Image Processing and Applications', Prentice Hall of India, **2000**.

AI & MACHINE LEARNING

Subject Code: MECED1-123 **L T P C** **Duration: 60 Hrs.**
3 1 0 4

Course Objectives:

1. To study the concepts of Artificial Intelligence.
2. To learn the methods of solving problems using Artificial Intelligence.
3. To introduce Image processing and NLP as application areas of AI.

Course Outcomes: At the end of the course the students will demonstrate the ability to:

1. Apply the concepts of knowledge representation, planning and reasoning for real world applications.
2. Apply AI techniques to solve complex problems of Industry using machine learning.
3. Apply AI techniques to solve problems in Image Processing and NLP.
4. Learn to use AI with complete Ethics and Follow legal considerations.

UNIT-I (15 Hrs)

Introduction to AI: Introduction to artificial intelligence, History, AI applications, Problem spaces and search, Knowledge and rationality, Heuristic search strategies, Search and optimization (gradient descent), Adversarial search, Planning and scheduling.

UNIT-II (15 Hrs)

Knowledge Representation and Reasoning: Propositional logic, First-order logic, Knowledge representation, Quantifying uncertainty, Probabilistic reasoning.

UNIT-III (15 Hrs)

Machine Learning Supervised methods: What is machine learning, Supervised vs. unsupervised learning, Regression - linear, logistic, ridge, Classification – decision trees, SVM, random forests, Model performance evaluation – MSE, lift, AUC, Type 1 vs 2 errors.
Deep Learning: Neural networks and back-propagation, Convolutional neural networks, Recurrent neural networks and Long Short-Term Memory (LSTM) networks.
Machine Learning: Unsupervised Methods, Dimensionality reduction: PCA, Clustering – k-means, hierarchical clustering, Semi-supervised methods, Reinforcement learning, Choosing among machine learning techniques.

UNIT-IV (15 Hrs)

AI and Machine learning in industry Image Processing: Introduction to computer vision, Image segmentation, Object and motion detection, Object classification.
Natural Language Understanding: Intro to natural language understanding, Application of deep learning to NLP.
Ethical and Legal Considerations in AI: Privacy, Bias, AI and the future of work, Appropriate uses of AI, Future of AI: Emerging developments.

Recommended Text Books / Reference Books:

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rd
2. Edition, Prentice Hall, 2001.
3. Goodfellow, I., Bengio, Y. and Courville A., “Deep Learning”, MIT Press, 2016.
4. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill, 2008.
5. Trivedi, M.C., “A Classical Approach to Artifical Intelligence”, Khanna Publishing House, Delhi.
6. Artificial Intelligence, George F. Luger, Pearson Education, 2001.

RESEARCH LAB.-1

Subject Code: MECES1-104 **L T P C**
4 0 0 4

Course Objectives

1. To acquaint the students with state-of-the-art software's related to Electronics and Communications.
2. To prepare the students to apply the software tools in experimentation, application and project.

Course Outcomes: At the end of the course the students shall demonstrate the ability of:

1. Using of various software tools available in the field of ECE pertaining to their curriculum.
2. Application of these toolboxes for developing experiments/applications/project work etc.

List of Experiments

Design and development of experiments shall cover the areas including but not restricted to:

1. Combinational Circuit Design
2. Sequential Circuit design
3. Simulation of different digital modulation techniques and calculation of BER
4. Design and testing of digital communication system through simulation
5. Problem solving through different Fuzzy based models including Mamdani & Suzeno Models
6. Simulation based design and development of Anteena in 4G/5G applications
7. Simulation based design and development of digital signal processing applications
8. Speech processing using Wavelet toolbox
9. Image processing with or without Image/Wavlet toolbox
10. Machine Learning Basics

ਮਹਾਰਾਜਾ ਰਣਜੀਤ ਸਿੰਘ ਪੰਜਾਬ ਤਕਨੀਕੀ ਯੂਨੀਵਰਸਿਟੀ, ਬਠਿੰਡਾ
ਡੱਬਵਾਲੀ ਰੋਡ, ਬਠਿੰਡਾ - 151001
Maharaja Ranjit Singh Punjab Technical University
DABWALI ROAD, BATHINDA-151001
[A State University Estb. by Govt. of Punjab Act No. 5(2015) u/s 2(f) & Approved u/s 12B of UGC Act, 1956]

ਐਸੋ. ਡੀਨ (ਅਕਾਦਮਿਕ ਮਾਮਲੇ) **Associate Dean (Academic Affairs)**

Ref. No.: DAA/MRSPTU/Notifications/175 **Date:** 11.09.2023

CORRIGENDUM

Guidelines regarding Conduct, Progress, and Evaluation of MTech Dissertation

In reference to the earlier notification issued by this office vide no. DAA/MRSPTU/ Notifications/142 dated 10.08.2022, it is to inform you that as per the decision of the Academic Council in its 8th Meeting held on 05.04.2023 the lines *"The panel shall award a Letter Grade to the student in line with CBCS-2016 regulations"* shall be read as ***"The Evaluation will not be Letter Grade. It shall be satisfactory/unsatisfactory"***.

Associate Dean (Academic Affairs),
MRSPTU, Bathinda

Copy to:

1. PA to Vice Chancellor, MRSPTU for information to the Hon'ble Vice Chancellor please.
2. Registrar, MRSPTU, Bathinda
3. CoE, MRSPTU, Bathinda
4. Prof. I/C, ITES, MRSPTU, Bathinda for uploading this on University website.
5. Heads/Directors/Principals of University Main Campus/ GZSCCET/ PITs/ PSAEC, Patiala/All affiliated colleges of MRSPTU through E-mail

SEMESTER 7th
Total Marks =700 Total Credits = 20

Subject Code	Subject	Period			Credits	External	Internal	Total
		L	T	P				
BTEXS1-701	Non-Conventional Yarn Manufacture	3	0	0	3	60	40	100
BTEXS1-702	Garment Manufacturing Technology	3	1	0	4	60	40	100
BTEXS1-703	Apparel Merchandising and Management	3	0	0	3	60	40	100
BTEXS1-704	Training – III	0	0	4	2	40	60	100
BTEXS1-705	Seminar	0	0	2	1	40	60	100
BTEXS1-801	Mechanics of Textile Process	3	1	0	4	60	40	100
BTEXS1-802	Mill Planning & Management	3	0	0	3	60	40	100
BMNCC0-007	Advisory Counselling	1	0	0	0	0	0	0
Total		16	2	6	20	380	320	700

1. Rjeev

SEMESTER- 8th
Total Marks = 500 Total Credits = 17

Subject Code	Subject	Period			Credits	External	Internal	Total
		L	T	P				
Departmental Elective – I (Select any one)		3	1	0	4	60	40	100
BTEXD1-811	Technical Textiles							
BTEXD1-812	Advancement in Manmade Fibres							
BTEXD1-813	High Performance & Specialty Fibres							
Departmental Elective – II (Select any one)		3	0	0	3	60	40	100
BTEXDI-721	Process Control in Textile Chemical Processing							
BTEXDI-722	Marketing & Financial Management in Textiles							
BTEXD1-723	Entrepreneurship development and management in Textile							
Departmental Elective – III (Select any one)								
BTEXDI-711	Advances in Fabric Structure	3	1	0	4	60	40	100
BTEXDI-712	Texturing Technology							
BTEXDI-713	Post Spinning Operation							
xxxx	Open Elective	3	0	0	3	60	40	100
BTEXS1-803	Project	0	0	6	3	40	60	100
BMNCC0-007	Advisory Counselling	1	0	0	0	0	0	0
Total		13	2	6	17	280	220	500

1. Rajeev 2.

Maharaja Ranjit Singh Punjab Technical University
Dabwali Road, Bathinda-151001
(A State Technical University Established by Government of Punjab Act No.5 (2015) u/s 2(f)
& approved u/s 12B of UGC Act 1956)

Ref No. HEED/ 9369

Dated: 26-05-2023

Board of Studies-Electrical Engineering

Minutes of Meeting

Agenda: Compliance of MoM of 8th Academic Council regarding Shifting of Core Courses of B. Tech Electrical Engineering 2018 Scheme for GZSCCET, MRSPTU Bathinda.

In compliance of Minutes of meeting of 8th Academic Council held on 05.4.2023, Implementation of Item No. 08.10 "Ratification of guidelines regarding B. Tech final year students to join Internship during 8th semester", Concerned Chairman BoS will do a comprehensive exercise to shift core subjects from 8th semester to previous semesters (Reference No. 849, Dated 06/4/2023).

Action: The faculty of department of electrical engineering GZSCCET, Bathinda made the required changes/shifting in semester 7 & 8 and Chairperson proposed the same to all members of board of studies (through email on May 19, 2023) for kind consent or observations.

The changes/shifting have been made in semester 7th and 8th scheme as follows, keeping the contact hours, marks, credits, and syllabus contents remain same.

Semester 7TH		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BELES1-701	Power System Analysis	3	0	0	40	60	100	3
BELES1-702	Introduction to Industry 4.0	2	0	0	40	60	100	2
BELES1-703	Power System Analysis Lab	0	0	2	60	40	100	1
BELES1-704	Minor Project	0	0	4	60	40	100	2
BELES1-705	Summer Internship (6-Week)	0	0	--	60	40	100	3
BELES1-801	Generation & Economics of Electric Power	3	0	0	40	60	100	3

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Departmental Elective - IV (Select any One)		3	0	0	40	60	100	3
BELED1-711	High Voltage Engineering							
BELED1-712	Electrical & Hybrid Vehicles							
BELED1-713	Introduction to Digital Protection							
BELED1-714	Digital Signal Processing							
Departmental Elective - V (Select any One)		3	0	0	40	60	100	3
BELED1-811	Electrical Energy Conservation & Auditing							
BELED1-812	Power System Dynamics & Control							
BELED1-813	Control Systems Design							
BELED1-814	Advanced Electric Drives							
BELED1-815	Restructuring of Power Industry							
Total		-	-	-	**380**	**420**	**800**	**20**

Semester 8TH		**Contact Hours**			**Max Marks**		**Total Marks**	**Credits**
Subject Code	**Subject Name**	**L**	**T**	**P**	**Int.**	**Ext.**		
BELES1-802	Major Project	0	0	8	60	40	100	4
XXXXX	**Open-Elective***	3	0	0	40	60	100	3
XXXXX	**Open-Elective ***	3	0	0	40	60	100	3
XXXXX	**Open-Elective***	3	0	0	40	60	100	3
BHSMC0-024	Project Management & Entrepreneurship	3	0	0	40	60	100	3
Total		-	-	-	**220**	**280**	**500**	**16**

It is pertinent to mention that these changes/shifting of courses in scheme are only for program running in GZSCCET Bathinda and shall be enforce for 2020 batch & onwards.

The consent of members is as follows (copy attached).

BoS Members	**Comments received**
Dr. Yadwinder Singh Brar	Acknowledged
Dr. Kanwardeep Singh	Agreed

Kanwardeep

2/3

Dr. Ved Parkash Arora	Agree with this shifting
Dr. Amit Kumar Manocha	I agreed upon this as stated
Dr. Harsimarn Singh	I agree with above changes
Dr. Lakhwinder Singh	Agreed with shifting of subjects
Dr. Gagandeep Kaur	Agreed

Recommendations: As per the consent of board members, these changes/shifting are recommended for approval from Office of Dean Academic Affairs / Academic Council.

Submitted please.

26/5/2023

Dr. Gagandeep Kaur
Head & Chairperson -BoS Electrical Engineering
MRSPTU Bathinda

REVISED B.TECH. COMPUTER SCIENCE & ENGINEERING SYLLABUS 2020BATCH ONWARDS

(7thSEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSES1-701	*Project-II	0	0	4	60	40	100	2
BCSES1-702	***Training-III	-	-	-	60	40	100	4
	Departmental Elective-IV	3	0	0	40	60	100	3
BCSED1-711	Distributed Operating System							
BCSED1712	Soft Computing							
BCSED1-713	Human Computer Interaction							
BCSED1-714	Ad-hoc & Sensor Networks							
	Departmental Elective-V	3	0	0	40	60	100	3
BCSED1-721	Bioinformatics							
BCSED1-722	Image processing							
BCSED1-723	Cryptography & Network Security							
BCSED1-724	Artificial Intelligence							
XXXX	**Open Elective***	3	0	0	40	60	100	3
BMNCC0-002	Environmental Sciences	2	0	0	100	00	100	0
	Mandatory Courses- noncredit****	2	0	0	100	00	100	0
BMNCC0-001	Constitution of India							
BMNCC0-006	Essence of Indian Knowledge Tradition							
	Total	-	-	-	440	260	700	15

*Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

**Continued from VII Semester, Project work, seminar and internship in industry or at appropriate work place

***During the summer vacation after 6th semester.

******choose any one subject from mandatory Courses.

(8th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Int.	Ext.	Total	
BCSES1-801	Project-III**	0	0	10	60	40	100	5
	Departmental Elective-VI	3	0	0	40	60	100	3
BCSED1-811	Enterprise Resource Planning							
BCSED1-812	Internet of things							
BCSED1-813	Advanced Database Management Systems							
BCSED1-814	Software Project Management							
XXXX	**Open Elective***	3	0	0	40	60	100	3
XXXX	**Open Elective***	3	0	0	40	60	100	3
	Total	-	-	-	180	220	400	14

*Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

**Project III to be made by student during the semester.

HMED/ 1833

Date 15/09/23

Minutes of Meeting

Agenda: Revision of B Tech Mechanical Engineering 7th and 8th-semester syllabus.

A BOS meeting has been held online (google meet) at 4:00 pm on June 14, 2023 (Wednesday). The following BoS members of the Mechanical Engineering Departments are available in the meeting;

1. Prof. JS Tiwana (Chairman)
2. Prof. Harpreet Singh IIT Ropar (Member)
3. Prof. Harwinder Singh, GNDEC Ludhiana (Member)
4. Prof. TS Sarao, BFCET, Bathinda (Member)
5. Prof. Manoj Mittal, FCET, Ferozepur (Member)
6. Prof Hajoor Singh, YCE, Talwandi Sabo (Member)
7. Mr. Narender Kirar, AGM, Guru Gobind Singh Refinery, Bathinda (Member)
8. Prof. Balwinder Singh (Member)
9. Prof Harish Garg (Member)
10. Prof. Rajesh Gupta (Member)
11. Prof. Naveen Singla (Member)
12. Prof. Kamaljit Singh Boparai (Member)

During the meeting, the following points were discussed and concluded:

1. 8th semester B Tech Mechanical Engineering students have the choice between two options: Industrial training or selecting four-course subjects, consisting of 2 electives and 2 open electives. Both options carry equal credits and marks, including internal and external assessments.
2. The Department will follow the guidelines provided by CRC Department MRSPTU, Bathinda, to assess and evaluate Industrial Training.
3. The Major Project (BMECS1-801) has been shifted to the 7th semester, maintaining the same credit and marking system for both internal and external evaluations.

Finally, the meeting concluded with a vote of thanks by the chairman.

15/9/23

Head of Department,
Mechanical Engineering.

SEMESTER-VII

Subject Code	Course Title	Contact Hrs.			Max. Marks			Credits
		L	T	P	Int.	Ext.	Total	
BMECS1-701	Refrigeration & Air Conditioning	3	0	0	40	60	100	3
YYYYY	Department Elective -IV	3	0	0	40	60	100	3
XXXXX	Open Elective$	3	0	0	40	60	100	3
YYYYY	Department Elective -V	3	0	0	40	60	100	3
BMECS1-702	*Mechanical Engineering Lab-VII (DMS&IAR Lab) Lab)	0	0	2	60	40	100	1
BMECS1-703	** Mechanical Engineering Lab-VIII (RAC Lab)	0	0	2	60	40	100	1
BMECS1-704	***Industrial Training	0	0	--	60	40	100	3
	Major Project	0	0	6	60	40	100	3
Total		-	-	-	400	400	800	20

$ Open Electives (OE) can also be taken from existing lists of Open Elective-I, Open Elective-II and Open Elective-III subject lists.

***DMS- Design & Manufacturing Software**

IAR – Industrial Automation and Robotics

****RAC- Refrigeration & Air Conditioning**

*****The industrial Training to be imparted at the end of 6th semester for Six weeks.**

Department Elective-IV (Choose any one from the following)

1. Computer Aided Design– **BMECD1-711**
2. Finite Element Analysis– **BMECD1-712**
3. Additive Manufacturing– **BMECD1-713**
4. Heat Exchanger Design– **BMECD1-714**

Department Elective-V (Choose any one from the following)

1. Non-Destructive Testing– **BMECD1-721**
2. Composite Materials– **BMECD1-722**
3. Mechanical Vibrations – **BMECD1-723**
4. Advance Fluid Mechanics– **BMECD1-724**

SEMESTER-VIII

Subject Code	Course Title	Contact Hrs.			Max. Marks			Credits
		L	T	P	Int.	Ext.	Total	
YYYYY	Department Elective -VI	3	0	0	40	60	100	3
YYYYY	Department Elective -VII	3	0	0	40	60	100	3
XXXXX	Open Elective$	3	0	0	40	60	100	3
XXXXX	Open Elective$	3	0	0	40	60	100	3
OR								
	Industrial Training				160	240	400	12
Total		-	-	-	**160**	**240**	**400**	**12**

$ Open Electives (OE) can also be taken from existing lists of Open Elective-I, Open Elective-II and Open Elective-III subject lists.

Department Elective-VI (Choose any one from the following)

1. Industrial Safety & Environment– **BMECD1-811**
2. Process Planning & Cost Estimation– **BMECD1-812**
3. Total Quality Management– **BMECD1-813**
4. Principles of Management– **BMECD1-814**
5. Energy Conservation and Management– **BMECD1-815**

Department Elective-VII (Choose any one from the following)

1. Operations Research– **BMECD1-821**
2. Operation Management– **BMECD1-822**
3. Sustainable Manufacturing– **BMECD1-823**
4. Work Study & Ergonomics– **BMECD1-824**

HCED/189

12/05/2023

GIANI ZAIL SINGH CAMPUS COLLEGE OF ENGINEERING & TECHNOLOGY

MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY, BATHINDA

DEPARTMENT OF CIVIL ENGINEERING

Minutes of BOS Meeting

BOS Civil Engineering MRSPTU meeting was held on 12.05.2023 at 3:30PM in offline as well as online mode. The following were present in offline mode:

1. Dr. Sanjiv Kumar Aggarwal
2. Dr. Manjeet Bansal
3. Dr. Gurpreet Singh Bath

Whereas following were present in online mode:

1. Dr. SP Singh
2. Dr. Bal Krishan
3. Dr. Prashant Garg
4. Er. Tanu
5. Er. Pankaj Mittal

The following decisions were taken unanimously:

Following subject of 8th semester of current Teaching Scheme applicable to 2020 Batch & onwards be shifted to 7th semester.

1. Design of Steel Structures-II (BCIES1-821) (03 Credits)

To balance semester wise credits, following elective subjects of 7th Semester of the above study scheme is proposed to be shifted to 8th semester.

Departmental Elective –VI (03 Credits) (BCIED1-76X)

Prestressed Concrete (BCIED1-761)

Pavement Construction and Management (BCIED1-762)

Soil Reinforcing Techniques (BCIED1-763)

12/05/2023

Chairperson
BOS in Civil Engg
MRSPTU, Bathinda

15/5/23
Asstt DRA-II

Action taken of 8th A/c and
Include in Agenda of Faculty of Enggg Tech
and fn-a

15/05/2023

Dean Academics
MRSPTU, Bathinda

CDEO

New Changed Study Scheme of 7th and 8th Semester

MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS
2019 BATCH ONWARDS

Total Credits= 21

Semester-VII (B. Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCIES1-721	Transportation Engineering-II	3	0	0	40	60	100	3
BCIES1-722	Earthquake Engineering	2	0	0	40	60	100	2
BCIES1-821	Design of Steel Structures-II	3	0	0	40	60	100	3
Departmental Elective-V (Select any one)								
BCIED1-751	Water Recourses Engineering	3	0	0	40	60	100	3
BCIED1-752	Air & Noise Pollution and Control							
BCIED1-753	Pipeline Engineering							
XXXXX	Open Elective**	3	0	0	40	60	100	3
BCIES1-723	Software Lab	0	0	2	60	40	100	1
BCIES1-724	Project-I	0	0	6	60	40	100	3
BCIES1-725	Training-III*	0	0	0	60	40	100	3
Total		-	-	-	**380**	**420**	**800**	**21**

*Internship will be imparted at the end of 6th semesteras per AICTE Internship Policy.

**Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

12.5.23 12/5/23

New Changed Study Scheme of 7th and 8th Semester

MRSPTU B.TECH. CIVIL ENGINEERING SYLLABUS
2019 BATCH ONWARDS

Total Credits= 16

Semester-VIII (B. Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
Departmental Elective-VI (Select any one)		3	0	0	40	60	100	3
BCIED1-851	Bridge Engineering							
BCIED1-852	Design of Industrial Structures							
BCIED1-853	Disaster Management							
Departmental Elective-VII (Select any one)		3	0	0	40	60	100	3
BCIED1-861	Engineering Hydrology							
BCIED1-862	Port and Harbour Engineering							
BCIED1-863	Geotechnical Design							
Departmental Elective-VIII (Select any one)		3	0	0	40	60	100	3
BCIED1-761	Prestressed Concrete							
BCIED1-762	Pavement Construction and Management							
BCIED1-763	Soil Reinforcing Techniques							
XXXXX	Open Elective**	3	0	0	60	40	100	3
BCIES1-822	Project-II	0	0	6	60	40	100	3
BCIES1-823	Advanced Testing Lab	0	0	2	60	40	100	1
BMNCC0-006	Essence of Indian Knowledge Tradition(Mandatory Course)	2	0	0	100	---	100	0
Total		-	-	-	**400**	**300**	**700**	**16**

**Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

12.5.23 19/7/23

Giani Zail Singh Campus College of Engineering & Technology ਗਿਆਨੀ ਜ਼ੈਲ ਸਿੰਘ ਕੈਂਪਸ ਕਾਲਜ ਆਫ ਇੰਜਨੀਅਰਿੰਗ ਐਂਡ ਟੈਕਨਾਲੋਜੀ
MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
(Estb vide Punjab Act No. 5(2015) u/s 2(f) and 12 B of UGC Act, 1956)
Dabwali Road, Bathinda (Punjab) -151001
ਮਹਾਰਾਜਾ ਰਣਜੀਤ ਸਿੰਘ ਪੰਜਾਬ ਟੈਕਨੀਕਲ, ਯੂਨੀਵਰਸਿਟੀ
(ਯੂ.ਜੀ.ਸੀ ਵੱਲੋ 2(ਐੱਫ) ਅਤੇ 12(ਬੀ) ਅਧੀਨ ਮਾਨਤਾ ਪ੍ਰਾਪਤ)
ਡੱਬਵਾਲੀ ਰੋਡ, ਬਠਿੰਡਾ (ਪੰਜਾਬ) - 151001
Estd.1989
HEAD (Electronics & Comm Engg Deptt)
ਮੁੱਖੀ (ਇਲੈਕਟ੍ਰੋਨਿਕਸ ਐਂਡ ਕੰਮਿਊਨੀਕੇਸ਼ਨ ਇੰਜ. ਵਿਭਾਗ)
www.gzscampus.org Contact No.: +91-87250-72480 eceptugzs@gmail.com

Ref. No.: HECD/ 284 Date: 21-09-2023

Minutes of Meeting of BoC ECE held on 20-09-2023

A prescheduled meeting of BoC ECE and other faculty members of deptt was held on 20-09-2023, 3:00 pm onwards in the o/o HoD ECE with HoD ECE in chair. The following members were present:

1) Prof (Dr) Savina Bansal *(Member)*
2) Prof (Dr) R K Bansal *(Member)*
3) Dr Shweta Rani *(Member)*
4) Dr Manoj Sharma *(Member)*

Following faculy members also joined:

1) Er Sukhjinder Singh *(AP ECE)*
2) Er. Amandeep Kaur *(AP ECE)*
3) Er. Anumeet Kaur *(AP ECE)*

The following decisions were unanimously arrieved at:

A. In reference to item No 8.10 of Ref. No. 849 dt 06-04-2023 the following arrangement of courses in the study scheme of 7th & 8th semesters of B Tech ECE for 2020 batch students is proposed, to facilitate them to undergo Internship in 8th semester as per the notified MRSPTU guidelines:

a. Department Elective-VI & -VII Courses (currently in 8th semester), for the students opting for Internship/Industrial Training in 8th semester may be:
   I. either offered in currently running 7th Semester (Aug-Dec 2023)
   II. or students can clear these courses during 8th Semester (Jan-June 2024) through MOOCs/Swayam platform.

b. Project Stage-I (BECES1-701) of 7th semester may be offered in 8th Semester as a subcomponent of Internship.

c. Project Stage-I (BECES1-701), Project Stage-II (BECES!-801) along with the course Project Management and Entrepreneurship (BHSMC0-024) and Open Elective course of 8th semester may be considered equivalent to Internship/Industrial Training inline with notification 150 dt 05-12-2022.

d. Students shall have to undertake have the mandatory non-credit course Indian Traditional Knowledge (MC) (BMNCC0-006) in 7th Semester (Aug-Dec-2023)/through MOOCs/Swayam platform/in non-attending mode in 8th semester. In non-attaending case, students shall be offered on-line assistance (if needed so) at the univ end.

21/09/23

e. Students opting for Internship/Industrial Training in 8th semester have to submit industry based Project-I/II report as a subcomponent of training report to meet the requirements of partial fulfillment of the BTech ECE degree.

f. Evaluation of student for Internship/Industrial Training shall be as per notified MRSPTU guidelines.

g. The above scheme shall be applicable to 2020 admitted students only and shall not to be treated as precedence for other batches of B Tech ECE program.

The proposed arrangement shall be put up before next BoS ECE for approval.

B. As desired by o/o ADDA, MRSPTU via email, the list of experiments for Research Lab-I of M Tech ECE (Full Time & Part Time) was prepared and proposed to be put up before next BoS ECE for approval.

21-09-23

(HOD ECED)
GZSCCET, MRSPTU, Bathinda

REVISED STUDY SCHEME B TECH ECE (7-8 SEMESTER)

FOR STUDENTS OPTING FOR INTERNSHIP IN 8TH SEMESTER (2020 BATCH ONLY)

Total Contact Hours= 22 **Total Marks= 700** **Total Credits= 22**

Semester 7th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BECED1-7XX	Departmental Elective-III	3	0	0	40	60	100	3
BECED1-7XX	Departmental Elective-IV	3	0	0	40	60	100	3
BECED1-7XX	Departmental Elective-V	3	0	0	40	60	100	3
BECED1-8XX	Department Elective-VI*	3	0	0	40	60	100	3
BECED1-8XX	Department Elective-VII*	3	0	0	40	60	100	3
BMNCC0-102	Environment Science (MC)	2	0	0	--	--	--	--
BMNCC0-006	Indian Traditional Knowledge (MC)*	2	0	0	--	--	--	--
XXXXX	Open Elective*	3	0	0	40	60	100	3
BECES1 -702	Training-III	--	--	--	60	40	100	4
Departmental Elective – III (Select any one)								
BECED1-711	Fiber Optic Communications							
BECED1-712	Mobile Communication and Networks							
Departmental Elective – IV (Select any one)								
BECED1-721	Parallel Processing							
BECED1-722	Scientific Computing							
BECED1-723	Neural Network & Fuzzy Logic							
Departmental Elective – V (Select any one)								
BECED1-731	VLSI Technology							
BECED1-732	CMOS Design							
BECED1-733	High Speed Electronics							
Departmental Elective – VI (Select any one)								
BECED1-811	Wireless Sensor Networks							
BECED1-812	Satellite Communication							
BECED1-813	Error Correcting Codes							
Departmental Elective – VII (Select any one)								
BECED1-821	Machine Learning							
BECED1-822	Data Mining & Big Data							
BECED1-823	Artificial Intelligence							
BECED1-824	Internet of Things							
Total		22	0	0	300	400	700	22

*- These courses can be opted in 8th semester through MOOCs/SWAYAM platform along with Internship/ Industrial Training.

Total Contact Hours= 22 **Total Marks= 600** **Total Credits= 13**

Semester 8th			Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name		L	T	P	Int.	Ext.		
BECES1 -701	Project Stage-I	Industrial Training/ Internship	0	0	4	60	40	100	2
BECES1 -801	Project Stage-II		0	0	10	120	80	200	5
BHSMC0-024	Project Management and Entrepreneurship		3	0	0	40	60	100	3
XXXXX	Open Elective		3	0	0	40	60	100	3
BMNCC0-006	Indian Traditional Knowledge (MC)*		2	0	0	--	--	--	--
		Total	**8**	**0**	**14**	**260**	**240**	**500**	**13**

*- This course can also be opted in 7th semester (Aug-Dec 2023).

RESEARCH LAB.-1

Subject Code: MECES1-104 **L T P C**

0 0 4 2

Course Objectives

1. To acquaint the students with state-of-the-art software's related to Electronics and Communications.
2. To prepare the students to apply the software tools in experimentation, application and project.

Course Outcomes: At the end of the course the students shall demonstrate the ability of:

1. Using of various software tools available in the field of ECE pertaining to their curriculum.
2. Application of these toolboxes for developing experiments/applications/project work etc.

List of Experiments

Design and development of experiments shall cover the areas including but not restricted to:

1. Combinational Circuit Design
2. Sequential Circuit design
3. Simulation of different digital modulation techniques and calculation of BER
4. Design and testing of digital communication system through simulation
5. Problem solving through different Fuzzy based models including Mamdani & Suzeno Models
6. Simulation based design and development of Anteena in 4G/5G applications
7. Simulation based design and development of digital signal processing applications
8. Speech processing using Wavelet toolbox
9. Image processing with or without Image/Wavlet toolbox
10. Machine Learning Basics

MINUTES OF MEETING

CRC/1239
20/9/23

A committee was constituted vide Ref. no. DAA/MRSPTU/2022/3975, dated 28.10.2022 to finalise a proposal to allow the BTech final year students to join internship during their 8th semester of study. A meeting of the committee was held on 13th September 2023 in the office of Campus Director, GZSCCET, MRSPTU, Bathinda. The following members attended the meeting:

1. Dr Sanjiv Kumar Aggarwal, Campus Director, GZSCCET, Bathinda
2. Dr Kawaljit Singh Sandhu, Associate Dean Academics Affairs, MRSPTU, Bathinda
3. Dr Rajesh Gupta, PI, Corporate Resource Centre, MRSPTU, Bathinda
4. Er. Harjot Singh, Director, Training & Placement, MRSPTU, Bathinda
5. Dr Satnam Singh, Assistant Dean Academics Affairs, MRSPTU, Bathinda

At the outset, PI (CRC) apprised the members that as per the job requirements of industry and demand of students for getting better opportunities for placements, there is a pressing need for permitting students of BTech course of GZSCCET, MRSPTU, Bathinda to attend internship during their 8th semester of study. But the current study schemes of BTech programs of all branches have 8th semester as teaching semester. The committee deliberated upon this issue in detail and made the following recommendations:

1. The proposal shall be applicable to 2020 batch BTech students of GZSCCET, MRSPTU Bathinda only.
2. The following two categories of students shall be allowed to attend internship during 8th semester of their BTech course, in lieu of their regular teaching semester:
   (a) The student has been given placement offer by a company during the 7th semester itself, and the company has made it mandatory for the student to join the company for internship for the entire duration of the 8th semester (Jan-Jun 2024).
   (b) The students who have been offered internship from any company of National or International repute for undergoing internship for entire duration of the 8th semester (Jan-Jun 2024).
3. The students of both of the above categories (a) and (b) shall submit a formal application to the office of CRC, before December 15th, 2023 enclosing all supporting documents including placement/internship offer letter. All such applications shall be scrutinized by the following committee:
   (a) Campus Director, GZSCCET
   (b) Professor Incharge CRC
   (c) Director Training and Placement
   (d) Respective Head of the department
   (e) Senior most faculty member from department

   The final list of students permitted to undergo internship shall be announced by the committee before December 31st, 2023.
4. The number of credits for internship undertaken by the students shall be equal to the number of credits prescribed for 8th semester of study scheme of their respective branches.
5. The students should exercise due diligence while choosing the internship option. Once request to join internship of a student is approved, he/she cannot join back the college for attending classes in the 8th semester and he/she has to complete the internship in the allowed industry/company. In case the student could not submit the internship completion certificate, he/she shall be considered detained in this semester (Jan-Jun 2024).

13/9/23

13.9.23

6. After joining the internship, the student shall have to fulfill the following requirements:
   (a) The student has to submit the joining letter of the internship in the office of respective HOD within seven days of the start of internship or latest by 30/01/2024.
   (b) He/she cannot change the company in between the internship.
   (c) The student has to complete at least 4 months duration of internship.
   (d) A minimum of 75% attendance at the internship is compulsory to avoid detention in 8th semester.
   (e) The student has to maintain the Daily Diary during the internship and submit it to the concerned department along with his/her Attendance Report, Comprehensive Internship Report and Internship Completion Certificate duly signed by company official, towards the end of semester for evaluation purposes.
   (f) The student has to go through the evaluation process as decided by department, institute and university.
   (g) Department, institute or university officials can contact or visit the company anytime to carry out inspection of the student during internship.
   (h) The student may be asked anytime to share his/her location during the period of internship.
7. The following process of evaluation shall be followed for internship:

Internal evaluation			External evaluation	
First on-site* evaluation by concerned department (During first two months of internship)	100		Evaluation by company official/ internship incharge	100
Second on-site* evaluation by concerned department (During next two months of internship)	100		Evaluation in the department (External viva/presentation at the end of semester)	100
Evaluation in the department (Internal viva/presentation at the end of semester)	100			
Total internal marks	300		Total external marks	200
The internal and external evaluation marks of students shall be sent to the COE for award of letter grade and SGPA.				

** on-line evaluation may be carried out for international and distant domestic locations.*

13.9.23

Dr Sanjiv Kumar Aggarwal
Campus Director, GZSCET

Dr Kanwaljit Sngh Sandhu
Associate DAA, MRSPTU

13/9/23

Dr Rajesh Gupta
PI CRC, MRSPTU

Er Harjot Singh Sidhu
Director, T&P, MRSPTU

Dr Satnam Singh
ADAA, MRSPTU

Submitted for approval please.

VICE CHANCELLOR, MRSPTU, BATHINDA

Maharaja Ranjit Singh Punjab Technical University
DIARY No. VC/ 960
DATE 25/09/2023
Bathinda (Pb.)

25/9/2023

GROUP-A
1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS1-101	Physics (Semiconductor Physics)	3	1	0	40	60	100	4
BMATH1-101	Mathematics-I (Calculus, Linear Algebra)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS1-102	Physics (Semiconductor Physics) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
BMNCC0-010	Universal Humanvalues – I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		15	3	10	540	360	900	19

Note:

1. There will be Induction Programme of 3 weeks before start of normal classes.
2. Drug Abuse: Problem, Management and Prevention and Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure atleast E grade in each of them.

* As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH1-201	Mathematics-II (Probability and Statistics)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
Total		12	2	12	400	400	800	20

Note:

1. Marks of 4 Week Manufacturing Practices Training during Summer Vacation will beincluded in 3rdSemester

(3rd SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMATH1-301	Calculus and Ordinary Differential Equation	3	0	0	40	60	100	3
BCSES1-301	Computer Peripherals & Interfaces	3	0	0	40	60	100	3
BCSES1-302	Data structure &Algorithms	3	1	0	40	60	100	4
BCSES1-303	Digital Electronics	3	1	0	40	60	100	4
BCSES1-304	Data structure & Algorithms Laboratory	0	0	4	60	40	100	2
BCSES1-305	Digital Electronics Laboratory	0	0	2	60	40	100	1
BCSES1-306	IT Workshop (SciLab / MATLAB) Laboratory	0	0	4	60	40	100	2
BCSES1-307	Training-I*	-	-	-	60	40	100	3
BHSMC0-007	Development of Societies	3	0	0	40	60	100	3
Total 5 Theory &3 Lab. Courses		**15**	**2**	**10**	**440**	**460**	**900**	**25**

***NOTE:** Training after the 2nd Semester.

(4th SEMESTER)

Course		**Contact Hrs.**			**Marks**			**Credits**
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMATH1-401	Discrete Mathematics	3	1	0	40	60	100	4
BCSES1-401	Computer Organization &Architecture	3	0	0	40	60	100	3
BCSES1-402	Operating Systems	3	1	0	40	60	100	4
BCSES1-403	Object Oriented Programming	3	1	0	40	60	100	4
BCSES1-404	Operating Systems Laboratory	0	0	2	60	40	100	1
BCSES1-405	Object Oriented Programming Laboratory	0	0	4	60	40	100	2
BHSMC0-016	Organizational Behaviour	3	0	0	40	60	100	3
BHSMC0-026	Universal Humanvalues – II Understanding Harmony	2	1	0	40	60	100	3
Total 6 Theory & 2 Lab. Courses		**17**	**4**	**06**	**360**	**440**	**800**	**24**

PHYSICS (SEMICONDUCTORPHYSICS)

Subject Code: BPHYS1-101 **L T PC** **Duration: 38Hrs.**
3 1 0 4

Course Outcomes

1. Understanding of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication.
2. Skill enhancement to solve numerical problems related with Quantum theory, Electronic Material, Semiconductors and Light- Semiconductor Interactions and Fiber Optics Communication.
3. Apply knowledge of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication to go for higher studies in diverse fields.
4. To inculcate and develop the ability to think abstractly.

UNIT-I

Quantum Theory: (10 Hrs.)
Need and origin of Quantum Concept, Wave-particle duality, Matter waves, Group and Phase velocities, Concept of Uncertainty Principle and its application: nonexistence of electron in the nucleus, wave function & its significance, normalization of wave function, Schrodinger wave equation: time independent and dependent, Eigen functions & Eigen values, particle in a box in 1-D. Concept of scattering from a potential barrier and tunneling.

UNIT-II

Electronic Materials: (8 Hrs.)
Free electron theory, Density of states and energy band diagrams, Introduction to band gap theory, Direct and in direct and gaps. Types of electronic materials: metals, semiconductors and insulators, Occupation probability, Fermi level, Effective mass, phonons.

UNIT-III

Semiconductors and Light- Semiconductor Interactions: (12 Hrs.)
Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices. Optical transitions in bulk semiconductors: absorption, spontaneousemission, and stimulated emission; Lasers: principles and working of laser: population inversion, pumping, types of lasers with emphasis on the semi-conductor Lasers.

UNIT-IV

Fibre Optics Communication: (8 Hrs.)
Introduction and importance of use of optical fibres in data transmission, optical fibre as a dielectric wave guide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, applications of optical fibres.

Recommended Books:

1. Satayaparkash, ‘QuantumMechanics’.
2. A. Ghatak and Lokanathan, ‘QuantumMechanics’.

3. J.Singh,'SemiconductorOptoelectronics:PhysicsandTechnology',McGrawHillInc.,1995.
4. S.M. Sze, 'Semiconductor Devices: Physics and Technology', Wiley,**2008**.
5. A. Yariv and P. Yeh, 'Photonics: Optical Electronics in Modern Communications', Oxford University Press, New York,**2007**.
6. P. Bhattacharya, 'Semiconductor Optoelectronic Devices', Prentice Hall of India,**1997**.
7. M R Shenoy, 'Online Course: Semiconductor Optoelectronics',NPTEL.
8. MonicaKatiyarandDeepakGupta,'OnlineCourse:OptoelectronicMaterialsandDevices', NPTEL.
9. Ben. G. Streetman, 'Solid State Electronics Devices', Pearson PrenticeHall.

MATHEMATICS-I (CALCULUS, LINEARALGEBRA)

Subject Code: BMATH1-101 **L T PC** **Duration: 46Hrs.**
3 1 0 4

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. The tool of power series and Fourier series for learning advanced EngineeringMathematics.
4. To deal with functions of several variables that are essential in most branches of engineering.
5. The essential tool of matrices and linear algebra in a comprehensive manner.

UNIT–I

Calculus: (12 Hrs.)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L' Hospital's rule; Maxima and minima. Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT –II

Sequences and Series: (10 Hrs.)

Convergence of sequence and series, tests for convergence (Comparison test, Ratio test, Raabe's test, Logarithmic test, Cauchy's root test, Cauchy's Integral test, series of positive and negative terms); Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

UNIT –III

Multivariable Calculus: (12 Hrs.)

Limit, continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence: Geometrical interpretation and basic properties, Directional derivative.

UNIT –IV

Linear Algebra: (12 Hrs.)

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Recommended Books:

1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', 9th Edn., Pearson, Reprint, **2002**.
2. Erwin Kreyszig, 'Advanced Engineering Mathematics', 9th Edn, John Wiley & Sons,**2006**.
3. T.Veerarajan,'EngineeringMathematicsforFirstYear',TataMcGrawHill,NewDelhi, **2008.**
4. B.V. Ramana, 'Higher Engineering Mathematics', 11th Reprint, Tata McGraw Hill, New Delhi,**2010**.
5. D. Poole, 'Linear Algebra: A Modern Introduction', 2nd Edn., Brooks/Cole,**2005**.
6. B.S. Grewal, 'Higher Engineering Mathematics', 36th Edn., Khanna Publishers, **2010**.

ENGINEERING GRAPHICS &DESIGN

Subject Code: BMECE0-101 **L T P C** **Duration: 30 Hrs.**
2 0 0 2

Course Objective

1 To understand the concept of Engineering drawing , Drawing instruments , Graphic standards and its application in Engineering.
2 To develop Skills in Preparation of Basic Drawings.
3 To develop Skills in Reading and Interpretation of Engineering Drawings.
4 Understand the concept of projection and acquire visualization skills
5 To prepare the student to communicate effectively.
6 To understand the concept of 2D and 3D drawings

Course Outcomes

1 Knowledge of Engineering drawing , drawing instruments and application .
2 Exposure to preparation of simple drawings
3 Inculcate the Concept of 2D and 3D and the related drawings
4 Exposure to creating working drawings
5 Exposure to improved communication and ability to visualize objects

1. Introduction

Engineering Drawing/Engineering Graphics/Technical Drawing - a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales. Basic Definition of geometrical objects: Points, lines, planes and solids.

2. Theory of Projections - Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

3. Projection of Points- Projection of points in quadrants and octants. Projection of point on Auxiliary planes.

4. Projection of Lines -Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two nonintersecting lines, and trace of line.

5. Projection of Planes- Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes. Application of auxiliary planes, and trace of planes.

6. Projection of Solids- Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

7. Section of Solids Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. Development of Surface Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

9. Isometric Projection Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

10. Orthographic Projection Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Recommended Text/Reference Books

1. N.D. Bhatt, V.M. Panchal& P.R. Ingle, 'Engineering Drawing', Charotar Publishing House, 2014.
2. M.B. Shah & B.C. Rana, 'Engineering Drawing and Computer Graphics', Pearson Education, 2008.
3. B. Agrawal& C.M. Agrawal, 'Engineering Graphics', TMH Publication, 2012.
4. K.L. Narayana& P. Kannaiah, 'Text book on Engineering Drawing', Scitech Publishers, 2008.

BASIC ELECTRICALENGINEERING

Subject Code: BELEE0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Outcomes:

1. To understand and analyze basic DC and AC circuits.
2. To study the use and working principle of single phase transformers.
3. To study the application and working principles of three phase and single phase induction motors.
4. To introduce to the components of low voltage electrical installations.

UNIT-1

DC Circuits: (8 Hrs.)

Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff current and voltage laws, analysis of simple circuits with dcexcitation Superposition, Thevenin and Norton Theorems. Step response of RL, RC circuits.

UNIT-2

AC Circuits: (12 Hrs.)

Representation of sinusoidal waveforms, average, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC series and parallel combinations, series and parallel resonance. Three phase voltage source, phase sequence, three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-3

Transformers: (10 Hrs.)

Magnetic materials, BH characteristics, Single-phase Transformer, no load and full load conditions,phasordiagrams,equivalentcircuit,calculationoflossesintransformers,regulation and efficiency, Auto-transformers, their applications and comparison with two winding transformers.

UNIT-4

Electrical Machines: (8 Hrs.)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Direct-On-Line and Star-Delta starters**.** Construction and working of single-phase motors(Splitphase,shadedpole,capacitorstart,capacitorrun,capacitorstartandrunmotors).

Electrical Installations: (4Hrs.)

Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), Moulded Case Circuit Breaker (MCCB), Types of Wiring, Earthing.

Recommended Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill,**2010**.
2. D.C. Kulshreshtha, 'Basic Electrical Engineering', McGraw Hill,**2009**.
3. L.S. Bobrow, 'Fundamentals of Electrical Engineering', Oxford University Press,**2011**.
4. E. Hughes, 'Electrical and Electronics Technology', Pearson,**2010**.
5. V.D. Toro, 'Electrical Engineering Fundamentals', Prentice Hall, India,**1989**.
6. J.P.S. Dhillon. J.S. Dhillon and D. Singh, 'Principles of Electrical & Electronics Engineering', Kalyani Publishers, New Delhi, **2005**.

PHYSICS (SEMICONDUCTOR PHYSICS) LAB.

Subject Code: BPHYS1-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Able to verify the concepts/laws of basic quantum Semiconductors and electronics.
2. To inculcate and develop scientific aptitude by performing the various experiments.
3. Skill enhancement by solving experimental problems.
4. To inculcate the spirit of teamwork.

Note: Students will have to perform at least 10 experiments from the given topic/list.

Experiments based on Semiconductor Physics:

1. To study the V-I characteristic of different PN junction diode-Ge andSi.
2. To study the V-I characteristic of Zenerdiode.
3. To study the V-I characteristic of LED.
4. To analyze the suitability of a given Zener diode as a power regulator.
5. To find out the intensity response of a solar cell/Photodiode.
6. To find out the intensity response of a LED.

7. To determine the band gap of a semiconductor.
8. To determine the resistivity of a semiconductor by four probe method.
9. To confirm the de Broglie equation for electrons.
10. To study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters.
11. To study the magnetic field of a circular coil carrying current.
12. To find out polarizability of a dielectric substance.
13. To study B-H curve of a ferromagnetic material using CRO.
14. To find out the frequency of AC mains using electric-vibrator.
15. To find the velocity of ultrasound in liquid.
16. To study the Hall effect for the determination of charge current densities.
17. Distinguish between Diamagnetic material, Paramagnetic and ferromagnetic material.
18. Measurement of susceptibility of a liquid or a solution by Quincke's method:
19. AFM experiment to study the sample with the nano-scale objects and measure surface topography with different scales, width and height of nano objects, and force-distance curves.
20. To study the temperature coefficient of Resistance of copper.

Physics Virtual Lab. Experiments:

21. To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.
22. To determine the resistivity of semiconductors by Four Probe Method.
23. To study the forward and reverse biased characteristics of PNP and NPN transistors.
24. To study the B-HCurve.
25. To study the Hall effect experiment to determine the charge carrier density.
26. To determine the magnetic susceptibilities of paramagnetic liquids by Quincke's Method.
27. To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a material using a hysteresis loop tracer.
28. Verification and design of combinational logic using AND, OR, NOT, NAND and XORgates.

Note: Any other experiment based on the above mentioned topics may be included.

ENGINEERING GRAPHICS & DESIGNLAB.

Subject Code: BMECE0-102 **L T P C** **Duration: 45 Hrs.**
0 0 6* 3

Course Objective

1. To have an overview of interactive computer graphics.
2. To learn the various 2D and 3D draw commands for drawing preparation
3. To understand the use of modify commands for making of drawings
4. To learn the dimensioning of drawings
5. To understand the use of the software in different Engineering applications

Course Outcomes

1 Understand the basics of computer graphics
2 Expertise to draw 2D and 3D drawings
3 Ability to do editing and dimensioning of drawings
4 Exposure to solid modeling

1. **Overview of Computer Graphics**

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

2. **Customization & CAD Drawing**

Consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

3. **Annotations, Layering & other Functions**

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques.

.*Lab work will be performed in two parts:

(i) Computer Lab (2 hours) Computer Graphics, CAD Drawing etc.

(ii) Drawing Hall (04 hours) Manual practice on drawing sheets of theory content the relevant theory part of Engineering Graphics & Design may also be covered in Lab work.

BASIC ELECTRICAL ENGINEERING LAB.

Subject Code: BELEE0-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical induction motors.

EXPERIMENTS/DEMONSTRATIONS

1. To study basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. real-life resistors, capacitors and inductors.
2. To verify Ohm's law.
3. To verify Kirchhoff's voltage and current laws.
4. To verify Superposition Theorem.
5. To verify The venin Theorem.
6. To obtain the sinusoidal steady state response of R-L circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
7. To obtain the sinusoidal steady state response of R-C circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
8. To study resonance phenomenon in R-L-C series circuits.
9. To perform open circuit and short circuit test on a single phase transformer and calculate the efficiency.
10. Demonstrationofcut-outsectionsofmachines:Inductionmachine(squirrelcagerotorand slip ring arrangement) and single-phase induction machines.
11. To connect, start and reverse the direction of rotation by change of phase-sequence of connections of three phase induction motor.
12. To connect, start and reverse the direction of rotation of single-phase induction motor.
13. To demonstrate working of DOL starter for three-phase induction motor.
14. To demonstrate working of star-delta starter for three-phase induction motor.
15. To demonstrate the components of LT switchgear.

DRUG ABUSE: PROBLEM, MANAGEMENT ANDPREVENTION

Subject Code: BMNCC0-004 **L T PC** **Duration: 30Hrs.**
2 0 0 0

Course Outcomes:

1. Differentiate between physical and psychological dependence of drug abuse.
2. Understanding the consequences of drug abuse.
3. Explain prevention of drug abuse.
4. Identify treatments and management of drug abuse.

UNIT-I

Meaning of Drug Abuse:

Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II

Consequences of Drug Abuse:
Individual: Education, Employment, Income.
Family: Violence.
Society: Crime.
Nation: Law and Order problem.

UNIT-III

Prevention of Drug Abuse:
Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny.
School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV

Treatment and Control of Drug Abuse:
Medical Management: Medication for treatment and to reduce withdrawal effects.
Psychological Management: Counselling, Behavioural and Cognitive therapy.
Social Management: Family, Group therapy and Environmental intervention.
Treatment: Medical, Psychological and Social Management.
Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, **2003**.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, **2004.**
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills,**1981**.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi,**1985**.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books,**1982**.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications,Jaipur, **1997.**
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, **2003 &2004**.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi,**2013**.
9. BhimSain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi,**1991**.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar,**2009**.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra,Delhi, **2000**.
12. S. Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention andCessation', Cambridge University Press,**2008**.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and Political Weekly, **2017**.
14. 'World Drug Report', United Nations Office of Drug and Crime,**2016**.
15. 'World Drug Report', United Nations Office of Drug and Crime,**2017**.

CHEMISTRY-I

Subject Code: BCHEM0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Objectives:

1. To understand the atomic and & molecular nature of various molecules
2. To understand the band structures
3. To elaborate the applications of spectroscopic techniques
4. To understand the thermodynamic functions and their applications
5. To rationalize periodic properties
6. To understand the concepts of stereochemistry and preparation of organic molecules

Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

1. Analyzemicroscopicchemistryintermsofatomicandmolecularorbitalsandintermolecular forces.
2. Rationalize bulk properties and processes using thermodynamic considerations.
3. Distinguishtherangesoftheelectromagneticspectrumusedforexcitingdifferentmolecular energy levels in various spectroscopic techniques
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. List major chemical reactions that are used in the synthesis of molecules.

UNIT-I

1. Atomic and Molecular Structure: (12Hrs.)

Bohr Theory of Hydrogen atom, Spectrum of H atom, Sommerfeld extension of Bohr Theory, Particle and wave nature of electron, De-Broglie equation, Aufbau principle, Compton effect, Schrodinger wave equation, Laplacian and Hamiltonian operator, Linear Combination of atomic orbitals. Molecular orbitals of diatomic molecules and Energy level diagrams of homonuclearandheteronucleardiatomics.Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT-II

2. Spectroscopic Techniques and Applications: (8Hrs.)

PrinciplesandselectionrulesofElectronicspectroscopyandFluorescencespectroscopyalong withtheirapplications.PrinciplesandselectionrulesofVibrationalandrotationalspectroscopy of diatomic molecules and their Applications. Nuclear magnetic resonance up to spin-spin coupling and magnetic resonance imaging.

3. Intermolecular Forces and Potential Energy Surfaces: (4Hrs.)

Ideal gas equation, Ionic, dipolar and vanDer Waals interactions. Realgas equation. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, and HCN

UNIT-III

4. Use of Free Energy in Chemical Equilibria: (6 Hrs.)

Ideal Solution, Non Ideal Solutions, Thermodynamic functions: energy, entropy and free energy. Numerical problems based on entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Thermodynamic properties of ideal solutions. Introduction to Electrochemical Corrosion and its mechanism. Use of free energy considerations in metallurgy through Ellingham diagrams.

5. Periodic Properties: (4 Hrs.)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases principle

UNIT-IV

6. Stereochemistry: (4 Hrs.)

Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis of butane. Isomerism in transitional metal compounds.

7. Organic Reactions and Synthesis of a Drug Molecule: (4Hrs.)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule – β lactum, Paracetamol, Chloroquine and Aspirin

Recommended Books:

1. B.H. Mahan, 'University Chemistry'.
2. M.J. Sienko and R.A. Plane 'Chemistry: Principles and Applications'.
3. C.N. Banwell, 'Fundamentals of Molecular Spectroscopy'.
4. B.L.Tembe,KamaluddinandM.S.Krishnan,'EngineeringChemistry(NPTELWeb-book)
5. P.W. Atkins, 'PhysicalChemistry'.
6. K.P.C. Volhardt and N.E. Schore 'Organic Chemistry: Structure and Function', 5th Edn., http://bcs.whfreeman.com/vollhardtschore5e/default.asp

MATHEMATICS-II (PROBABILITY AND STATISTICS)

Subject Code: BMATH1-201 **L T PC** **Duration: 40Hrs.**
3 1 0 4

COURSE OBJECTIVE

Students will learn

1. Understanding Probability theory.
2. Probability distribution, bivariate distribution, conditional densities
3. Statistical analysis, correlation and regression, moment, skewness and kurtosis.
4. Statistical hypothesis about real world problem, curve fitting, small samples.

Course Outcomes (CO)

Students will be able

1. To express the concept of basic probability and its features, expected values and moments.
2. To explain the concept of continuous probability distribution and bivariate distribution
3. To describe basic statistics(moments, skewness, kurtosis, correlation and regression).
4. To explain about applied statistics and small samples.

UNIT–I

Basic Probability: (12 Hrs.)

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.

UNIT –II

Continuous Probability Distributions: (6 Hrs.)

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Bivariate Distributions: (6 Hrs.) Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT –III

Basic Statistics: (10 Hrs.)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

UNIT –IV

Applied Statistics: (8 Hrs.)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Small Samples: (4 Hrs.)

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Recommended Books:

1. E. Kreyszig, 'Advanced Engineering Mathematics', John Wiley & Sons,**2006**

2. P.G. Hoel, S.C. Port and C.J. Stone, 'Introduction to Probability Theory', Universal Book Stall, **2003**.
3. S. Ross, 'A First Course in Probability', Pearson Education India,**2002**.
4. W.Feller,'AnIntroductiontoProbabilityTheoryanditsApplications',Vol.-1,Wiley,**1968**.
5. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers,**2000**.
6. T. Veerarajan, 'Engineering Mathematics', Tata McGraw Hill, New Delhi, **2010**.

ENGLISH

Subject Code: BHUMA0-101 **L T PC** **Duration: 25Hrs.**
2 0 0 2

Course Objectives:

1. Students should be able to enhance language proficiency, critical thinking and analytical skills
2. To expose the students to various spoken skills
3. To strength their professional skills
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. The students will be able to understand specific piece of information
2. Be able to express themselves in writing for social occasions
3. Be able to identify the language functions in the spoken discourse
4. Improvement of technical communication skills , such as writing reports giving presentations and effectively communicating ideas related to respective field

UNIT-I

1. Vocabulary Building:
The concept of Word Formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to formderivatives.Synonyms, antonyms, and standard abbreviations.

UNIT-II

2. Basic Writing Skills:
Sentence Structures
Use of phrases and clauses in sentencesImportance of proper punctuation Creating coherence
Organizing principles of paragraphs in documentsTechniques for writing precisely

UNIT-III

3. Identifying Common Errors in Writing:
Subject-verb agreement Noun-pronoun agreement
Misplaced modifiers
Articles
Prepositions
Redundancies
Clichés

UNIT-IV

4. Nature and Style of sensible Writing:
Describing
Defining
Classifying
Providing examples or evidence
Writing introduction and conclusion

5. Writing
Practices:
Comprehension
Précis Writing
Essay Writing

Recommended Books:

1. Michael Swan, 'Practical English Usage', OUP, **1995**.
2. F.T. Wood, 'Remedial English Grammar', Macmillan,**2007.**
3. William Zinsser, 'On Writing Well', Harper Resource Book,**2001.**
4. Liz Hamp-Lyons and Ben Heasly, 'Study Writing', Cambridge University Press,**2006**.
5. Sanjay Kumar and Pushp Lata, 'Communication Skills', Oxford University Press,**2011**.
6. 'Exercises in Spoken English', Parts. I-III. CIEFL, Hyderabad. Oxford UniversityPress.

PROGRAMMING FOR PROBLEMSOLVING

Subject Code: BCSCE0-101 **L T PC** **Duration: 41Hrs.**
3 0 0 3

Course Objectives:
1. To be familiarize with flow of algorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:
The student will learn
1. To learn the basic terms related to programming and understand arithmetic expressions.
2. To understand the concept of arrays.
3. To implement functions and recursion.
4. To learn structure, pointers and file handling

UNIT-I

1. Introduction to Programming: (6 Hrs.)
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps tosolve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

2. Arithmetic Expressions and Precedence: (12Hrs.)
Conditional Branching and Loops. Writing and evaluation of conditionals and consequentbranching. Iteration and loops.

UNIT-II

3. Arrays: (5 Hrs.)
Arrays (1-D, 2-D), Character arrays and Strings

4. Basic Algorithms: (5 Hrs.)
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definitionrequired)

UNIT-III

5. Function: (4Hrs.)
Functions (including using built in libraries), Parameter passing in functions, call by value,Passing arrays to functions: idea of call by reference

6. Recursion: (4Hrs.)
Recursion, as a different way of solving problems. Example programs, such as FindingFactorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-IV

7. Structure: (3 Hrs.)
Structures, Defining structures and Array of Structures.Pointers: (2Hrs.)
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion oflinked list (no implementation)

8. File Handling: (only if time is available, otherwise should be done as part of thelab)

Recommended Text Books:

1. Byron Gottfried, 'Schaum's Outline of Programming with C', McGrawHill.
2. E. Balaguruswamy, 'Programming in ANSI C', Tata McGrawHill.

Recommended Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, 'The C Programming Language', PrenticeHall of India.

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CHEMISTRY-I LAB.

Subject Code: BCHEM0-101 **L T P C**
0 0 2 1

Course Objectives:

1. To learn the preparation and standardization of solutions
2. To learn the estimation of various physical properties of given liquid samples
3. To estimate various crucial parameters for water sample
4. To learn the preparation of various molecules and detection of functional groups.

Course Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. Thestudents will learn to:

1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyze a salt sample

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension and viscosity
3. Thin layer chromatography
4. Determination of total Alkalinity/ Acidity of a water sample.
5. Determination of residual chlorine in water sample
6. Estimation of total, temporary and permanent hardness of water
7. Determination of the rate constant of a reaction
8. Determination of strength of an acid conductometrically
9. Potentiometry - determination of redox potentials andemfs
10. Synthesis of apolymer
11. Saponification /acid value of anoil
12. Detection and confirmation of organic functionalgroups.
13. Models of spatialorientation
14. TotestthevalidityofLambertBeerlaw/Determinationofλ_{max}/Determinationofunknown concentration of asolution.
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid bycharcoal
17. Synthesis of a drug – Acetaminophen,Aspirin

ENGLISH LAB.

Subject Code: BHUMA0-102 **L T P C**
0 0 2 1

Course Objectives:

1. To enhance LSRW Skills
2. To improve the fluency in spoken English
3. To familiarize students with the use of English in everyday situations
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. Identify common errors in spoken and written communication
2. List familiarized with English vocabulary and language proficiency
3. Improve nature and style of sensible writing.
4. Improve acquire employment and work place communication skills.

Oral Communication

(This unit involves interactive practice sessions in Language Lab.)

1. Listening Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations

PROGRAMMING FOR PROBLEM SOLVING LAB.

Subject Code: BCSCE0-102 **L T P C**
0 0 4 2

Course objectives:

1. To be familiarize with flow of algorithm to solve simple problems

2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:
1. Correct syntax errors as reported by the compilers and logical errors encountered at run time
2. Develop programs by using decision making and looping constructs.
3. Implement real time applications using the concept of array, pointers, functions and structures.
4. Solve real world problems using matrices, searching and sorting

NOTE: The laboratory should be preceded or followed by a tutorial to explain the approachor algorithm to be implemented for the problem given.
Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions
Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numericalintegration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations

MANUFACTURING PRACTICES (THEORY &LAB.)

Subject Code: BMFPR0-101 **L T PC** **Duration: 80 Hrs.**
1 0 4 3

Course objectives.

1 Understand the operations of manufacturing methods and processes.
2 Perform the various manufacturing operations.
3 Understand the basics of advanced manufacturing methods.
4. Understanding the basics of computer numerical control machines.

Course outcomes:

After the completion of this course students will be able:-

1. To perform various metal forming operations.
2. To perform various metal cutting operations.
3. To perform various metal joining operations.
4. To write simple CNC part programming.

Lectures & Videos: (10 Hrs.)

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturingMethods.
2. CNC machining, Additivemanufacturing.
3. Fitting operations & powertools.
4. Sheet MetalOperations.
5. Electrical &Electronics.
6. Carpentry.
7. Plastic moulding (injection moulding, blow moulding, extrusion moulding), glasscutting.
8. Metalcasting.
9. Welding (arc welding & gas welding),brazing.

Recommended Text/Reference Books:

1. S.K. Hajra Choudhury, A.K. Hajra Choudhury and S.K. Nirjhar Roy, 'Elements of Workshop Technology', Vol.-I, **2008** and Vol.-II **2010**, Media Promoters and PublishersPvt. Ltd.,Mumbai.
2. S. Kalpakjian, Steven S. Schmid, 'Manufacturing Engineering and Technology', 4thEdn.,Pearson Education India Edn.,**2002**.
3. Gowri P. Hariharan and A. Suresh Babu, 'Manufacturing Technology – I', Pearson,**2008**.
4. Roy A. Lindberg, 'Processes and Materials of Manufacture', 4thEdn., Prentice HallIndia, 1998.
5. P.N. Rao, 'Manufacturing Technology', Vol.-I and Vol.-II, Tata McGraw HillHouse,2017.

Workshop Practice: (70 Hrs.)

1. Machine shop **(10Hrs.)**
2. Fitting shop **(8Hrs.)**
3. Carpentry **(6Hrs.)**
4. Electrical & Electronics **(8 Hrs.)**
5. Welding shop **(8 Hrs. (Arc welding 4 Hrs. + Gas welding 4Hrs.)**
6. Casting **(8Hrs.)**
7. Sheet Metal Operations **(10 Hrs.)**
8. Smithy **(6Hrs.)**
9. Plastic moulding& Glass Cutting **(6Hrs.)**
10. Examinations could involve the actual fabrication of simple components, utilizing one ormore of the techniques covered above.

INTRODUCTION TO COMPUTER SCIENCE &ENGINEERING

Subject Code: BMNCC0-014 **L T PC** **Duration: 24Hrs.**
2 0 0 0

Course Outcomes:

1. Basic knowledge of Computer Science and Engineering
2. Exploring Computer Science Fields and Opportunities
3. Understanding Computer Hardware and Software
4. Software Types and Operating Systems

UNIT-I

Introduction to Computer Science & Engineering, Difference between science & engineering,Applications of Computer Science & engineering.

UNIT-II

Different branches/fields of Computer Science, Scope of Computer Science in industry, self-employment etc.

UNIT-III

Introduction to Computer, parts of computer system. Difference between Hardware & software, Configuration of computer systems, Types of memory-RAM, ROM, Introduction toUPS-Online and Offline, printers etc.

UNIT-IV

Different types of Software- Application software and System Software, Types ofLanguages-High level and low level languages, Introduction to Operating System.

Calculus and Ordinary Differential Equation

Subject Code- BMATH1- 301 **L T P C** **Duration – 45hrs**
3 0 0 3

Course Ojectives:
Students will learn
1. Basics of sequence and series and their results to check convergence.
2. Multivariable concepts and their real life problems.
3. Green's theorem, stokes theorem, and Gauss theorem and their applications.
4. Linear, non-linear ordinary differential equations of first and higher order.

Course Outcomes (CO)
Students will be able
1. To apply concepts of convergence of sequence and series.
2. To apply green's theorem, stroke's theorem and green's theorem in real life situations.
3. To solve linear and non-linear ordinary differential equations.
4. To solve second and higher order linear, non-linear differential equation.

COURSE CONTENT

UNIT-I (12hrs)

Sequences and Series: Basic concept of Convergence, tests for convergence, power series, Taylor's series, Series for exponential, trigonometric and logarithmic functions.

Multivariable Calculus: Partial derivatives, directional derivatives, total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers.

UNIT-II (11 hrs)

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables, Theorems of Green, Gauss and Stokes (without proof), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT-III(11 hrs)

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-IV (11 hrs)

Ordinary differential equations of higher orders: Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

RECOMMENDED BOOKS

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
5. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
6. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
7. Earl A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

COMPUTER PERIPHERALS & INTERFACES

Subject Code- BCSES1-301 **L T P C** **M Duration – 45 hrs.**
3 0 0 3

COURSE OBJECTIVCE

To learn the functional and operational details of various peripheral devices.

COURSE OUTCOMES

1. To be able to learn system resources, IDE & SCSI Interfaces.
2. To be able to learn different video Hardware.
3. To learn different, I/O Interfaces and Input/ Output Driver Software Aspects.
4. To be able to design and implement different peripheral devices.

COURSE CONTENT

UNIT I(12hrs)

SYSTEM RESOURCES: Interrupt, DMA Channel, I/O Port Addresses and resolving and resolving the conflict of resources. I/O buses- ISA, EISA, Local bus, VESA Local bus, PCI bus, PCI Express, Accelerated graphics port bus.

IDE & SCSI Interfaces: IDE origin, IDE Interface ATA standards. ATA feature, ATA RAID and SCSI RAID, SCSI Cable and pin Connector pin outs SCSI V/s IDE Advantages and limitation, SATA, SSD drives.

UNIT II(11hrs)

Video Hardware: Video display technologies, DVI Digital signals for CRT Monitor, LCD, LED, OLED Panels, Video adapter types, Integrated Video/ Motherboard chipset, Video RAM,Video driver and multiple Monitor, Graphic accelerators. Advanced 3D Technologies,TV Tuner and Video Capture upgrades troubleshooting Video Cards and Drivers.

UNIT III(11hrs)

I/O Interfaces: I/O Interfaces from USB1.0, 2.0, 3.0, lighting port, I/O Interface from serial, Parallel to SCSI converter. Testing of serial andparallel port, USB Mouse/ Keyboard Interfaces like HDMI

Input/ Output Driver software aspects: Role of device driver DOS and UNIX/ LINUX device drivers.

UNIT IV(11hrs)

Design & Integration of Peripheral devices to a computer system as a Case Study.

Future Trends: Detailed Analysis of recent Progress in the Peripheral devices. Some aspects of cost Performance analysis and applications of latest digital devices like WiFi-LED projectors, HDMI devices, wireless printers and other devices

RECOMMENDED BOOKS

1. Douglas V. Hall,"Microprocessors and Interfacing", Tata McGraw Hill 2006.
2. Barry B. Brey&C.R.Sarma, "The intel microprocessors," Pearson 2003.
3. P. Pal Chandhari, "Computer Organization and design" Prentice Hall of India Pvt. Ltd, 1994.
4. Del Corso, H.Kirrman, JD Nicond "Microcomputer buses & links" Academic Press 1986.

DATA STRUCTURE & ALGORITHMS

Subject Code- BCSES1-302 **L T P C** **Duration – 60hrs**
3 1 0 4

COURSE OBJECTIVE

1. To impart the basic concepts of data structures, algorithms and time complexity.
2. To understand concepts about stacks and queues.
3. To understand concepts about linked lists and trees.
4. To enable them to learn and write algorithms for hashing, sorting and graphs.

COURSE OUTCOMES

1. To impart the basic concepts of data structures, algorithms and time complexity.
2. To understand concepts about stacks and queues
3. To understand concepts about linked lists and trees
4. To enable them to learn and write algorithms for hashing, sorting and graphs

COURSE CONTENT

UNIT-I (15hrs)

Introduction: Basic Terminologies: Elementary Data Organizations, Data StructureOperations: insertion, deletion, traversal etc.; Analysis of an Algorithm, AsymptoticNotations, Time-Space trade off. Searching: Linear Search and Binary Search Techniquesand their complexity analysis.

UNIT-II (15hrs)

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexityanalysis, Applications of Stacks: Expression Conversion and evaluation –corresponding algorithms and complexity analysis. ADT queue, Types of Queue: SimpleQueue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithmsand their analysis.

UNIT-III (15hrs)

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search trees, Binary Search Tree,Tree operations on each of the trees and their algorithms with complexity analysis. Introduction to B Tree, B+ Tree and AVL Tree

UNIT-IV (15hrs)

Sorting and Hashing: Objective and properties of different sorting algorithms:Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort;Performance and comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

RECOMMENDED BOOKS:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni,Computer Science Press.

SUGGESTED REFERENCE BOOKS:

2. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition byMarkAllen Weiss, Addison-Wesley Publishing Company
3. "How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

Digital Electronics

Subject Code- BCSES1-303 **L T P C**
3 1 0 4

Duration – 60hrs

COURSE OBJECTIVE

To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

COURSE OUTCOMES: At the end of this course, students will demonstrate the ability to

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Be able to use PLDs to implement the given logical problem.

COURSE CONTENT

UNIT-I (15hrs)

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations,Boolean algebra, examples of ICgates,number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOSand TTL, Tri-statelogic.

Combinational DigitalCircuits: Standard representation for logic functions, K-map representation, simplification oflogicfunctionsusing K-map, minimization of logical functions. Don't care conditions, Multiplexer,De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder,serial adder,ALU, elementary ALU design, popular MSI chips, digital comparator,paritychecker/generator, code converters, priority encoders, decoders/drivers for display devices,Q-M method offunction realization.

UNIT-II (15hrs)

Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-III (15hrs)

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/Aconverter,specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit,analog to digital converters: quantization and encoding, parallel comparator A/Dconverter, successive approximation A/D converter, counting A/D converter, dual slope A/Dconverter,A/DconverterusingVoltagetofrequencyandvoltagetotimeconversion,specifications of A/D converters, example of A/D converterICs

UNIT-IV (15hrs)

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable

memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

RECOMMENDED BOOKS

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

DATA STRUCTURE & ALGORITHMS LABORATORY

Subject Code- BCSES1-304 **L T P C**
0 0 4 2

COURSE OUTCOMES

1 . To implementing searching algorithms and operations on stacks.
2 . To enable the students to learn and implement sorting algorithms.
3 . To implement operations for different types of queues.
4 . To implement programs related to various types of Linked Lists.

PRACTICALS

1. Write a program for Linear search methods.
2. Write a program for Binary search methods.
3. Write a program for insertion sort, selection sort and bubble sort.
4. Write a program to implement Stack and its operation.
5. Write a program for quick sort.
6. Write a program for merge sort.
7. Write a program to implement Queue and its operation.
8. Write a program to implement Circular Queue and its operation.
9. Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.
10. Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
11. Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.

DIGITAL ELECTRONICS LABORATORY

Subject Code- BCSES1-305 **L T P C**
0 0 2 1

COURSE OUTCOMES

1 To Familiarization with Digital Trainer Kit and associated equipment.
2 To Study and design of TTL gates
3 To learn the formal procedures for the analysis and design of combinational circuits.
4 To learn the formal procedures for the analysis and design of sequential circuits

PRACTICALS: Implementation all experiments with help of Bread- Board.
1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates. 13 13 Punjab Technical

University B.Tech. Computer Science Engineering (CSE)
3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
6. Multiplexer: Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using IC74139 chip.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
12. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.
13. ADC Operations: Study of 8-bit ADC.

IT WORKSHOP (SciLab / MATLAB) LABORATORY

Subject Code- BCSES1-306 **L T P C**
0 0 4 2

COURSE OUTCOMES

1. Introduction to Sci Labs / MATLAB environment and types of Sci Labs / MATLAB files.
2. To be able to write programs for Matrix manipulations.
3. MATLAB code for computing factorial of a number
4. To be able to write programs using functions and plotting results

Following experiments to be conducted using Sci Labs / MATLAB

1. Introduction to Sci Labs / MATLAB environment and types of Sci Labs / MATLAB files.
2. Use of help command to get help about different inbuilt functions.
3. Write a program to show the output of various unary and binary operators.
4. Write programs for Matrix Manipulations, (reshaping matrices, expanding matrix size, appending or deleting a row/column to a matrix, concatenation of matrices).
5. Write programs which demonstrate the use special matrices.
6. Write programs to show output for various matrix and array operations.
7. Write programs for demonstrating the use for various control statements.
8. Write a MATLAB code for computing factorial of a number n. Assume n is already defined. The code should return a scalar, not a vector.
9. Write programs using functions and plot results.

*other programs related to some application area may also be done

TRAINING-1

Subject Code- BCSES1-307 | **L T P C 0 0 0 3** | **Duration – 4 WEEKS**

Training after the 2nd Semester, students are required to be involved in Inter/ Intra Institutional Activities viz; Training with higher Institutions; Soft skill training organized by Training and Placement Cell of the respective institutions; contribution at incubation/ innovation /entrepreneurship cell of the institute; participation in conferences/ workshops/ competitions etc.; Learning at Departmental Lab/Tinkering Lab/ Institutional workshop; Working for consultancy/ research project within the institutes and Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/Design/ Innovation/ Business Completion/ Technical Expos etc.

DEVELOPMENT OF SOCIETIES

Subject Code- BHSMC0-007 | **L T P C 3 0 0 3** | **Duration – 45hrs**

Course Outcomes

Students will be able to

1 Become familiar with development of different social systems, connectedness of human being with society and able to evaluate different models of social development.

2 Develop ideas about political system and identify discriminating features of various governing systems..

3 Build up knowledge about different economic systems and evaluate various ideas of economic developmental ideologies.

4 Understand the relationship between human and society both historically and analytically

Course objectives

To make the students

1. To Understand societal development and various societal models

2. To understand and analyze different political systems

3. To develop knowledge about economic systems and ideologies

4 To understand the economic development in different periods of history.

UNIT-I (15hrs)

Social Development: Concepts behind the origin of Family, Clan and Society, Different Social Systems, Relation between Human being and Society, Comparative studies on different models of Social Structures and their evolution

UNIT-II (15hrs)

Political Development: Ideas of Political Systems as learnt from History, Different models of Governing system and their comparative study

UNIT-III(15hrs)

Economic Development: Birth of Capitalism, Socialism, Marxism, Concept of development in pre-British, British and post British period- Barter, Jajmani, Idea of development in current context., E. F. Schumacher's idea of development, Buddhist economics. Gandhian idea of development. Swaraj and Decentralization.

RECOMMENDED BOOKS:

TEXTBOOK:

1. 'Indian Society' by Dr S.K Jena & B.N Mohanty
2. 'Indian Society' by C.N Shankar Rao
3. 'Foundations of Political Science, Indian Constitution & Government' by Gulshan Rai, SomNathVerma& Suresh Kumar

***REFERENCE BOOKS:**

1. 'The Interpretation of Cultures: Selected Essays' by Geertz & Clifford. 1973, New York
2. 'Dictionary of Modern Sociology Hoult' by Thomas Ford, ed. 1969) Totowa, New Jersey, United States: Littlefield, Adams & Co.
3. 'Sociology –In a Changing Society' by William Korblum
4. 'The Origin of Humankind' by Leakey, Richard 1996, New York Basic Books

4. OTHER SESSIONS

*TUTORIALS:

*LABORATORY:

*PROJECT: Possible projects in this course could be

a) Interact with local communities and understand their issues.

b) Study local cottage industry and agricultural practices. Role of engineering and specialized knowledge.

c) Evaluation of technology in the context of its application. Social impact of technology. Environmental impact of technology. Evaluation from a holistic perspective.

DISCRETE MATHEMATICS

Subject Code- BMATH1-401 **L T P C** **Duration – 60 hrs.**
3 1 0 4

COURSE OBJECTIVE

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counterexamples.
5. Apply logical reasoning to solve a variety of problems.

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to

1. For a given logic sentence express it in terms of predicates, quantifiers, andlogical connectives
2. For a given a problem, derive the solution using deductive logic and prove thesolution based on logical inference
3. For a given a mathematical problem, classify its algebraic structure
4. Evaluate Boolean functions and simplify expressions using the properties ofBoolean Algebra

5 Develop the given problem as graph networks and solve with techniques of graph theory**.**

COURSE CONTENTS

UNIT-I (15 hrs)

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products,Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sumand Product of Functions, Bijective functions, Inverse and Composite Function, Size of aSet, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argumentand The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursivedefinition, The Division algorithm: Prime Numbers, The Greatest Common Divisor:Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT-II (15 hrs)

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation andcombination.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives andTruth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules ofInference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and

Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof ofNecessity and Sufficiency.

UNIT-III (15 hrs)

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation,Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free andCyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups,Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields.Boolean Algebra

and Boolean Ring, Identities of Boolean Algebra, Duality,Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT-IV (15 hrs)

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle,Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring mapsand Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph,definition properties and Example, rooted trees, trees and sorting, weighted trees andprefix codes, Bi-connected component and Articulation Points, Shortest distances.

RECOMMENDED BOOKS:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, WadsworthPublishing Co. Inc.
3. Satinder Bal Gupta, Discrete Mathematics and structures, University Science Press, New Delhi.
4. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

SUGGESTED REFERENCE BOOKS:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application toComputer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

COMPUTER ORGANIZATION & ARCHITECTURE

Subject Code- BCSES1-401 **L T P C** **Duration – 45hrs3**
0 0 3

COURSE OBJECTIVE

To expose the students to the following:

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism
6. To impart the knowledge on micro programming
7. Concepts of advanced pipelining techniques.

COURSE OUTCOMES

1. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions,addressing modes, instruction set.
2. Write assembly language program for specified microprocessor for computing16 bit multiplication, division and I/O device interface (ADC, Control circuit, serialport communication).
3. Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.

5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

COURSE CONTENT

UNIT-I (11 hrs)

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit.Instruction set architecture of a CPU–registers, instruction execution cycle, RTLinterpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating pointrepresentations, character representation. Computer arithmetic – integer addition andsubtraction, ripple carry adder, carry look ahead adder etc. multiplication shift and add.

UNIT-II (12 hrs)

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches.

Memory system design: semiconductor memory technologies, memory organization.

UNIT-III (11 hrs)

Peripheral devices and their characteristics: Input-output subsystems, I/O deviceinterface, I/O transfers–program controlled, interrupt driven and DMA, software interrupts and exceptions. Programs andprocesses–role of interrupts in process state transitions.

UNIT-IV (11 hrs)

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors.

Memory organization: Memory interleaving, concept of hierarchical memory organization,cache memory, cache size vs. block size, mapping,replacement algorithms.

RECOMMENDED BOOKS:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

SUGGESTED REFERENCE BOOKS:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

OPERATING SYSTEMS

Subject Code- BCSES1-402 **L T P C** **Duration – 60hrs**
3 1 0 4

COURSE OBJECTIVE

To learn the fundamentals of Operating Systems.

1. To learn the mechanisms of OS to handle processes and threads and their communication
2. To learn the mechanisms involved in memory management in contemporary OS
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols

4. To know the components and management aspects of concurrency management
5. To learn to implement simple OS mechanisms

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to1.

Create processes and threads.

2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system and For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

COURSE CONTENT

UNIT-I (15hrs)

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS-Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

UNIT-II (16hrs)

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, **Scheduling criteria:** CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

UNIT-III (15hrs)

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation
-Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC),Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV (14hrs)

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation(linear list, hashtable), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

RECOMMENDED BOOKS

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

SUGGESTED REFERENCE BOOKS:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

OBJECT ORIENTED PROGRAMMING

Subject Code- BCSES1-403 **L T P C** **Duration – 60 hrs**
3 1 0 4

COURSE OBJECTIVE

To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System

COURSE OUTCOME

1. To introduce the basic concepts of object oriented programming language and its representation
2. To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.
3. To introduce polymorphism, interface design and overloading of operator.
4. To handle backup system using file, general purpose template and handling of raised exception during programming

COURSE CONTENT

UNIT-I (15hrs)

Introduction to C++, C++ Standard Library, Illustrative Simple C++ Programs. Header Files, Namespaces, Application of object oriented programming.

Object Oriented Concepts, Introduction to Objects and Object Oriented Programming, Encapsulation, Polymorphism, Overloading, Inheritance, Abstract Classes, Accessifier (public/ protected/ private), Class Scope and Accessing Class Members, Controlling Access Function, Constant, Class Member, Structure and Class

UNIT-II (15hrs)

This Pointer, Dynamic Memory Allocation and Deallocation (New and Delete), Static Class Members, Constructors, parameter Constructors and Copy Constructors, Deconstructors,

Introduction of inheritance, Types of Inheritance, Overriding Base Class Members in aDerived Class, Public, Protected and Private Inheritance

UNIT-III (15hrs)

Polymorphism, Pointer to Derived class, Virtual Functions, Pure Virtual Function, Abstract Base Classes, Static and Dynamic Binding

Fundamentals of Operator Overloading, Rules for Operators Overloading, Implementation of Operator Overloading Like <<,>> Unary Operators, Binary Operators.

Basics of C++ Exception Handling, Try, Throw, Catch, multiple catch, Re-throwing an

Exception.

UNIT-IV (15hrs)

Text Streams and binary stream, Sequential and Random Access File, Stream Input/ Output Classes, Stream Manipulators.

Templates: Function Templates, Overloading Template Functions, Class Template, Class Templates

Introduction: design patterns, Classifications

Introduction: model- view- controller pattern

RECOMMENDED BOOKS:

4. Robert Lafore, 'Object Oriented Programming in Turbo C++',2nd Ed., The WAITE Group Press, **1994**.
5. Herbert shield, 'The complete reference C ++', 4th Ed., Tata McGraw Hill, **2003**.
6. Shukla, 'Object Oriented Programming in C++', Wiley India, 2008.
7. H M Deitel and P J Deitel, 'C++ How to Program',2nd Ed., Prentice Hall, **1998**.
8. D Ravichandran, 'Programming with C++', 3rd Ed., Tata McGraw Hill, **2003**.
9. Bjarne Stroustrup, 'The C++ Programming Language',4th Ed.,Addison Wesley,**2013**.
10. R. S. Salaria, 'Mastering Object-Oriented Programming with C++', Salaria Publishing House, **2016**.

OPERATING SYSTEMS LABORATORY

Subject Code- -BCSES1-404 **L T P C**
0 0 2 1

COURSE OUTCOMES

1. To be able to install various operating systems
2. To learn commands for files and directories.
3. To learn about background processes and commands to print something.
4. To be able to learn shell programming.

1. Installation Process of various operating systems
2. Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine
3. Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in linux, connecting processes with pipes, background processing, managing multiple processes. Manual help. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file. File related commands ws, sat, cut, grep.
4. Shell Programming: Basic of shell programming, various types of shell, ShellProgramming in bash, conditional & looping statement, case statements, parameter passing and arguments, shellvariables, shell keywords, creating shell programs for automate system tasks, report printing.

OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY

Subject Code- BCSES1-405 **L T P C**
0 0 4 2

COURSE OUTCOMES

1. To learn the concept of classes and objects.
2. To be able to implement constructors and destructors.
3. To implement initializer list and operator overloading
4. To learn type casting and inheritance.

PRACTICALS

1. Classes and Objects- Write a program that uses a class where the member functions are defined inside a class.
2. Classes and Objects- Write a program that uses a class where the member functions are defined outside a class.
3. Classes and Objects- Write a program to demonstrate the use of static data members.
4. Classes and Objects- Write a program to demonstrate the use of const data members.
5. Constructors and Destructors- Write a program to demonstrate the use of zero argument and parameterized constructors.
6. Constructors and Destructors- Write a program to demonstrate the use of explicit constructor.
7. Initializer Lists- Write a program to demonstrate the use of initializer list.
8. Operator Overloading- Write a program to demonstrate the overloading of increment and decrement operators.
9. Operator Overloading- Write a program to demonstrate the overloading of binary arithmetic operators.
10. Typecasting- Write a program to demonstrate the typecasting of basic type to class type.
11. Typecasting- Write a program to demonstrate the typecasting of class type to basic type.
12. Typecasting- Write a program to demonstrate the typecasting of class type to class type.
13. Inheritance- Write a program to demonstrate the multilevel inheritance

ORGANIZATIONAL BEHAVIOR

Subject Code- BHSMC0-016 **L T P C** **Duration – 45hrs**
3 0 0 3

Course Objectives: The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behavior at the individual, group and organizational levels in the changing global scenario. The course must be taught using case study method.

Course Outcomes:-

1. After Studying this course the students will equip with ability to identify, explore and examine factors
2. Impinge on Individual and group behavior in organizations in the new millennium
3. Explain the terminology associated with organizational behavior

4. Incorporate and apply the predominate organization behavior theories to gain
5. knowledge of contemporary issues in organizational behavior
6. Frameworks to work with real life organizational issues concerned with human behavior at work place

UNIT-I (12Hrs)

Organizational Behaviour: Concepts, Theories and organization aspects of OB, Contributing Disciplines to OB, challenges and opportunities for OB. Foundations of Individual Behaviour: Biographical Characteristics, Course, Theories of Course, Attitudes,
Attitude Change, Values & Believes, Prejudices Personality: Determinants of Personality, Perception, Attribution Theory, Person's Perception.

UNIT-II (11Hrs)

Motivation: Definition & Process, Early Theories of Motivation, Contemporary Theories of Motivation, Nature and process of Motivation, Application of Motivation Concept. Job Satisfaction: Nature & Significance of Job satisfaction. Leadership: Nature Significance & Theories; Leadership Effectiveness Model; Leadership Traits & Skills; Behavioural Styles in Leadership. Transactional Analysis, Life Position, Johari Window Model.

UNIT-III (11Hrs)

Foundations of Group Behaviour: Nature & Concept of Group Formation, Stages of Group Formation, Theories of Group Formation. Teams, Difference between Group and TeamGroup Decision Making: Meaning & Nature, Decision Making Process; Decision Making Styles; Advantages & disadvantages of Decision Making; Techniques of Decision Making; Group Size & Decision Making.

UNIT-IV (11Hrs)

Organizational Change & Development: Meaning & Definition, Change Agents, Change Models, Resistance to Change. Power and Politics in Organization: Nature & Concepts, Sources & Types of Power, Techniques of Politics. Stress Management: Meaning and Concept of Stress, Stress in Organizations

Recommended Books

1. Robbins, 'Organization Behavior', Pearson Education.
2. Luthans, Organization Behavior', Tata McGraw Hill.
3. Hersey, 'Management of Organizational Behavior', Prentice Hall India.
4. Aswathappa, 'Organization Behavior', Himalaya Publications.
5. L.M. Prasad, 'Organization Behavior', Sultan Chand & Sons
6. Parikh, Gupta, 'Organizational Behavior', Tata McGraw Hill

GROUP-A 1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS1-101	Physics (Semiconductor Physics)	3	1	0	40	60	100	4
BMATH1-101	Mathematics-I (Calculus, Linear Algebra)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS1-102	Physics (Semiconductor Physics) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
BMNCC0-010	Universal Humanvalues – I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		15	3	10	540	360	900	19

Note:

1. There will be Induction Programme of 3 weeks before start of normal classes.
2. Drug Abuse: Problem, Management and Prevention and Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure atleast E grade in each of them.

* As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH1-201	Mathematics-II (Probability and Statistics)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
Total		12	2	12	400	400	800	20

Note:

1. Marks of 4 Week Manufacturing Practices Training during Summer Vacation will beincluded in 3rdSemester

PHYSICS (SEMICONDUCTORPHYSICS)

Subject Code: BPHYS1-101 **L T PC** **Duration: 38Hrs.**
3 1 0 4

Course Outcomes

1. Understanding of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication.
2. Skill enhancement to solve numerical problems related with Quantum theory, Electronic Material, Semiconductors and Light- Semiconductor Interactions and Fiber Optics Communication.
3. Apply knowledge of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication to go for higher studies in diverse fields.
4. To inculcate and develop the ability to think abstractly.

UNIT-I

Quantum Theory: (10 Hrs.)

Need and origin of Quantum Concept, Wave-particle duality, Matter waves, Group and Phase velocities, Concept of Uncertainty Principle and its application: nonexistence of electron in the nucleus, wave function & its significance, normalization of wave function, Schrodinger wave equation: time independent and dependent, Eigen functions & Eigen values, particle in a box in 1-D. Concept of scattering from a potential barrier and tunneling.

UNIT-II

Electronic Materials: (8 Hrs.)

Free electron theory, Density of states and energy band diagrams, Introduction to band gap theory, Direct and in direct and gaps. Types of electronic materials: metals, semiconductors and insulators, Occupation probability, Fermi level, Effective mass, phonons.

UNIT-III

Semiconductors and Light- Semiconductor Interactions: (12 Hrs.)

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices. Optical transitions in bulk semiconductors: absorption, spontaneousemission, and stimulated emission; Lasers: principles and working of laser: population inversion, pumping, types of lasers with emphasis on the semi-conductor Lasers.

UNIT-IV

Fibre Optics Communication: (8 Hrs.)

Introduction and importance of use of optical fibres in data transmission, optical fibre as a dielectric wave guide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, applications of optical fibres.

Recommended Books:

1. Satayaparkash, ‘QuantumMechanics’.
2. A. Ghatak and Lokanathan, ‘QuantumMechanics’.

3. J.Singh,'SemiconductorOptoelectronics:PhysicsandTechnology',McGrawHillInc.,1995.
4. S.M. Sze, 'Semiconductor Devices: Physics and Technology', Wiley,**2008**.
5. A. Yariv and P. Yeh, 'Photonics: Optical Electronics in Modern Communications', Oxford University Press, New York,**2007**.
6. P. Bhattacharya, 'Semiconductor Optoelectronic Devices', Prentice Hall of India,**1997**.
7. M R Shenoy, 'Online Course: Semiconductor Optoelectronics',NPTEL.
8. MonicaKatiyarandDeepakGupta,'OnlineCourse:OptoelectronicMaterialsandDevices', NPTEL.
9. Ben. G. Streetman, 'Solid State Electronics Devices', Pearson PrenticeHall.

MATHEMATICS-I (CALCULUS, LINEARALGEBRA)

Subject Code: BMATH1-101 **L T PC** **Duration: 46Hrs.**
3 1 0 4

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. The tool of power series and Fourier series for learning advanced EngineeringMathematics.
4. To deal with functions of several variables that are essential in most branches of engineering.
5. The essential tool of matrices and linear algebra in a comprehensive manner.

UNIT–I

Calculus: (12 Hrs.)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L' Hospital's rule; Maxima and minima. Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT –II

Sequences and Series: (10 Hrs.)

Convergence of sequence and series, tests for convergence (Comparison test, Ratio test, Raabe's test, Logarithmic test, Cauchy's root test, Cauchy's Integral test, series of positive and negative terms); Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

UNIT –III

Multivariable Calculus: (12 Hrs.)

Limit, continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence: Geometrical interpretation and basic properties, Directional derivative.

UNIT –IV

Linear Algebra: (12 Hrs.)

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Recommended Books:

1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', 9th Edn., Pearson, Reprint, **2002**.
2. Erwin Kreyszig, 'Advanced Engineering Mathematics', 9th Edn, John Wiley & Sons,**2006**.
3. T.Veerarajan,'EngineeringMathematicsforFirstYear',TataMcGrawHill,NewDelhi, **2008.**
4. B.V. Ramana, 'Higher Engineering Mathematics', 11th Reprint, Tata McGraw Hill, New Delhi,**2010**.
5. D. Poole, 'Linear Algebra: A Modern Introduction', 2nd Edn., Brooks/Cole,**2005**.
6. B.S. Grewal, 'Higher Engineering Mathematics', 36th Edn., Khanna Publishers, **2010**.

ENGINEERING GRAPHICS &DESIGN

Subject Code: BMECE0-101 **L T P C** **Duration: 30 Hrs.**
2 0 0 2

Course Objective

1 To understand the concept of Engineering drawing , Drawing instruments , Graphic standards and its application in Engineering.
2 To develop Skills in Preparation of Basic Drawings.
3 To develop Skills in Reading and Interpretation of Engineering Drawings.
4 Understand the concept of projection and acquire visualization skills
5 To prepare the student to communicate effectively.
6 To understand the concept of 2D and 3D drawings

Course Outcomes

1 Knowledge of Engineering drawing , drawing instruments and application .
2 Exposure to preparation of simple drawings
3 Inculcate the Concept of 2D and 3D and the related drawings
4 Exposure to creating working drawings
5 Exposure to improved communication and ability to visualize objects

1. Introduction

Engineering Drawing/Engineering Graphics/Technical Drawing - a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales. Basic Definition of geometrical objects: Points, lines, planes and solids.

2. Theory of Projections - Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

3. Projection of Points- Projection of points in quadrants and octants. Projection of point on Auxiliary planes.

4. Projection of Lines -Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two nonintersecting lines, and trace of line.

5. Projection of Planes- Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes. Application of auxiliary planes, and trace of planes.

6. Projection of Solids- Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

7. Section of Solids Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. Development of Surface Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

9. Isometric Projection Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

10. Orthographic Projection Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Recommended Text/Reference Books

1. N.D. Bhatt, V.M. Panchal& P.R. Ingle, ‘Engineering Drawing’, Charotar Publishing House, 2014.
2. M.B. Shah & B.C. Rana, ‘Engineering Drawing and Computer Graphics’, Pearson Education, 2008.
3. B. Agrawal& C.M. Agrawal, ‘Engineering Graphics’, TMH Publication, 2012.
4. K.L. Narayana& P. Kannaiah, ‘Text book on Engineering Drawing’, Scitech Publishers, 2008.

BASIC ELECTRICALENGINEERING

Subject Code: BELEE0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Outcomes:

1. To understand and analyze basic DC and AC circuits.
2. To study the use and working principle of single phase transformers.
3. To study the application and working principles of three phase and single phase induction motors.
4. To introduce to the components of low voltage electrical installations.

UNIT-1

DC Circuits: (8 Hrs.)

Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff current and voltage laws, analysis of simple circuits with dcexcitation Superposition, Thevenin and Norton Theorems. Step response of RL, RC circuits.

UNIT-2

AC Circuits: (12 Hrs.)

Representation of sinusoidal waveforms, average, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC series and parallel combinations, series and parallel resonance. Three phase voltage source, phase sequence, three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-3

Transformers: (10 Hrs.)

Magnetic materials, BH characteristics, Single-phase Transformer, no load and full load conditions,phasordiagrams,equivalentcircuit,calculationoflossesintransformers,regulation and efficiency, Auto-transformers, their applications and comparison with two winding transformers.

UNIT-4

Electrical Machines: (8 Hrs.)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Direct-On-Line and Star-Delta starters**.** Construction and working of single-phase motors(Splitphase,shadedpole,capacitorstart,capacitorrun,capacitorstartandrunmotors).

Electrical Installations: (4Hrs.)

Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), Moulded Case Circuit Breaker (MCCB), Types of Wiring, Earthing.

Recommended Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill,**2010**.
2. D.C. Kulshreshtha, 'Basic Electrical Engineering', McGraw Hill,**2009**.
3. L.S. Bobrow, 'Fundamentals of Electrical Engineering', Oxford University Press,**2011**.
4. E. Hughes, 'Electrical and Electronics Technology', Pearson,**2010**.
5. V.D. Toro, 'Electrical Engineering Fundamentals', Prentice Hall, India,**1989**.
6. J.P.S. Dhillon. J.S. Dhillon and D. Singh, 'Principles of Electrical & Electronics Engineering', Kalyani Publishers, New Delhi, **2005**.

PHYSICS (SEMICONDUCTOR PHYSICS) LAB.

Subject Code: BPHYS1-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Able to verify the concepts/laws of basic quantum Semiconductors and electronics.
2. To inculcate and develop scientific aptitude by performing the various experiments.
3. Skill enhancement by solving experimental problems.
4. To inculcate the spirit of teamwork.

Note: Students will have to perform at least 10 experiments from the given topic/list.

Experiments based on Semiconductor Physics:

1. To study the V-I characteristic of different PN junction diode-Ge andSi.
2. To study the V-I characteristic of Zenerdiode.
3. To study the V-I characteristic of LED.
4. To analyze the suitability of a given Zener diode as a power regulator.
5. To find out the intensity response of a solar cell/Photodiode.
6. To find out the intensity response of a LED.
7. To determine the band gap of a semiconductor.
8. To determine the resistivity of a semiconductor by four probe method.
9. To confirm the de Broglie equation for electrons.
10. To study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters.
11. To study the magnetic field of a circular coil carrying current.
12. To find out polarizability of a dielectric substance.
13. To study B-H curve of a ferromagnetic material using CRO.
14. To find out the frequency of AC mains using electric-vibrator.
15. To find the velocity of ultrasound in liquid.
16. To study the Hall effect for the determination of charge current densities.
17. Distinguish between Diamagnetic material, Paramagnetic and ferromagnetic material.
18. Measurement of susceptibility of a liquid or a solution by Quincke's method:
19. AFM experiment to study the sample with the nano-scale objects and measure surface topography with different scales, width and height of nano objects, and force-distance curves.
20. To study the temperature coefficient of Resistance of copper.

Physics Virtual Lab. Experiments:

21. To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.
22. To determine the resistivity of semiconductors by Four Probe Method.
23. To study the forward and reverse biased characteristics of PNP and NPN transistors.
24. To study the B-HCurve.
25. To study the Hall effect experiment to determine the charge carrier density.
26. To determine the magnetic susceptibilities of paramagnetic liquids by Quincke's Method.
27. To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a material using a hysteresis loop tracer.
28. Verification and design of combinational logic using AND, OR, NOT, NAND and XORgates.

Note: Any other experiment based on the above mentioned topics may be included.

ENGINEERING GRAPHICS & DESIGNLAB.

Subject Code: BMECE0-102 **L T P C** **Duration: 45 Hrs.**
0 0 6* 3

Course Objective

1. To have an overview of interactive computer graphics.
2. To learn the various 2D and 3D draw commands for drawing preparation
3. To understand the use of modify commands for making of drawings
4. To learn the dimensioning of drawings
5. To understand the use of the software in different Engineering applications

Course Outcomes

1 Understand the basics of computer graphics
2 Expertise to draw 2D and 3D drawings
3 Ability to do editing and dimensioning of drawings
4 Exposure to solid modeling

1. Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

2. Customization & CAD Drawing

Consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

3. Annotations, Layering & other Functions

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques.

.*Lab work will be performed in two parts:

(i) **Computer Lab (2 hours)** Computer Graphics, CAD Drawing etc.

(ii) **Drawing Hall (04 hours)** Manual practice on drawing sheets of theory content the relevant theory part of Engineering Graphics & Design may also be covered in Lab work.

BASIC ELECTRICAL ENGINEERING LAB.

Subject Code: BELEE0-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical induction motors.

EXPERIMENTS/DEMONSTRATIONS

1. To study basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. real-life resistors, capacitors and inductors.
2. To verify Ohm's law.
3. To verify Kirchhoff's voltage and current laws.
4. To verify Superposition Theorem.
5. To verify The venin Theorem.
6. To obtain the sinusoidal steady state response of R-L circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
7. To obtain the sinusoidal steady state response of R-C circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
8. To study resonance phenomenon in R-L-C series circuits.
9. To perform open circuit and short circuit test on a single phase transformer and calculate the efficiency.
10. Demonstrationofcut-outsectionsofmachines:Inductionmachine(squirrelcagerotorand slip ring arrangement) and single-phase induction machines.
11. To connect, start and reverse the direction of rotation by change of phase-sequence of connections of three phase induction motor.
12. To connect, start and reverse the direction of rotation of single-phase induction motor.
13. To demonstrate working of DOL starter for three-phase induction motor.
14. To demonstrate working of star-delta starter for three-phase induction motor.
15. To demonstrate the components of LT switchgear.

DRUG ABUSE: PROBLEM, MANAGEMENT ANDPREVENTION

Subject Code: BMNCC0-004 **L T PC** **Duration: 30Hrs.**
2 0 0 0

Course Outcomes:

1. Differentiate between physical and psychological dependence of drug abuse.
2. Understanding the consequences of drug abuse.
3. Explain prevention of drug abuse.
4. Identify treatments and management of drug abuse.

UNIT-I

Meaning of Drug Abuse:

Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II

Consequences of Drug Abuse:
Individual: Education, Employment, Income.
Family: Violence.
Society: Crime.
Nation: Law and Order problem.

UNIT-III

Prevention of Drug Abuse:
Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny.
School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV

Treatment and Control of Drug Abuse:
Medical Management: Medication for treatment and to reduce withdrawal effects.
Psychological Management: Counselling, Behavioural and Cognitive therapy.
Social Management: Family, Group therapy and Environmental intervention.
Treatment: Medical, Psychological and Social Management.
Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, **2003**.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, **2004.**
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills,**1981**.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi,**1985**.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books,**1982**.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications,Jaipur, **1997.**
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, **2003 &2004**.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi,**2013**.
9. BhimSain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi,**1991**.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar,**2009**.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra,Delhi, **2000**.
12. S. Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention andCessation', Cambridge University Press,**2008**.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and Political Weekly, **2017**.
14. 'World Drug Report', United Nations Office of Drug and Crime,**2016**.
15. 'World Drug Report', United Nations Office of Drug and Crime,**2017**.

CHEMISTRY-I

Subject Code: BCHEM0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Objectives:

1. To understand the atomic and & molecular nature of various molecules
2. To understand the band structures
3. To elaborate the applications of spectroscopic techniques
4. To understand the thermodynamic functions and their applications
5. To rationalize periodic properties
6. To understand the concepts of stereochemistry and preparation of organic molecules

Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.
Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

1. Analyzemicroscopicchemistryintermsofatomicandmolecularorbitalsandintermolecular forces.
2. Rationalize bulk properties and processes using thermodynamic considerations.
3. Distinguishtherangesoftheelectromagneticspectrumusedforexcitingdifferentmolecular energy levels in various spectroscopic techniques
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. List major chemical reactions that are used in the synthesis of molecules.

UNIT-I

1. Atomic and Molecular Structure: (12Hrs.)

Bohr Theory of Hydrogen atom, Spectrum of H atom, Sommerfeld extension of Bohr Theory, Particle and wave nature of electron, De-Broglie equation, Aufbau principle, Compton effect, Schrodinger wave equation, Laplacian and Hamiltonian operator, Linear Combination of atomic orbitals. Molecular orbitals of diatomic molecules and Energy level diagrams of homonuclearandheteronucleardiatomics.Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT-II

2. Spectroscopic Techniques and Applications: (8Hrs.)

PrinciplesandselectionrulesofElectronicspectroscopyandFluorescencespectroscopyalong withtheirapplications.PrinciplesandselectionrulesofVibrationalandrotationalspectroscopy of diatomic molecules and their Applications. Nuclear magnetic resonance up to spin-spin coupling and magnetic resonance imaging.

3. Intermolecular Forces and Potential Energy Surfaces: (4Hrs.)

Ideal gas equation, Ionic, dipolar and vanDer Waals interactions. Realgas equation. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, and HCN

UNIT-III

4. Use of Free Energy in Chemical Equilibria: (6 Hrs.)

Ideal Solution, Non Ideal Solutions, Thermodynamic functions: energy, entropy and free energy. Numerical problems based on entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Thermodynamic properties of ideal solutions. Introduction to Electrochemical Corrosion and its mechanism. Use of free energy considerations in metallurgy through Ellingham diagrams.

5. Periodic Properties: (4 Hrs.)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases principle

UNIT-IV

6. Stereochemistry: (4 Hrs.)

Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis of butane. Isomerism in transitional metal compounds.

7. Organic Reactions and Synthesis of a Drug Molecule: (4Hrs.)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule – β lactum, Paracetamol, Chloroquine and Aspirin

Recommended Books:

1. B.H. Mahan, 'University Chemistry'.
2. M.J. Sienko and R.A. Plane 'Chemistry: Principles and Applications'.
3. C.N. Banwell, 'Fundamentals of Molecular Spectroscopy'.
4. B.L.Tembe,KamaluddinandM.S.Krishnan,'EngineeringChemistry(NPTELWeb-book)
5. P.W. Atkins, 'PhysicalChemistry'.
6. K.P.C. Volhardt and N.E. Schore 'Organic Chemistry: Structure and Function', 5thEdn., http://bcs.whfreeman.com/vollhardtschore5e/default.asp

MATHEMATICS-II (PROBABILITY AND STATISTICS)

Subject Code: BMATH1-201 **L T PC** **Duration: 40Hrs.**
3 1 0 4

COURSE OBJECTIVE

Students will learn

1. Understanding Probability theory.
2. Probability distribution, bivariate distribution, conditional densities
3. Statistical analysis, correlation and regression, moment, skewness and kurtosis.
4. Statistical hypothesis about real world problem, curve fitting, small samples.

Course Outcomes (CO)

Students will be able

1. To express the concept of basic probability and its features, expected values and moments.
2. To explain the concept of continuous probability distribution and bivariate distribution
3. To describe basic statistics(moments, skewness, kurtosis, correlation and regression).
4. To explain about applied statistics and small samples.

UNIT–I

Basic Probability: (12 Hrs.)

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.

UNIT –II

Continuous Probability Distributions: (6 Hrs.)

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Bivariate Distributions: (6 Hrs.) Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT –III

Basic Statistics: (10 Hrs.)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

UNIT –IV

Applied Statistics: (8 Hrs.)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Small Samples: (4 Hrs.)

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Recommended Books:

1. E. Kreyszig, 'Advanced Engineering Mathematics', John Wiley & Sons,**2006**

2. P.G. Hoel, S.C. Port and C.J. Stone, 'Introduction to Probability Theory', Universal Book Stall, **2003**.
3. S. Ross, 'A First Course in Probability', Pearson Education India,**2002**.
4. W.Feller,'AnIntroductiontoProbabilityTheoryanditsApplications',Vol.-1,Wiley,**1968**.
5. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers,**2000**.
6. T. Veerarajan, 'Engineering Mathematics', Tata McGraw Hill, New Delhi, **2010**.

ENGLISH

Subject Code: BHUMA0-101 **L T PC** **Duration: 25Hrs.**
2 0 0 2

Course Objectives:

1. Students should be able to enhance language proficiency, critical thinking and analytical skills
2. To expose the students to various spoken skills
3. To strength their professional skills
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. The students will be able to understand specific piece of information
2. Be able to express themselves in writing for social occasions
3. Be able to identify the language functions in the spoken discourse
4. Improvement of technical communication skills , such as writing reports giving presentations and effectively communicating ideas related to respective field

UNIT-I

1. Vocabulary Building:
The concept of Word Formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to formderivatives.Synonyms, antonyms, and standard abbreviations.

UNIT-II

2. Basic Writing Skills:
Sentence Structures
Use of phrases and clauses in sentences
Importance of proper punctuation
Creating coherence
Organizing principles of paragraphs in documents
Techniques for writing precisely

UNIT-III

3. Identifying Common Errors in Writing:
Subject-verb agreement
Noun-pronoun agreement
Misplaced modifiers
Articles
Prepositions
Redundancies
Clichés

UNIT-IV

4. Nature and Style of sensible Writing:
DescribingDefining
Classifying
Providing examples or evidence

Writing introduction and conclusion

5. Writing Practices:

Comprehension
Précis Writing
Essay Writing

Recommended Books:

1. Michael Swan, 'Practical English Usage', OUP, **1995**.
2. F.T. Wood, 'Remedial English Grammar', Macmillan,**2007.**
3. William Zinsser, 'On Writing Well', Harper Resource Book,**2001.**
4. Liz Hamp-Lyons and Ben Heasly, 'Study Writing', Cambridge University Press,**2006**.
5. Sanjay Kumar and Pushp Lata, 'Communication Skills', Oxford University Press,**2011**.
6. 'Exercises in Spoken English', Parts. I-III. CIEFL, Hyderabad. Oxford UniversityPress.

PROGRAMMING FOR PROBLEMSOLVING

Subject Code: BCSCE0-101 **L T PC** **Duration: 41Hrs.**
3 0 0 3

Course Objectives:

1. To be familiarize with flow of algorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:

The student will learn

1. To learn the basic terms related to programming and understand arithmetic expressions.
2. To understand the concept of arrays.
3. To implement functions and recursion.
4. To learn structure, pointers and file handling

UNIT-I

1. Introduction to Programming: (6 Hrs.)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

2. Arithmetic Expressions and Precedence: (12Hrs.)

Conditional Branching and Loops. Writing and evaluation of conditionals and consequent branching. Iteration and loops.

UNIT-II

3. Arrays: (5 Hrs.)

Arrays (1-D, 2-D), Character arrays and Strings

4. Basic Algorithms: (5 Hrs.)

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT-III

5. Function: (4Hrs.)

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

6. Recursion: (4Hrs.)

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-IV

7. Structure: (3 Hrs.)

Structures, Defining structures and Array of Structures.Pointers: (2Hrs.)
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

8. File Handling: (only if time is available, otherwise should be done as part of thelab)

Recommended Text Books:

1. Byron Gottfried, 'Schaum's Outline of Programming with C', McGrawHill.
2. E. Balaguruswamy, 'Programming in ANSI C', Tata McGrawHill.

Recommended Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, 'The C Programming Language', Prentice Hall of India.

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CHEMISTRY-I LAB.

Subject Code: BCHEM0-101 **L T P C**
0 0 2 1

Course Objectives:

1. To learn the preparation and standardization of solutions
2. To learn the estimation of various physical properties of given liquid samples
3. To estimate various crucial parameters for water sample
4. To learn the preparation of various molecules and detection of functional groups.

Course Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyze a salt sample

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension and viscosity
3. Thin layer chromatography
4. Determination of total Alkalinity/ Acidity of a water sample.
5. Determination of residual chlorine in water sample
6. Estimation of total, temporary and permanent hardness of water
7. Determination of the rate constant of a reaction
8. Determination of strength of an acid conductometrically

9. Potentiometry - determination of redox potentials andemfs
10. Synthesis of apolymer
11. Saponification /acid value of anoil
12. Detection and confirmation of organic functionalgroups.
13. Models of spatialorientation
14. TotestthevalidityofLambertBeerlaw/Determinationofλ_{max}/Determinationofunknown concentration of asolution.
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid bycharcoal
17. Synthesis of a drug – Acetaminophen,Aspirin

ENGLISH LAB.

Subject Code: BHUMA0-102 **L T P C**
0 0 2 1

Course Objectives:

1. To enhance LSRW Skills
2. To improve the fluency in spoken English
3. To familiarize students with the use of English in everyday situations
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. Identify common errors in spoken and written communication
2. List familiarized with English vocabulary and language proficiency
3. Improve nature and style of sensible writing.
4. Improve acquire employment and work place communication skills.

Oral Communication

(This unit involves interactive practice sessions in Language Lab.)

1. Listening Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations

PROGRAMMING FOR PROBLEM SOLVING LAB.

Subject Code: BCSCE0-102 **L T P C**
0 0 4 2

Course objectives:

1. To be familiarize with flow of algorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:

1. Correct syntax errors as reported by the compilers and logical errors encountered at run time
2. Develop programs by using decision making and looping constructs.
3. Implement real time applications using the concept of array, pointers, functions and structures.

4. Solve real world problems using matrices, searching and sorting

NOTE: The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions
Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations

MANUFACTURING PRACTICES (THEORY &LAB.)

Subject Code: BMFPR0-101 **L T PC** **Duration: 80 Hrs.**
1 0 4 3

Course objectives.

1 Understand the operations of manufacturing methods and processes.
2 Perform the various manufacturing operations.
3 Understand the basics of advanced manufacturing methods.
4. Understanding the basics of computer numerical control machines.

Course outcomes:

After the completion of this course students will be able:-

1. To perform various metal forming operations.
2. To perform various metal cutting operations.
3. To perform various metal joining operations.
4. To write simple CNC part programming.

Lectures & Videos: (10 Hrs.)

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing Methods.
2. CNC machining, Additivemanufacturing.
3. Fitting operations & powertools.
4. Sheet MetalOperations.
5. Electrical &Electronics.

6. Carpentry.
7. Plastic moulding (injection moulding, blow moulding, extrusion moulding), glasscutting.
8. Metalcasting.
9. Welding (arc welding & gas welding),brazing.

Recommended Text/Reference Books:

1. S.K. Hajra Choudhury, A.K. Hajra Choudhury and S.K. Nirjhar Roy, 'Elements of Workshop Technology', Vol.-I, **2008** and Vol.-II **2010**, Media Promoters and Publishers Pvt. Ltd.,Mumbai.
2. S. Kalpakjian, Steven S. Schmid, 'Manufacturing Engineering and Technology', 4thEdn., Pearson Education India Edn.,**2002**.
3. Gowri P. Hariharan and A. Suresh Babu, 'Manufacturing Technology – I', Pearson,**2008**.
4. Roy A. Lindberg, 'Processes and Materials of Manufacture', 4thEdn., Prentice HallIndia, 1998.
5. P.N. Rao, 'Manufacturing Technology', Vol.-I and Vol.-II, Tata McGraw HillHouse,2017.

Workshop Practice: (70 Hrs.)

1. Machine shop **(10Hrs.)**
2. Fitting shop **(8Hrs.)**
3. Carpentry **(6Hrs.)**
4. Electrical & Electronics **(8 Hrs.)**
5. Welding shop **(8 Hrs. (Arc welding 4 Hrs. + Gas welding 4Hrs.)**
6. Casting **(8Hrs.)**
7. Sheet Metal Operations **(10 Hrs.)**
8. Smithy **(6Hrs.)**
9. Plastic moulding& Glass Cutting **(6Hrs.)**
10. Examinations could involve the actual fabrication of simple components, utilizing one ormore of the techniques covered above.

INTRODUCTION TO CSE((Internet of Things and Cyber Security Including Block Chain Technology)

Subject Code: BMNCC0-014 **L T PC** **Duration: 24Hrs.**

2 0 0 0

Course Outcomes:

1. Basic knowledge of Computer Science and Engineering
2. Exploring Computer Science Fields and Opportunities
3. Understanding Computer Hardware and Software
4. Software Types and Operating Systems

UNIT-I

Introduction to Computer Science & Engineering, Difference between science & engineering, Applications of Computer Science & engineering.

UNIT-II

Different branches/fields of Computer Science, Scope of Computer Science in industry, self-employment etc.

UNIT-III

Introduction to Computer, parts of computer system. Difference between Hardware & software, Configuration of computer systems, Types of memory-RAM, ROM, Introduction to UPS-Online and Offline, printers etc.

UNIT-IV

Different types of Software- Application software and System Software, Types of Languages-High level and low level languages, Introduction to Operating System.

GROUP-A
1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS1-101	Physics (Semiconductor Physics)	3	1	0	40	60	100	4
BMATH1-101	Mathematics-I (Calculus, Linear Algebra)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS1-102	Physics (Semiconductor Physics) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
BMNCC0-010	Universal Humanvalues – I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		15	3	10	540	360	900	19

Note:

1. There will be Induction Programme of 3 weeks before start of normal classes.
2. Drug Abuse: Problem, Management and Prevention and Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure atleast E grade in each of them.

* As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH1-201	Mathematics-II (Probability and Statistics)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
Total		12	2	12	400	400	800	20

Note:

1. Marks of 4 Week Manufacturing Practices Training during Summer Vacation will beincluded in 3rdSemester

(3rd SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMATH1-301	Calculus and Ordinary Differential Equation	3	0	0	40	60	100	3
BCSES1-301	Computer Peripherals & Interfaces	3	0	0	40	60	100	3
BCSES1-302	Data structure &Algorithms	3	1	0	40	60	100	4
BCSES1-303	Digital Electronics	3	1	0	40	60	100	4
BCSES1-304	Data structure & Algorithms Laboratory	0	0	4	60	40	100	2
BCSES1-305	Digital Electronics Laboratory	0	0	2	60	40	100	1
BCSES1-306	IT Workshop (SciLab / MATLAB) Laboratory	0	0	4	60	40	100	2
BCSES1-307	Training-I*	-	-	-	60	40	100	3
BHSMC0-007	Development of Societies	3	0	0	40	60	100	3
Total 5 Theory &3 Lab. Courses		**15**	**2**	**10**	**440**	**460**	**900**	**25**

***NOTE:** Training after the 2nd Semester.

(4th SEMESTER)

Course		**Contact Hrs.**			**Marks**			**Credits**
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BMATH1-401	Discrete Mathematics	3	1	0	40	60	100	4
BCSES1-401	Computer Organization &Architecture	3	0	0	40	60	100	3
BCSES1-402	Operating Systems	3	1	0	40	60	100	4
BCSES1-403	Object Oriented Programming	3	1	0	40	60	100	4
BCSES1-404	Operating Systems Laboratory	0	0	2	60	40	100	1
BCSES1-405	Object Oriented Programming Laboratory	0	0	4	60	40	100	2
BHSMC0-016	Organizational Behaviour	3	0	0	40	60	100	3
BHSMC0-026	Universal Humanvalues – II Understanding Harmony	2	1	0	40	60	100	3
Total 6 Theory & 2 Lab. Courses		**17**	**4**	**06**	**360**	**440**	**800**	**24**

(5th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCSES1-501	Compiler Design	3	1	0	40	60	100	4
BCSES1-502	Database Management System	3	0	0	40	60	100	3
BCSES1-503	Formal Language and Automata Theory	3	0	0	40	60	100	3
BCSES1-504	Design &Analysis of Algorithms	3	1	0	40	60	100	4
BCSES1-505	Database Management System Laboratory	0	0	4	60	40	100	2
BCSES1-506	Design &Analysis of Algorithms Laboratory	0	0	2	60	40	100	1
BCSES1-507	Training-II*	-	-	-	60	40	100	4
	Departmental Elective-I	3	0	0	40	60	100	3
BCSED1-511	Computer Graphics							
BCSED1-512	Graph Theory							
BCSED1-513	Web Technologies							
BCSED1-514	Java Programming							
BHSCM0-015	Finance & Accounting	3	0	0	40	60	100	3
Total 7 Theory & 2 Lab. Courses		**-**	**-**	**-**	**420**	**480**	**900**	**27**

***NOTE:** During the summer vacation after 4th.

(6th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCSES1-601	Software Engineering	3	0	0	40	60	100	3
BCSES1-602	Computer Networks	3	1	0	40	60	100	4
BCSES1-603	Computer Network Laboratory	0	0	2	60	40	100	1
BCSES1-604	***Project-I	0	0	4	60	40	100	2
	Departmental Elective-II (Select any One)	3	0	0	40	60	100	3
BCSED1-611	Mobile Application Development							
BCSED1-612	Machine Learning							
BCSED1-613	Distributed Systems							
BCSED1-614	Signals and Systems							
	Departmental Elective-III (Select any One)	3	0	0	40	60	100	3
BCSED1-621	Data Mining							
BCSED1-622	Cloud Computing							
BCSED1-623	Parallel Processing							
BCSED1-624	Embedded Systems							
XXXX	**Open Elective****	3	0	0	40	60	100	3
Total 5 Theory &2 Lab. Courses		**-**	**-**	**-**	**320**	**380**	**700**	**19**

**** Open Elective Subject may be chosen from the list of open elective offered by other departments of university**

****Project work, seminar and internship in industry or at appropriate work place**

(7thSEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCSES1-701	*Project-II	0	0	4	60	40	100	2
BCSES1-702	***Training-III	-	-	-	60	40	100	4
	Departmental Elective-IV	3	0	0	40	60	100	3
BCSED1-711	Distributed Operating System							
BCSED1712	Soft Computing							
BCSED1-713	Human Computer Interaction							
BCSED1-714	Ad-hoc & Sensor Networks							
	Departmental Elective-V	3	0	0	40	60	100	3
BCSED1-721	Bioinformatics							
BCSED1-722	Image processing							
BCSED1-723	Cryptography & Network Security							
BCSED1-724	Artificial Intelligence							
XXXX	**Open Elective***	3	0	0	40	60	100	3
BMNCC0-002	Environmental Sciences	2	0	0	100	00	100	0
Total		**-**	**-**	**-**	**340**	**260**	**600**	**15**

*Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

****Continued from VII Semester, Project work, seminar and internship in industry or at appropriate work place

*****During the summer vacation after 6th semester.

(8th SEMESTER)

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
BCSES1-801	Project-III**	0	0	10	60	40	100	5
	Departmental Elective-VI	3	0	0	40	60	100	3
BCSED1-811	Enterprise Resource Planning							
BCSED1-812	Internet of things							
BCSED1-813	Advanced Database Management Systems							
BCSED1-814	Software Project Management							
XXXX	**Open Elective***	3	0	0	40	60	100	3
XXXX	**Open Elective***	3	0	0	40	60	100	3
	Mandatory Courses- noncredit***	2	0	0	100	00	100	0
BMNCC0-001	Constitution of India							
BMNCC0-006	Essence of Indian Knowledge Tradition							
Total		**-**	**-**	**-**	**280**	**220**	**500**	**14**

*Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

**Project III to be made by student during the semester.

***choose any one subject from mandatory Courses.

PHYSICS (SEMICONDUCTORPHYSICS)

Subject Code: BPHYS1-101 **L T PC** **Duration: 38Hrs.**
3 1 0 4

Course Outcomes

1. Understanding of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication.
2. Skill enhancement to solve numerical problems related with Quantum theory, Electronic Material, Semiconductors and Light- Semiconductor Interactions and Fiber Optics Communication.
3. Apply knowledge of Quantum theory, Electronic Material, Semiconductors and Light-Semiconductor Interactions and Fiber Optics Communication to go for higher studies in diverse fields.
4. To inculcate and develop the ability to think abstractly.

UNIT-I

Quantum Theory: (10 Hrs.)

Need and origin of Quantum Concept, Wave-particle duality, Matter waves, Group and Phase velocities, Concept of Uncertainty Principle and its application: nonexistence of electron in the nucleus, wave function & its significance, normalization of wave function, Schrodinger wave equation: time independent and dependent, Eigen functions & Eigen values, particle in a box in 1-D. Concept of scattering from a potential barrier and tunneling.

UNIT-II

Electronic Materials: (8 Hrs.)

Free electron theory, Density of states and energy band diagrams, Introduction to band gap theory, Direct and in direct and gaps. Types of electronic materials: metals, semiconductors and insulators, Occupation probability, Fermi level, Effective mass, phonons.

UNIT-III

Semiconductors and Light- Semiconductor Interactions: (12 Hrs.)

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices. Optical transitions in bulk semiconductors: absorption, spontaneousemission, and stimulated emission; Lasers: principles and working of laser: population inversion, pumping, types of lasers with emphasis on the semi-conductor Lasers.

UNIT-IV

Fibre Optics Communication: (8 Hrs.)

Introduction and importance of use of optical fibres in data transmission, optical fibre as a dielectric wave guide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, applications of optical fibres.

Recommended Books:

1. Satayaparkash, 'QuantumMechanics'.
2. A. Ghatak and Lokanathan, 'QuantumMechanics'.
3. J.Singh,'SemiconductorOptoelectronics:PhysicsandTechnology',McGrawHillInc.,1995.
4. S.M. Sze, 'Semiconductor Devices: Physics and Technology', Wiley,**2008**.

5. A. Yariv and P. Yeh, 'Photonics: Optical Electronics in Modern Communications', Oxford University Press, New York,**2007**.
6. P. Bhattacharya, 'Semiconductor Optoelectronic Devices', Prentice Hall of India,**1997**.
7. M R Shenoy, 'Online Course: Semiconductor Optoelectronics',NPTEL.
8. MonicaKatiyarandDeepakGupta,'OnlineCourse:OptoelectronicMaterialsandDevices', NPTEL.
9. Ben. G. Streetman, 'Solid State Electronics Devices', Pearson PrenticeHall.

MATHEMATICS-I (CALCULUS, LINEARALGEBRA)

Subject Code: BMATH1-101 **L T PC** **Duration: 46Hrs.**
3 1 0 4

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. The tool of power series and Fourier series for learning advanced EngineeringMathematics.
4. To deal with functions of several variables that are essential in most branches of engineering.
5. The essential tool of matrices and linear algebra in a comprehensive manner.

UNIT–I

Calculus: (12 Hrs.)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L' Hospital's rule; Maxima and minima. Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT –II

Sequences and Series: (10 Hrs.)

Convergence of sequence and series, tests for convergence (Comparison test, Ratio test, Raabe's test, Logarithmic test, Cauchy's root test, Cauchy's Integral test, series of positive and negative terms); Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

UNIT –III

Multivariable Calculus: (12 Hrs.)

Limit, continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence: Geometrical interpretation and basic properties, Directional derivative.

UNIT –IV

Linear Algebra: (12 Hrs.)

Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Recommended Books:

1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', 9th Edn., Pearson, Reprint, **2002**.
2. Erwin Kreyszig, 'Advanced Engineering Mathematics', 9th Edn, John Wiley & Sons,**2006**.
3. T.Veerarajan,'EngineeringMathematicsforFirstYear',TataMcGrawHill,NewDelhi, **2008.**
4. B.V. Ramana, 'Higher Engineering Mathematics', 11th Reprint, Tata McGraw Hill, New Delhi,**2010**.
5. D. Poole, 'Linear Algebra: A Modern Introduction', 2nd Edn., Brooks/Cole,**2005**.
6. B.S. Grewal, 'Higher Engineering Mathematics', 36th Edn., Khanna Publishers, **2010**.

ENGINEERING GRAPHICS &DESIGN

Subject Code: BMECE0-101 **L T P C** **Duration: 30 Hrs.**
2 0 0 2

Course Objective

1 To understand the concept of Engineering drawing , Drawing instruments , Graphic standards and its application in Engineering.
2 To develop Skills in Preparation of Basic Drawings.
3 To develop Skills in Reading and Interpretation of Engineering Drawings.
4 Understand the concept of projection and acquire visualization skills
5 To prepare the student to communicate effectively.
6 To understand the concept of 2D and 3D drawings

Course Outcomes

1 Knowledge of Engineering drawing , drawing instruments and application .
2 Exposure to preparation of simple drawings
3 Inculcate the Concept of 2D and 3D and the related drawings
4 Exposure to creating working drawings
5 Exposure to improved communication and ability to visualize objects

1. Introduction

Engineering Drawing/Engineering Graphics/Technical Drawing - a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales. Basic Definition of geometrical objects: Points, lines, planes and solids.

2. Theory of Projections - Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

3. Projection of Points- Projection of points in quadrants and octants. Projection of point on Auxiliary planes.

4. Projection of Lines -Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two nonintersecting lines, and trace of line.

5. Projection of Planes- Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes. Application of auxiliary planes, and trace of planes.

6. Projection of Solids- Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

7. Section of Solids Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. Development of Surface Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

9. Isometric Projection Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

10. Orthographic Projection Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Recommended Text/Reference Books

1. N.D. Bhatt, V.M. Panchal& P.R. Ingle, 'Engineering Drawing', Charotar Publishing House, 2014.
2. M.B. Shah & B.C. Rana, 'Engineering Drawing and Computer Graphics', Pearson Education, 2008.
3. B. Agrawal& C.M. Agrawal, 'Engineering Graphics', TMH Publication, 2012.
4. K.L. Narayana& P. Kannaiah, 'Text book on Engineering Drawing', Scitech Publishers, 2008.

BASIC ELECTRICALENGINEERING

Subject Code: BELEE0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Outcomes:

1. To understand and analyze basic DC and AC circuits.
2. To study the use and working principle of single phase transformers.
3. To study the application and working principles of three phase and single phase induction motors.
4. To introduce to the components of low voltage electrical installations.

UNIT-1

DC Circuits: (8 Hrs.)

Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff current and voltage laws, analysis of simple circuits with dcexcitation Superposition, Thevenin and Norton Theorems. Step response of RL, RC circuits.

UNIT-2

AC Circuits: (12 Hrs.)

Representation of sinusoidal waveforms, average, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC series and parallel combinations, series and parallel resonance. Three phase voltage source, phase sequence, three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-3

Transformers: (10 Hrs.)

Magnetic materials, BH characteristics, Single-phase Transformer, no load and full load conditions,phasordiagrams,equivalentcircuit,calculationoflossesintransformers,regulation and efficiency, Auto-transformers, their applications and comparison with two winding transformers.

UNIT-4

Electrical Machines: (8 Hrs.)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Direct-On-Line and Star-Delta starters**.** Construction and working of single-phase motors(Splitphase,shadedpole,capacitorstart,capacitorrun,capacitorstartandrunmotors).

Electrical Installations: (4Hrs.)

Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), Moulded Case Circuit Breaker (MCCB), Types of Wiring, Earthing.

Recommended Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill,**2010**.
2. D.C. Kulshreshtha, 'Basic Electrical Engineering', McGraw Hill,**2009**.
3. L.S. Bobrow, 'Fundamentals of Electrical Engineering', Oxford University Press,**2011**.
4. E. Hughes, 'Electrical and Electronics Technology', Pearson,**2010**.
5. V.D. Toro, 'Electrical Engineering Fundamentals', Prentice Hall, India,**1989**.
6. J.P.S. Dhillon. J.S. Dhillon and D. Singh, 'Principles of Electrical & Electronics Engineering', Kalyani Publishers, New Delhi, **2005**.

PHYSICS (SEMICONDUCTOR PHYSICS) LAB.

Subject Code: BPHYS1-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Able to verify the concepts/laws of basic quantum Semiconductors and electronics.
2. To inculcate and develop scientific aptitude by performing the various experiments.
3. Skill enhancement by solving experimental problems.
4. To inculcate the spirit of teamwork.

Note: Students will have to perform at least 10 experiments from the given topic/list.

Experiments based on Semiconductor Physics:

1. To study the V-I characteristic of different PN junction diode-Ge andSi.
2. To study the V-I characteristic of Zenerdiode.
3. To study the V-I characteristic of LED.
4. To analyze the suitability of a given Zener diode as a power regulator.
5. To find out the intensity response of a solar cell/Photodiode.
6. To find out the intensity response of a LED.

7. To determine the band gap of a semiconductor.
8. To determine the resistivity of a semiconductor by four probe method.
9. To confirm the de Broglie equation for electrons.
10. To study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters.
11. To study the magnetic field of a circular coil carrying current.
12. To find out polarizability of a dielectric substance.
13. To study B-H curve of a ferromagnetic material using CRO.
14. To find out the frequency of AC mains using electric-vibrator.
15. To find the velocity of ultrasound in liquid.
16. To study the Hall effect for the determination of charge current densities.
17. Distinguish between Diamagnetic material, Paramagnetic and ferromagnetic material.
18. Measurement of susceptibility of a liquid or a solution by Quincke's method:
19. AFM experiment to study the sample with the nano-scale objects and measure surface topography with different scales, width and height of nano objects, and force-distance curves.
20. To study the temperature coefficient of Resistance of copper.

Physics Virtual Lab. Experiments:

21. To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.
22. To determine the resistivity of semiconductors by Four Probe Method.
23. To study the forward and reverse biased characteristics of PNP and NPN transistors.
24. To study the B-HCurve.
25. To study the Hall effect experiment to determine the charge carrier density.
26. To determine the magnetic susceptibilities of paramagnetic liquids by Quincke's Method.
27. To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a material using a hysteresis loop tracer.
28. Verification and design of combinational logic using AND, OR, NOT, NAND and XORgates.

Note: Any other experiment based on the above mentioned topics may be included.

ENGINEERING GRAPHICS & DESIGNLAB.

Subject Code: BMECE0-102 **L T P C** **Duration: 45 Hrs.**
0 0 6* 3

Course Objective

1. To have an overview of interactive computer graphics.
2. To learn the various 2D and 3D draw commands for drawing preparation
3. To understand the use of modify commands for making of drawings
4. To learn the dimensioning of drawings
5. To understand the use of the software in different Engineering applications

Course Outcomes

1 Understand the basics of computer graphics
2 Expertise to draw 2D and 3D drawings
3 Ability to do editing and dimensioning of drawings
4 Exposure to solid modeling

1. **Overview of Computer Graphics**

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

2. **Customization & CAD Drawing**

Consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

3. **Annotations, Layering & other Functions**

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques.

.*Lab work will be performed in two parts:

(i) **Computer Lab (2 hours)** Computer Graphics, CAD Drawing etc.

(ii) **Drawing Hall (04 hours)** Manual practice on drawing sheets of theory content the relevant theory part of Engineering Graphics & Design may also be covered in Lab work.

BASIC ELECTRICAL ENGINEERING LAB.

Subject Code: BELEE0-102 **L T P C**
0 0 2 1

Course Outcomes:

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical induction motors.

EXPERIMENTS/DEMONSTRATIONS

1. To study basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. real-life resistors, capacitors and inductors.
2. To verify Ohm's law.
3. To verify Kirchhoff's voltage and current laws.
4. To verify Superposition Theorem.
5. To verify The venin Theorem.
6. To obtain the sinusoidal steady state response of R-L circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
7. To obtain the sinusoidal steady state response of R-C circuit – impedance calculation and verification. Observation of phase differences between current and voltage.
8. To study resonance phenomenon in R-L-C series circuits.
9. To perform open circuit and short circuit test on a single phase transformer and calculate the efficiency.
10. Demonstrationofcut-outsectionsofmachines:Inductionmachine(squirrelcagerotorand slip ring arrangement) and single-phase induction machines.
11. To connect, start and reverse the direction of rotation by change of phase-sequence of connections of three phase induction motor.
12. To connect, start and reverse the direction of rotation of single-phase induction motor.
13. To demonstrate working of DOL starter for three-phase induction motor.
14. To demonstrate working of star-delta starter for three-phase induction motor.
15. To demonstrate the components of LT switchgear.

DRUG ABUSE: PROBLEM, MANAGEMENT ANDPREVENTION

Subject Code: BMNCC0-004 **L T PC** **Duration: 30Hrs.**
2 0 0 0

Course Outcomes:

1. Differentiate between physical and psychological dependence of drug abuse.
2. Understanding the consequences of drug abuse.
3. Explain prevention of drug abuse.
4. Identify treatments and management of drug abuse.

UNIT-I

Meaning of Drug Abuse:

Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II

Consequences of Drug Abuse:
Individual: Education, Employment, Income.
Family: Violence.
Society: Crime.
Nation: Law and Order problem.

UNIT-III

Prevention of Drug Abuse:
Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny.
School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV

Treatment and Control of Drug Abuse:
Medical Management: Medication for treatment and to reduce withdrawal effects.
Psychological Management: Counselling, Behavioural and Cognitive therapy.
Social Management: Family, Group therapy and Environmental intervention.
Treatment: Medical, Psychological and Social Management.
Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, **2003**.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, **2004.**
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills,**1981**.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi,**1985**.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books,**1982**.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications,Jaipur, **1997.**
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, **2003 &2004**.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi,**2013**.
9. BhimSain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi,**1991**.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar,**2009**.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra,Delhi, **2000**.
12. S. Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention andCessation', Cambridge University Press,**2008**.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and Political Weekly, **2017**.
14. 'World Drug Report', United Nations Office of Drug and Crime,**2016**.
15. 'World Drug Report', United Nations Office of Drug and Crime,**2017**.

CHEMISTRY-I

Subject Code: BCHEM0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

Course Objectives:

1. To understand the atomic and & molecular nature of various molecules
2. To understand the band structures
3. To elaborate the applications of spectroscopic techniques
4. To understand the thermodynamic functions and their applications
5. To rationalize periodic properties
6. To understand the concepts of stereochemistry and preparation of organic molecules

Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

1. Analyzemicroscopicchemistryintermsofatomicandmolecularorbitalsandintermolecular forces.
2. Rationalize bulk properties and processes using thermodynamic considerations.
3. Distinguishtherangesoftheelectromagneticspectrumusedforexcitingdifferentmolecular energy levels in various spectroscopic techniques
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. List major chemical reactions that are used in the synthesis of molecules.

UNIT-I

1. Atomic and Molecular Structure: (12Hrs.)

Bohr Theory of Hydrogen atom, Spectrum of H atom, Sommerfeld extension of Bohr Theory, Particle and wave nature of electron, De-Broglie equation, Aufbau principle, Compton effect, Schrodinger wave equation, Laplacian and Hamiltonian operator, Linear Combination of atomic orbitals. Molecular orbitals of diatomic molecules and Energy level diagrams of homonuclearandheteronucleardiatomics.Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT-II

2. Spectroscopic Techniques and Applications: (8Hrs.)

PrinciplesandselectionrulesofElectronicspectroscopyandFluorescencespectroscopyalong withtheirapplications.PrinciplesandselectionrulesofVibrationalandrotationalspectroscopy of diatomic molecules and their Applications. Nuclear magnetic resonance up to spin-spin coupling and magnetic resonance imaging.

3. Intermolecular Forces and Potential Energy Surfaces: (4Hrs.)

Ideal gas equation, Ionic, dipolar and vanDer Waals interactions. Realgas equation. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, and HCN

UNIT-III

4. Use of Free Energy in Chemical Equilibria: (6 Hrs.)

Ideal Solution, Non Ideal Solutions, Thermodynamic functions: energy, entropy and free energy. Numerical problems based on entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Thermodynamic properties of ideal solutions. Introduction to Electrochemical Corrosion and its mechanism. Use of free energy considerations in metallurgy through Ellingham diagrams.

5. Periodic Properties: (4 Hrs.)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases principle

UNIT-IV

6. Stereochemistry: (4 Hrs.)

Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis of butane. Isomerism in transitional metal compounds.

7. Organic Reactions and Synthesis of a Drug Molecule: (4Hrs.)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule – β lactum, Paracetamol, Chloroquine and Aspirin

Recommended Books:

1. B.H. Mahan, 'University Chemistry'.
2. M.J. Sienko and R.A. Plane 'Chemistry: Principles and Applications'.
3. C.N. Banwell, 'Fundamentals of Molecular Spectroscopy'.
4. B.L.Tembe,KamaluddinandM.S.Krishnan,'EngineeringChemistry(NPTELWeb-book)
5. P.W. Atkins, 'PhysicalChemistry'.
6. K.P.C. Volhardt and N.E. Schore 'Organic Chemistry: Structure and Function', 5th Edn., http://bcs.whfreeman.com/vollhardtschore5e/default.asp

MATHEMATICS-II (PROBABILITY AND STATISTICS)

Subject Code: BMATH1-201 **L T PC** **Duration: 40Hrs.**
3 1 0 4

COURSE OBJECTIVE

Students will learn

1. Understanding Probability theory.
2. Probability distribution, bivariate distribution, conditional densities
3. Statistical analysis, correlation and regression, moment, skewness and kurtosis.
4. Statistical hypothesis about real world problem, curve fitting, small samples.

Course Outcomes (CO)

Students will be able

1. To express the concept of basic probability and its features, expected values and moments.
2. To explain the concept of continuous probability distribution and bivariate distribution
3. To describe basic statistics(moments, skewness, kurtosis, correlation and regression).
4. To explain about applied statistics and small samples.

UNIT–I

Basic Probability: (12 Hrs.)

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.

UNIT –II

Continuous Probability Distributions: (6 Hrs.)

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Bivariate Distributions: (6 Hrs.) Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT –III

Basic Statistics: (10 Hrs.)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

UNIT –IV

Applied Statistics: (8 Hrs.)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Small Samples: (4 Hrs.)

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Recommended Books:

1. E. Kreyszig, 'Advanced Engineering Mathematics', John Wiley & Sons,**2006**

2. P.G. Hoel, S.C. Port and C.J. Stone, 'Introduction to Probability Theory', Universal Book Stall, **2003**.
3. S. Ross, 'A First Course in Probability', Pearson Education India,**2002**.
4. W.Feller,'AnIntroductiontoProbabilityTheoryanditsApplications',Vol.-1,Wiley,**1968**.
5. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers,**2000**.
6. T. Veerarajan, 'Engineering Mathematics', Tata McGraw Hill, New Delhi, **2010**.

ENGLISH

Subject Code: BHUMA0-101 **L T PC** **Duration: 25Hrs.**
2 0 0 2

Course Objectives:

1. Students should be able to enhance language proficiency, critical thinking and analytical skills
2. To expose the students to various spoken skills
3. To strength their professional skills
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. The students will be able to understand specific piece of information
2. Be able to express themselves in writing for social occasions
3. Be able to identify the language functions in the spoken discourse
4. Improvement of technical communication skills , such as writing reports giving presentations and effectively communicating ideas related to respective field

UNIT-I

1. Vocabulary Building:
The concept of Word Formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to formderivatives.Synonyms, antonyms, and standard abbreviations.

UNIT-II

2. Basic Writing Skills:
Sentence Structures
Use of phrases and clauses in sentencesImportance of proper punctuation Creating coherence
Organizing principles of paragraphs in documentsTechniques for writing precisely

UNIT-III

3. Identifying Common Errors in Writing:
Subject-verb agreement Noun-pronoun agreement
Misplaced modifiers
Articles
Prepositions
Redundancies
Clichés

UNIT-IV

4. Nature and Style of sensible Writing:

Describing
Defining
Classifying
Providing examples or evidence
Writing introduction and conclusion

5. Writing

Practices:

Comprehension
Précis Writing
Essay Writing

Recommended Books:

1. Michael Swan, 'Practical English Usage', OUP, **1995**.
2. F.T. Wood, 'Remedial English Grammar', Macmillan,**2007.**
3. William Zinsser, 'On Writing Well', Harper Resource Book,**2001.**
4. Liz Hamp-Lyons and Ben Heasly, 'Study Writing', Cambridge University Press,**2006**.
5. Sanjay Kumar and Pushp Lata, 'Communication Skills', Oxford University Press,**2011**.
6. 'Exercises in Spoken English', Parts. I-III. CIEFL, Hyderabad. Oxford UniversityPress.

PROGRAMMING FOR PROBLEMSOLVING

Subject Code: BCSCE0-101 **L T PC** **Duration: 41Hrs.**
3 0 0 3

Course Objectives:

1. To be familiarize with flow of algorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:

The student will learn

1. To learn the basic terms related to programming and understand arithmetic expressions.
2. To understand the concept of arrays.
3. To implement functions and recursion.
4. To learn structure, pointers and file handling

UNIT-I

1. Introduction to Programming: (6 Hrs.)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps tosolve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

2. Arithmetic Expressions and Precedence: (12Hrs.)

Conditional Branching and Loops. Writing and evaluation of conditionals and consequentbranching. Iteration and loops.

UNIT-II

3. Arrays: (5 Hrs.)
Arrays (1-D, 2-D), Character arrays and Strings
4. Basic Algorithms: (5 Hrs.)
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definitionrequired)

UNIT-III

5. Function: (4Hrs.)
Functions (including using built in libraries), Parameter passing in functions, call by value,Passing arrays to functions: idea of call by reference
6. Recursion: (4Hrs.)
Recursion, as a different way of solving problems. Example programs, such as FindingFactorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-IV

7. Structure: (3 Hrs.)
Structures, Defining structures and Array of Structures.Pointers: (2Hrs.)
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion oflinked list (no implementation)
8. File Handling: (only if time is available, otherwise should be done as part of thelab)

Recommended Text Books:
1. Byron Gottfried, 'Schaum's Outline of Programming with C', McGrawHill.
2. E. Balaguruswamy, 'Programming in ANSI C', Tata McGrawHill.

Recommended Reference Books:
1. Brian W. Kernighan and Dennis M. Ritchie, 'The C Programming Language', PrenticeHall of India.

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CHEMISTRY-I LAB.

Subject Code: BCHEM0-101 **L T P C**
0 0 2 1

Course Objectives:
1. To learn the preparation and standardization of solutions
2. To learn the estimation of various physical properties of given liquid samples
3. To estimate various crucial parameters for water sample
4. To learn the preparation of various molecules and detection of functional groups.

Course Outcomes:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. Thestudents will learn to:
1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyze a salt sample

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension and viscosity
3. Thin layer chromatography
4. Determination of total Alkalinity/ Acidity of a water sample.
5. Determination of residual chlorine in water sample
6. Estimation of total, temporary and permanent hardness of water
7. Determination of the rate constant of a reaction
8. Determination of strength of an acid conductometrically
9. Potentiometry - determination of redox potentials andemfs
10. Synthesis of apolymer
11. Saponification /acid value of anoil
12. Detection and confirmation of organic functionalgroups.
13. Models of spatialorientation
14. TotestthevalidityofLambertBeerlaw/Determinationofλ_{max}/Determinationofunknown concentration of asolution.
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid bycharcoal
17. Synthesis of a drug – Acetaminophen,Aspirin

ENGLISH LAB.

Subject Code: BHUMA0-102 **L T P C**
0 0 2 1

Course Objectives:

1. To enhance LSRW Skills
2. To improve the fluency in spoken English
3. To familiarize students with the use of English in everyday situations
4. To maintain good linguistic competency and accuracy in grammar

Course Outcomes:

1. Identify common errors in spoken and written communication
2. List familiarized with English vocabulary and language proficiency
3. Improve nature and style of sensible writing.
4. Improve acquire employment and work place communication skills.

Oral Communication

(This unit involves interactive practice sessions in Language Lab.)

1. Listening Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations

PROGRAMMING FOR PROBLEM SOLVING LAB.

Subject Code: BCSCE0-102 **L T P C**
0 0 4 2

Course objectives:

1. To be familiarize with flow of algorithm to solve simple problems

2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings, pointers and structures.

Course Outcomes:
1. Correct syntax errors as reported by the compilers and logical errors encountered at run time
2. Develop programs by using decision making and looping constructs.
3. Implement real time applications using the concept of array, pointers, functions and structures.
4. Solve real world problems using matrices, searching and sorting

NOTE: The laboratory should be preceded or followed by a tutorial to explain the approachor algorithm to be implemented for the problem given.
Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions
Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numericalintegration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations

MANUFACTURING PRACTICES (THEORY &LAB.)

Subject Code: BMFPR0-101 **L T PC** **Duration: 80 Hrs.**
1 0 4 3

Course objectives.

1 Understand the operations of manufacturing methods and processes.
2 Perform the various manufacturing operations.
3 Understand the basics of advanced manufacturing methods.
4. Understanding the basics of computer numerical control machines.

Course outcomes:

After the completion of this course students will be able:-

1. To perform various metal forming operations.
2. To perform various metal cutting operations.
3. To perform various metal joining operations.
4. To write simple CNC part programming.

Lectures & Videos: (10 Hrs.)

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturingMethods.
2. CNC machining, Additivemanufacturing.
3. Fitting operations & powertools.
4. Sheet MetalOperations.
5. Electrical &Electronics.
6. Carpentry.
7. Plastic moulding (injection moulding, blow moulding, extrusion moulding), glasscutting.
8. Metalcasting.
9. Welding (arc welding & gas welding),brazing.

Recommended Text/Reference Books:

1. S.K. Hajra Choudhury, A.K. Hajra Choudhury and S.K. Nirjhar Roy, 'Elements of Workshop Technology', Vol.-I, **2008** and Vol.-II **2010**, Media Promoters and PublishersPvt. Ltd.,Mumbai.
2. S. Kalpakjian, Steven S. Schmid, 'Manufacturing Engineering and Technology', 4thEdn.,Pearson Education India Edn.,**2002**.
3. Gowri P. Hariharan and A. Suresh Babu, 'Manufacturing Technology – I', Pearson,**2008**.
4. Roy A. Lindberg, 'Processes and Materials of Manufacture', 4thEdn., Prentice HallIndia, 1998.
5. P.N. Rao, 'Manufacturing Technology', Vol.-I and Vol.-II, Tata McGraw HillHouse,2017.

Workshop Practice: (70 Hrs.)

1. Machine shop **(10Hrs.)**
2. Fitting shop **(8Hrs.)**
3. Carpentry **(6Hrs.)**
4. Electrical & Electronics **(8 Hrs.)**
5. Welding shop **(8 Hrs. (Arc welding 4 Hrs. + Gas welding 4Hrs.)**
6. Casting **(8Hrs.)**
7. Sheet Metal Operations **(10 Hrs.)**
8. Smithy **(6Hrs.)**
9. Plastic moulding& Glass Cutting **(6Hrs.)**
10. Examinations could involve the actual fabrication of simple components, utilizing one ormore of the techniques covered above.

INTRODUCTION TO COMPUTER SCIENCE &ENGINEERING

Subject Code: BMNCC0-014 **L T PC** **Duration: 24Hrs.**
2 0 0 0

Course Outcomes:

1. Basic knowledge of Computer Science and Engineering
2. Exploring Computer Science Fields and Opportunities
3. Understanding Computer Hardware and Software
4. Software Types and Operating Systems

UNIT-I

Introduction to Computer Science & Engineering, Difference between science & engineering,Applications of Computer Science & engineering.

UNIT-II

Different branches/fields of Computer Science, Scope of Computer Science in industry, self-employment etc.

UNIT-III

Introduction to Computer, parts of computer system. Difference between Hardware & software, Configuration of computer systems, Types of memory-RAM, ROM, Introduction toUPS-Online and Offline, printers etc.

UNIT-IV

Different types of Software- Application software and System Software, Types ofLanguages-High level and low level languages, Introduction to Operating System.

Calculus and Ordinary Differential Equation

Subject Code- BMATH1- 301 **L T P C** **Duration – 45hrs**
3 0 0 3

Course Ojectives:
Students will learn
1. Basics of sequence and series and their results to check convergence.
2. Multivariable concepts and their real life problems.
3. Green's theorem, stokes theorem, and Gauss theorem and their applications.
4. Linear, non-linear ordinary differential equations of first and higher order.

Course Outcomes (CO)
Students will be able
1. To apply concepts of convergence of sequence and series.
2. To apply green's theorem, stroke's theorem and green's theorem in real life situations.
3. To solve linear and non-linear ordinary differential equations.
4. To solve second and higher order linear, non-linear differential equation.

COURSE CONTENT

UNIT-I (12hrs)

Sequences and Series: Basic concept of Convergence, tests for convergence, power series, Taylor's series, Series for exponential, trigonometric and logarithmic functions.

Multivariable Calculus: Partial derivatives, directional derivatives, total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers.

UNIT-II (11 hrs)

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables, Theorems of Green, Gauss and Stokes (without proof), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT-III(11 hrs)

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-IV (11 hrs)

Ordinary differential equations of higher orders: Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

RECOMMENDED BOOKS

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
5. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
6. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
7. Earl A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

COMPUTER PERIPHERALS & INTERFACES

Subject Code- BCSES1-301 **L T P C** **M Duration – 45 hrs.**
3 0 0 3

COURSE OBJECTIVCE

To learn the functional and operational details of various peripheral devices.

COURSE OUTCOMES

1. To be able to learn system resources, IDE & SCSI Interfaces.
2. To be able to learn different video Hardware.
3. To learn different, I/O Interfaces and Input/ Output Driver Software Aspects.
4. To be able to design and implement different peripheral devices.

COURSE CONTENT

UNIT I(12hrs)

SYSTEM RESOURCES: Interrupt, DMA Channel, I/O Port Addresses and resolving and resolving the conflict of resources. I/O buses- ISA, EISA, Local bus, VESA Local bus, PCI bus, PCI Express, Accelerated graphics port bus.

IDE & SCSI Interfaces: IDE origin, IDE Interface ATA standards. ATA feature, ATA RAID and SCSI RAID, SCSI Cable and pin Connector pin outs SCSI V/s IDE Advantages and limitation, SATA, SSD drives.

UNIT II(11hrs)

Video Hardware: Video display technologies, DVI Digital signals for CRT Monitor, LCD, LED, OLED Panels, Video adapter types, Integrated Video/ Motherboard chipset, Video RAM,Video driver and multiple Monitor, Graphic accelerators. Advanced 3D Technologies,TV Tuner and Video Capture upgrades troubleshooting Video Cards and Drivers.

UNIT III(11hrs)

I/O Interfaces: I/O Interfaces from USB1.0, 2.0, 3.0, lighting port, I/O Interface from serial, Parallel to SCSI converter. Testing of serial andparallel port, USB Mouse/ Keyboard Interfaces like HDMI

Input/ Output Driver software aspects: Role of device driver DOS and UNIX/ LINUX device drivers.

UNIT IV(11hrs)

Design & Integration of Peripheral devices to a computer system as a Case Study.

Future Trends: Detailed Analysis of recent Progress in the Peripheral devices. Some aspects of cost Performance analysis and applications of latest digital devices like WiFi-LED projectors, HDMI devices, wireless printers and other devices

RECOMMENDED BOOKS

1. Douglas V. Hall,"Microprocessors and Interfacing", Tata McGraw Hill 2006.
2. Barry B. Brey&C.R.Sarma, "The intel microprocessors," Pearson 2003.
3. P. Pal Chandhari, "Computer Organization and design" Prentice Hall of India Pvt. Ltd, 1994.
4. Del Corso, H.Kirrman, JD Nicond "Microcomputer buses & links" Academic Press 1986.

DATA STRUCTURE & ALGORITHMS

Subject Code- BCSES1-302 **L T P C** **Duration – 60hrs**
3 1 0 4

COURSE OBJECTIVE

1. To impart the basic concepts of data structures, algorithms and time complexity.
2. To understand concepts about stacks and queues.
3. To understand concepts about linked lists and trees.
4. To enable them to learn and write algorithms for hashing, sorting and graphs.

COURSE OUTCOMES

1. To impart the basic concepts of data structures, algorithms and time complexity.
2. To understand concepts about stacks and queues
3. To understand concepts about linked lists and trees
4. To enable them to learn and write algorithms for hashing, sorting and graphs

COURSE CONTENT

UNIT-I (15hrs)

Introduction: Basic Terminologies: Elementary Data Organizations, Data StructureOperations: insertion, deletion, traversal etc.; Analysis of an Algorithm, AsymptoticNotations, Time-Space trade off. Searching: Linear Search and Binary Search Techniquesand their complexity analysis.

UNIT-II (15hrs)

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexityanalysis, Applications of Stacks: Expression Conversion and evaluation –corresponding algorithms and complexity analysis. ADT queue, Types of Queue: SimpleQueue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithmsand their analysis.

UNIT-III (15hrs)

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Binary Search trees, Binary Search Tree,Tree operations on each of the trees and their algorithms with complexity analysis. Introduction to B Tree, B+ Tree and AVL Tree

UNIT-IV (15hrs)

Sorting and Hashing: Objective and properties of different sorting algorithms:Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort;Performance and comparison among all the methods, Hashing.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

RECOMMENDED BOOKS:

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni,Computer Science Press.

SUGGESTED REFERENCE BOOKS:

2. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition byMarkAllen Weiss, Addison-Wesley Publishing Company
3. "How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

Digital Electronics

Subject Code- BCSES1-303 **L T P C**
3 1 0 4

Duration – 60hrs

COURSE OBJECTIVE

To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

COURSE OUTCOMES: At the end of this course, students will demonstrate the ability to

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Be able to use PLDs to implement the given logical problem.

COURSE CONTENT

UNIT-I (15hrs)

Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations,Boolean algebra, examples of ICgates,number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOSand TTL, Tri-statelogic.

Combinational DigitalCircuits: Standard representation for logic functions, K-map representation, simplification oflogicfunctionsusing K-map, minimization of logical functions. Don't care conditions, Multiplexer,De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder,serial adder,ALU, elementary ALU design, popular MSI chips, digital comparator,paritychecker/generator, code converters, priority encoders, decoders/drivers for display devices,Q-M method offunction realization.

UNIT-II (15hrs)

Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-III (15hrs)

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/Aconverter,specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit,analog to digital converters: quantization and encoding, parallel comparator A/Dconverter, successive approximation A/D converter, counting A/D converter, dual slope A/Dconverter,A/DconverterusingVoltagetofrequencyandvoltagetotimeconversion,specifications of A/D converters, example of A/D converterICs

UNIT-IV (15hrs)

Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable

memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

RECOMMENDED BOOKS

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

DATA STRUCTURE & ALGORITHMS LABORATORY

Subject Code- BCSES1-304 **L T P C**
0 0 4 2

COURSE OUTCOMES

1 . To implementing searching algorithms and operations on stacks.
2 . To enable the students to learn and implement sorting algorithms.
3 . To implement operations for different types of queues.
4 . To implement programs related to various types of Linked Lists.

PRACTICALS

1. Write a program for Linear search methods.
2. Write a program for Binary search methods.
3. Write a program for insertion sort, selection sort and bubble sort.
4. Write a program to implement Stack and its operation.
5. Write a program for quick sort.
6. Write a program for merge sort.
7. Write a program to implement Queue and its operation.
8. Write a program to implement Circular Queue and its operation.
9. Write a program to implement singly linked list for the following operations: Create, Display, searching, traversing and deletion.
10. Write a program to implement doubly linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.
11. Write a program to implement circular linked list for the following operations: Create, Display, inserting, counting, searching, traversing and deletion.

DIGITAL ELECTRONICS LABORATORY

Subject Code- BCSES1-305 **L T P C**
0 0 2 1

COURSE OUTCOMES

1 To Familiarization with Digital Trainer Kit and associated equipment.
2 To Study and design of TTL gates
3 To learn the formal procedures for the analysis and design of combinational circuits.
4 To learn the formal procedures for the analysis and design of sequential circuits

PRACTICALS: Implementation all experiments with help of Bread- Board.
1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates; Realization of OR, AND, NOT and XOR functions using universal gates.
2. Half Adder / Full Adder: Realization using basic and XOR gates. 13 13 Punjab Technical

University B.Tech. Computer Science Engineering (CSE)

3. Half Subtractor / Full Subtractor: Realization using NAND gates.
4. 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter: Realization using XOR gates.
5. 4-Bit and 8-Bit Comparator: Implementation using IC7485 magnitude comparator chips.
6. Multiplexer: Truth-table verification and realization of Half adder and Full adder using IC74153 chip.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor using IC74139 chip.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF using IC7476 chip.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter using IC7490 & IC7493 chip.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter using IC74192 & IC74193 chip.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations using IC7495 chip.
12. DAC Operation: Study of 8-bit DAC (IC 08/0800 chip), obtain staircase waveform using IC7493 chip.
13. ADC Operations: Study of 8-bit ADC.

IT WORKSHOP (SciLab / MATLAB) LABORATORY

Subject Code- BCSES1-306 **L T P C**
0 0 4 2

COURSE OUTCOMES

1. Introduction to Sci Labs / MATLAB environment and types of Sci Labs / MATLAB files.
2. To be able to write programs for Matrix manipulations.
3. MATLAB code for computing factorial of a number
4. To be able to write programs using functions and plotting results

Following experiments to be conducted using Sci Labs / MATLAB

1. Introduction to Sci Labs / MATLAB environment and types of Sci Labs / MATLAB files.
2. Use of help command to get help about different inbuilt functions.
3. Write a program to show the output of various unary and binary operators.
4. Write programs for Matrix Manipulations, (reshaping matrices, expanding matrix size, appending or deleting a row/column to a matrix, concatenation of matrices).
5. Write programs which demonstrate the use special matrices.
6. Write programs to show output for various matrix and array operations.
7. Write programs for demonstrating the use for various control statements.
8. Write a MATLAB code for computing factorial of a number n. Assume n is already defined. The code should return a scalar, not a vector.
9. Write programs using functions and plot results.

*other programs related to some application area may also be done

TRAINING-1

Subject Code- BCSES1-307 | **L T P C 0 0 0 3** | **Duration – 4 WEEKS**

Training after the 2nd Semester, students are required to be involved in Inter/ Intra Institutional Activities viz; Training with higher Institutions; Soft skill training organized by Training and Placement Cell of the respective institutions; contribution at incubation/ innovation /entrepreneurship cell of the institute; participation in conferences/ workshops/ competitions etc.; Learning at Departmental Lab/Tinkering Lab/ Institutional workshop; Working for consultancy/ research project within the institutes and Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/Design/ Innovation/ Business Completion/ Technical Expos etc.

DEVELOPMENT OF SOCIETIES

Subject Code- BHSMC0-007 | **L T P C 3 0 0 3** | **Duration – 45hrs**

Course Outcomes

Students will be able to

1 Become familiar with development of different social systems, connectedness of human being with society and able to evaluate different models of social development.

2 Develop ideas about political system and identify discriminating features of various governing systems..

3 Build up knowledge about different economic systems and evaluate various ideas of economic developmental ideologies.

4 Understand the relationship between human and society both historically and analytically

Course objectives

To make the students

1. To Understand societal development and various societal models

2. To understand and analyze different political systems

3. To develop knowledge about economic systems and ideologies

4 To understand the economic development in different periods of history.

UNIT-I (15hrs)

Social Development: Concepts behind the origin of Family, Clan and Society, Different Social Systems, Relation between Human being and Society, Comparative studies on different models of Social Structures and their evolution

UNIT-II (15hrs)

Political Development: Ideas of Political Systems as learnt from History, Different models of Governing system and their comparative study

UNIT-III(15hrs)

Economic Development: Birth of Capitalism, Socialism, Marxism, Concept of development in pre-British, British and post British period- Barter, Jajmani, Idea of development in current context., E. F. Schumacher's idea of development, Buddhist economics. Gandhian idea of development. Swaraj and Decentralization.

RECOMMENDED BOOKS:

TEXTBOOK:

1. 'Indian Society' by Dr S.K Jena & B.N Mohanty
2. 'Indian Society' by C.N Shankar Rao
3. 'Foundations of Political Science, Indian Constitution & Government' by Gulshan Rai, SomNathVerma& Suresh Kumar

***REFERENCE BOOKS:**

1. 'The Interpretation of Cultures: Selected Essays' by Geertz & Clifford. 1973, New York
2. 'Dictionary of Modern Sociology Hoult' by Thomas Ford, ed. 1969) Totowa, New Jersey, United States: Littlefield, Adams & Co.
3. 'Sociology –In a Changing Society' by William Korblum
4. 'The Origin of Humankind' by Leakey, Richard 1996, New York Basic Books

4. OTHER SESSIONS

*TUTORIALS:

*LABORATORY:

*PROJECT: Possible projects in this course could be

a) Interact with local communities and understand their issues.

b) Study local cottage industry and agricultural practices. Role of engineering and specialized knowledge.

c) Evaluation of technology in the context of its application. Social impact of technology. Environmental impact of technology. Evaluation from a holistic perspective.

DISCRETE MATHEMATICS

Subject Code- BMATH1-401 **L T P C** **Duration – 60 hrs.**
3 1 0 4

COURSE OBJECTIVE

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counterexamples.
5. Apply logical reasoning to solve a variety of problems.

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to

1. For a given logic sentence express it in terms of predicates, quantifiers, andlogical connectives
2. For a given a problem, derive the solution using deductive logic and prove thesolution based on logical inference
3. For a given a mathematical problem, classify its algebraic structure
4. Evaluate Boolean functions and simplify expressions using the properties ofBoolean Algebra
5. Develop the given problem as graph networks and solve with techniques of graph theory.

COURSE CONTENTS

UNIT-I (15 hrs)

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products,Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sumand Product of Functions, Bijective functions, Inverse and Composite Function, Size of aSet, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argumentand The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursivedefinition, The Division algorithm: Prime Numbers, The Greatest Common Divisor:Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT-II (15 hrs)

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation andcombination.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives andTruth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules ofInference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and

Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof ofNecessity and Sufficiency.

UNIT-III (15 hrs)

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation,Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free andCyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups,Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields.Boolean Algebra

and Boolean Ring, Identities of Boolean Algebra, Duality,Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT-IV (15 hrs)

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle,Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring mapsand Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph,definition properties and Example, rooted trees, trees and sorting, weighted trees andprefix codes, Bi-connected component and Articulation Points, Shortest distances.

RECOMMENDED BOOKS:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, WadsworthPublishing Co. Inc.
3. Satinder Bal Gupta, Discrete Mathematics and structures, University Science Press, New Delhi.
4. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

SUGGESTED REFERENCE BOOKS:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application toComputer Science", TMG Edition, TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

COMPUTER ORGANIZATION & ARCHITECTURE

Subject Code- BCSES1-401 **L T P C** **Duration – 45hrs**
3 0 0 3

COURSE OBJECTIVE

To expose the students to the following:

1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism
6. To impart the knowledge on micro programming
7. Concepts of advanced pipelining techniques.

COURSE OUTCOMES

1. Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions,addressing modes, instruction set.
2. Write assembly language program for specified microprocessor for computing16 bit multiplication, division and I/O device interface (ADC, Control circuit, serialport communication).
3. Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.

5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

COURSE CONTENT

UNIT-I (11 hrs)

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit.Instruction set architecture of a CPU–registers, instruction execution cycle, RTLinterpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating pointrepresentations, character representation. Computer arithmetic – integer addition andsubtraction, ripple carry adder, carry look ahead adder etc. multiplication shift and add.

UNIT-II (12 hrs)

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches.

Memory system design: semiconductor memory technologies, memory organization.

UNIT-III (11 hrs)

Peripheral devices and their characteristics: Input-output subsystems, I/O deviceinterface, I/O transfers–program controlled, interrupt driven and DMA, software interrupts and exceptions. Programs andprocesses–role of interrupts in process state transitions.

UNIT-IV (11 hrs)

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors.

Memory organization: Memory interleaving, concept of hierarchical memory organization,cache memory, cache size vs. block size, mapping,replacement algorithms.

RECOMMENDED BOOKS:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

SUGGESTED REFERENCE BOOKS:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

OPERATING SYSTEMS

Subject Code- BCSES1-402 **L T P C** **Duration – 60hrs**
3 1 0 4

COURSE OBJECTIVE

To learn the fundamentals of Operating Systems.

1. To learn the mechanisms of OS to handle processes and threads and their communication
2. To learn the mechanisms involved in memory management in contemporary OS
3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols

4. To know the components and management aspects of concurrency management
5. To learn to implement simple OS mechanisms

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system and For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

COURSE CONTENT

UNIT-I (15hrs)

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS-Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

UNIT-II (16hrs)

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, **Scheduling criteria:** CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

UNIT-III (15hrs)

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation -Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC),Not recently used (NRU) and Least Recently used (LRU).

UNIT-IV (14hrs)

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation(linear list, hashtable), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

RECOMMENDED BOOKS

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

SUGGESTED REFERENCE BOOKS:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

OBJECT ORIENTED PROGRAMMING

Subject Code- BCSES1-403 **L T P C** **Duration – 60 hrs**
3 1 0 4

COURSE OBJECTIVE

To introduce the principles and paradigms of Object Oriented Programming Language for design and implement the Object Oriented System

COURSE OUTCOME

1. To introduce the basic concepts of object oriented programming language and its representation
2. To allocate dynamic memory, access private members of class and the behavior of inheritance and its implementation.
3. To introduce polymorphism, interface design and overloading of operator.
4. To handle backup system using file, general purpose template and handling of raised exception during programming

COURSE CONTENT

UNIT-I (15hrs)

Introduction to C++, C++ Standard Library, Illustrative Simple C++ Programs. Header Files, Namespaces, Application of object oriented programming.

Object Oriented Concepts, Introduction to Objects and Object Oriented Programming, Encapsulation, Polymorphism, Overloading, Inheritance, Abstract Classes, Accessifier (public/ protected/ private), Class Scope and Accessing Class Members, Controlling Access Function, Constant, Class Member, Structure and Class

UNIT-II (15hrs)

This Pointer, Dynamic Memory Allocation and Deallocation (New and Delete), Static Class Members, Constructors, parameter Constructors and Copy Constructors, Deconstructors, Introduction of inheritance, Types of Inheritance, Overriding Base Class Members in a Derived Class, Public, Protected and Private Inheritance

UNIT-III (15hrs)

Polymorphism, Pointer to Derived class, Virtual Functions, Pure Virtual Function, Abstract Base Classes, Static and Dynamic Binding

Fundamentals of Operator Overloading, Rules for Operators Overloading, Implementation of

Operator Overloading Like <<,>> Unary Operators, Binary Operators.
Basics of C++ Exception Handling, Try, Throw, Catch, multiple catch, Re-throwing an Exception.

UNIT-IV (15hrs)

Text Streams and binary stream, Sequential and Random Access File, Stream Input/ Output Classes, Stream Manipulators.
Templates: Function Templates, Overloading Template Functions, Class Template, Class Templates
Introduction: design patterns, Classifications
Introduction: model- view- controller pattern

RECOMMENDED BOOKS:

4. Robert Lafore, 'Object Oriented Programming in Turbo C++',2nd Ed., The WAITE Group Press, **1994**.
5. Herbert shield, 'The complete reference C ++', 4th Ed., Tata McGraw Hill, **2003**.
6. Shukla, 'Object Oriented Programming in C++', Wiley India, 2008.
7. H M Deitel and P J Deitel, 'C++ How to Program',2nd Ed., Prentice Hall, **1998**.
8. D Ravichandran, 'Programming with C++', 3rd Ed., Tata McGraw Hill, **2003**.
9. Bjarne Stroustrup, 'The C++ Programming Language',4th Ed.,Addison Wesley,**2013**.
10. R. S. Salaria, 'Mastering Object-Oriented Programming with C++', Salaria Publishing House, **2016**.

OPERATING SYSTEMS LABORATORY

Subject Code- -BCSES1-404 **L T P C**
0 0 2 1

COURSE OUTCOMES

1. To be able to install various operating systems
2. To learn commands for files and directories.
3. To learn about background processes and commands to print something.
4. To be able to learn shell programming.

1. Installation Process of various operating systems
2. Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine
3. Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in linux, connecting processes with pipes, background processing, managing multiple processes. Manual help. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file. File related commands ws, sat, cut, grep.
4. Shell Programming: Basic of shell programming, various types of shell, Shell Programming in bash, conditional & looping statement, case statements, parameter passing and arguments, shellvariables, shell keywords, creating shell programs for automate system tasks, report printing.

OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY

Subject Code- BCSES1-405 **L T P C**
0 0 4 2

COURSE OUTCOMES

1. To learn the concept of classes and objects.
2. To be able to implement constructors and destructors.
3. To implement initializer list and operator overloading
4. To learn type casting and inheritance.

PRACTICALS

1. Classes and Objects- Write a program that uses a class where the member functions are defined inside a class.
2. Classes and Objects- Write a program that uses a class where the member functions are defined outside a class.
3. Classes and Objects- Write a program to demonstrate the use of static data members.
4. Classes and Objects- Write a program to demonstrate the use of const data members.
5. Constructors and Destructors- Write a program to demonstrate the use of zero argument and parameterized constructors.
6. Constructors and Destructors- Write a program to demonstrate the use of explicit constructor.
7. Initializer Lists- Write a program to demonstrate the use of initializer list.
8. Operator Overloading- Write a program to demonstrate the overloading of increment and decrement operators.
9. Operator Overloading- Write a program to demonstrate the overloading of binary arithmetic operators.
10. Typecasting- Write a program to demonstrate the typecasting of basic type to class type.
11. Typecasting- Write a program to demonstrate the typecasting of class type to basic type.
12. Typecasting- Write a program to demonstrate the typecasting of class type to class type.
13. Inheritance- Write a program to demonstrate the multilevel inheritance

ORGANIZATIONAL BEHAVIOR

Subject Code- BHSMC0-016 **L T P C** **Duration – 45hrs**
3 0 0 3

Course Objectives: The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behavior at the individual, group and organizational levels in the changing global scenario. The course must be taught using case study method.

Course Outcomes:-

1. After Studying this course the students will equip with ability to identify, explore and examine factors
2. Impinge on Individual and group behavior in organizations in the new millennium
3. Explain the terminology associated with organizational behavior
4. Incorporate and apply the predominate organization behavior theories to gain knowledge of contemporary issues in organizational behavior

5. Frameworks to work with real life organizational issues concerned with human behavior at work place

UNIT-I (12Hrs)

Organizational Behaviour: Concepts, Theories and organization aspects of OB, Contributing Disciplines to OB, challenges and opportunities for OB. Foundations of Individual Behaviour: Biographical Characteristics, Course, Theories of Course, Attitudes, Attitude Change, Values & Believes, Prejudices Personality: Determinants of Personality, Perception, Attribution Theory, Person's Perception.

UNIT-II (11Hrs)

Motivation: Definition & Process, Early Theories of Motivation, Contemporary Theories of Motivation, Nature and process of Motivation, Application of Motivation Concept. Job Satisfaction: Nature & Significance of Job satisfaction. Leadership: Nature Significance & Theories; Leadership Effectiveness Model; Leadership Traits & Skills; Behavioural Styles in Leadership. Transactional Analysis, Life Position, Johari Window Model.

UNIT-III (11Hrs)

Foundations of Group Behaviour: Nature & Concept of Group Formation, Stages of Group Formation, Theories of Group Formation. Teams, Difference between Group and Team Group Decision Making: Meaning & Nature, Decision Making Process; Decision Making Styles; Advantages & disadvantages of Decision Making; Techniques of Decision Making; Group Size & Decision Making.

UNIT-IV (11Hrs)

Organizational Change & Development: Meaning & Definition, Change Agents, Change Models, Resistance to Change. Power and Politics in Organization: Nature & Concepts, Sources & Types of Power, Techniques of Politics. Stress Management: Meaning and Concept of Stress, Stress in Organizations

Recommended Books

1. Robbins, 'Organization Behavior', Pearson Education.
2. Luthans, Organization Behavior', Tata McGraw Hill.
3. Hersey, 'Management of Organizational Behavior', Prentice Hall India.
4. Aswathappa, 'Organization Behavior', Himalaya Publications.
5. L.M. Prasad, 'Organization Behavior', Sultan Chand & Sons
6. Parikh, Gupta, 'Organizational Behavior', Tata McGraw Hill

COMPILER DESIGN

Subject Code- BCSES1-501 **L T P C** **Duration – 60 Hrs.**
3 1 0 4

COURSE OBJECTIVE:
This course will help students to understand the process involved in a compiler. This course will make student aware about the working of top down and bottom up parsers. This will help students to better understand the different phases of compilation and generation of target code for a machine.

COURSE OUTCOMES:
1. For a given grammar specification, develop the lexical analyser.
2. For a given parser specification design top-down and bottom-up parsers.
3. Use syntax directed translation schemes to develop intermediate code.
4. Learn algorithms to generate code for a target machine

COURSE CONTENTS:

UNIT I (10 Hrs)

Introduction: Phases of compilation and overview.
Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (LEX).

UNIT II (20 Hrs)

Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (YACC)
Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree. Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope.

UNIT III (15 Hrs)

Intermediate Code Generation: Translation of different language features, different types of intermediate forms.
Code Improvement (optimization): control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc.

UNIT IV (15 Hrs)

Target code generation: Architecture dependent code improvement: instruction scheduling, Introduction to code generation, Target Machine, Register allocation, issues in code generation, A simple code generation algorithm.

RECOMMENDED BOOKS

1. V. Aho, R. Sethi, and J. Softec, D. Ullman, 'Compilers: Principles, Techniques and Tools', 2nd Edn., Addison-Wesley, **2006**.
2. Fischer and R. LeBlanc, 'Crafting a Compiler', Benjamin Cummings, **2009.**
3. C. Fischer and R. LeBlanc, 'Crafting a Compiler in C', Benjamin Cummings, **1991**.
4. C. Holub, 'Compiler Design in C', Prentice-Hall Inc., **1993**.

5. 'Modern Compiler Implementation in C: Basic Design', Cambridge Press, **2004**.
6. 'Modern Compiler Implementation in Java: Basic Design', 2nd Edn., Cambridge Press, **2002**.
7. Fraser and Hanson. A Retargetable C, 'Compiler: Design and Implementation', Addison-Wesley, **1995**.

DATABASE MANAGEMENT SYSTEM

Subject Code- BCSES1- 502 **L T P C** **Duration – 45 Hrs.**
3 0 0 3

COURSE OBJECTIVE:
This course will help student to understand the concepts used in database management systems. They will also help to create database using DDL and DML. They will learn to implement database security and various advanced topics will also be covered.

COURSE OUTCOMES:
1. To be able to learn different DBMS languages, data models and normalization.
2. For a given specification construct the SQL queries for Open source and Commercial DBMS- MYSQL, ORACLE, and DB2.
3. Able to learn about query processing and transaction processing system
4. Implement database security and recovery techniques.

COURSE CONTENTS:

UNIT I (11 Hrs)

Database system architecture: introduction, Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).
Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints.

UNIT II (11 Hrs)

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, introduction to MYSQL, ORACLE, DB2, SQL server.
Relational database design: Domain and data dependency, Normal forms, Dependency preservation, Lossless design.

UNIT III (12 Hrs)

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.
Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic
Concurrency Control schemes,

UNIT IV (11 Hrs)

Database recovery: Introduction, log based recovery, shadow page recovery.
Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, introduction to SQL injection.
Advanced topics: Introduction to Object oriented, Distributed databases.

RECOMMENDED BOOKS

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F.Korth, S. Sudarshan, McGraw-Hill.

2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
3. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
4. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

FORMAL LANGUAGE AND AUTOMATA THEORY

Subject Code- BCSES1-503 **L T P C** **Duration – 45 Hrs.**
3 0 0 3

COURSE OBJECTIVE:
1. Develop a formal notation for strings, languages and machines.
2. Design finite automata to accept a set of strings of a language.
3. Identify the hierarchy of formal languages, grammars and machines.

COURSE OUTCOMES:
1. Design finite automata to accept a set of strings of a language.
2. Design context free grammars to generate strings of context free language.
3. Design Turing machine for accepting context sensitive languages.
4. To learn Rice's theorem.

COURSE CONTENTS:

UNIT I (11 Hrs)

Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

Regular languages and finite automata: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.

UNIT II (12 Hrs)

Context-free languages and pushdown automata: Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

UNIT III (12 Hrs)

Context sensitive languages: Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

Turing machines: The basic model for Turing machines (TM),Turing-recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

UNIT IV (10 Hrs)

Undecidability: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice's theorem, undecidable problems about languages.

RECOMMENDED BOOKS

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
3. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
4. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
5. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

DESIGN &ANALYSIS OF ALGORITHMS

Subject Code- BCSES1-504 **L T P C** **Duration – 60 Hrs.**
3 1 0 4

COURSE OBJECTIVE:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

COURSE OUTCOMES:

1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis.
2. Describe the algorithmic strategies.
3. Describe the different graph and tree traversal algorithms.
4. Describe the tractable and intractable problems.

COURSE CONTENTS:

UNIT I (15 Hrs)

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behaviour; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT II (15 Hrs)

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch and Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem Solving, Bin Packing, Knap Sack TSP. Heuristics –characteristics and their application domains.

UNIT III (15 Hrs)

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT IV (15 Hrs)

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems, and Reduction techniques. Introduction to recent advancements in design and analysis of algorithms.

RECOMMENDED BOOKS:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.
3. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
4. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
5. Algorithms—A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

DATABASE MANAGEMENT SYSTEM LABORATORY

Subject Code- BCSES1-505

L	T	P	C
0	0	4	2

COURSE OBJECTIVE:

To learn the implementation of SQL queries to perform DBMS operations.

COURSE OUTCOMES:

1. To understand basic DDL, DML, DCL commands.
2. To understand the SQL queries using SQL operators and implement the database constraints.
3. To understand the concept of relational algebra and SQL functions.
4. To implement sub queries and transaction processing.

PRACTICALS:

1. Write the queries for Data Definition Language (DDL) in RDBMS.
2. Write the queries for Data Manipulation Language (DML) in RDBMS.
3. Write the queries for Data Control Language (DCL) in RDBMS.
4. Write SQL queries using logical operators
5. Write SQL queries using SQL operators
6. Write SQL query using character, number, date and group functions
7. Write SQL queries for relational algebra
8. Write SQL queries for extracting data from more than one table
9. Write SQL queries for sub queries, nested queries
10. Concepts for ROLL BACK, COMMIT & CHECK POINTS
11. Case studies on normalization

DESIGN &ANALYSIS OF ALGORITHMS LABORATORY

Subject Code- BCSES1-506 **L T P C**
0 0 2 1

COURSE OBJECTIVE:

1. To get a first-hand experience of implementing well-known algorithms in a high-level language.
2. To be able to compare the practical performance of different algorithms for the same problem.

COURSE OUTCOMES:

1. To perform different operations on integers.
2. To sort number of elements of an array using different sorting techniques.
3. To implement dynamic programming for various problems.
4. To implement various Graph Techniques.

PRACTICALS

1. Code and analyse to compute the greatest common divisor (GCD) of two numbers.
2. Code and analyse to find the median element in an array of integers.
3. Code and analyse to find the majority element in an array of integers.
4. Code and analyse to sort an array of integers using Heap sort.
5. Code and analyse to sort an array of integers using Merge sort.
6. Code and analyse to sort an array of integers using Quick sort.
7. Code and analyse Knapsack problem using dynamic programming
8. Code and analyse to find the shortest path for single source shortest path using dynamic programming.
9. Code and analyse to find the shortest path for All pair shortest path using dynamic programming.
10. Code and analyse to do a depth-first search (DFS) on an undirected graph. Implementing an application of DFS such as to find the topological sort of a directed acyclic graph.
11. Code and analyse to do a breadth-first search (BFS) on an undirected graph. Implementing an application of BFS such as (i) to find connected components of an undirected graph, OR (ii) to check whether a given graph is bipartite.
12. Code and analyse to find the minimum spanning tree in a weighted, undirected graph.
13. Code and analyse to find all occurrences of a pattern P in a given string S using KMP Method
14. Code and analyse to compute the convex hull of a set of points in the plane.

COMPUTER GRAPHICS

Subject Code- BCSED1-511 **L T P C** **Duration – 45 Hrs.**
3 0 0 3

COURSE OBJECTIVE:

1. Understanding the fundamental graphical operations and the implementation on computer,
2. To get a glimpse of recent advances in computer graphics.
3. Understanding user interface issues that make the computer easy for the novice to use.

COURSE OUTCOME:

1. Able to learn about the basics of graphics, its applications, uses and Knowledge to draw different shapes in graphics on computer.
2. Ability to apply different 2-D and 3-D transformations on an object.
3. Learn clipping operations and various object filling techniques, different projections techniques. Various hidden surface removal.
4. Knowledge of Rendering techniques, Fractals and different colour models.

COURSE CONTENTS:

UNIT I (12 Hrs)

Introduction: Computer Graphics and its applications, Elements of a Graphics, Graphics Systems: Video Display Devices, Raster Scan Systems, Random Scan Systems, Input devices. **Basic Raster Graphics**: Scan conversion- Point plot technique, Line drawing, Circle generating and Ellipse generating algorithms.

UNIT II (11 Hrs)

Two-dimensional Geometric Transformations: Basic Transformations-Translation, Rotation and Scaling, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing transformations.

Elementary 3D Graphics: Matrix Representation of 3D transformations, Plane projections and its types, Vanishing points, Specification of a 3D view.

UNIT III (11 Hrs)

Clipping: Window to viewport transformation, Clipping Operations- Point Clipping, Line Clipping, Polygon Clipping and Text Clipping.

Filling Techniques: Scan line algorithms, Boundary-fill algorithm, Flood-fill algorithm.

Visibility: Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; z buffer algorithms, Depth sort algorithm, Scan line algorithm and Floating horizon technique.

UNIT IV (11 Hrs)

Color Models: Properties of Light, Intuitive Color Concepts, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.

Advance Topics: Introduction of Rendering, Fractals, Gourard and Phong shading.

RECOMMENDED BOOKS:

1. Donald Hearn and M. Pauline Baker, **'**Computer Graphics', 4th Edn.**,** PHI/Pearson Education, **2010**.

2. Zhigand Xiang, Roy Plastock, Schaum's Outlines, **'**Computer Graphics**',** 2nd Edn., Tata Mc-Graw Hill, **2001**.

3. C. Foley, Van Dam, Feiner and Hughes, **'**Computer Graphics Principles & Practice**'**, 3rd Edn., Pearson Education**, 2013.**

4. Roy A. Plastock, Gordon Kalley, 'Computer Graphics', 1st Edn., Schaum's Outline Series, **1986**.

GRAPH THEORY

Subject Code- BCSED1-512 **L T P C** **Duration – 45 Hrs.**
3 0 0 3

COURSE OBJECTIVE:

1. The course is aimed at developing the fundamental Mathematical skills of Graduates that are instrumental for effective understanding of advanced Engineering subjects.
2. The topics introduced will serve as the tools for specialized studies in many Engineering fields, significantly in Field theory, computer technology and Communication Engineering.

COURSE OUTCOMES:

1.To have knowledge of the basic concepts of graph
2.To have a knowledge of classes of graphs and its properties.
3.To have knowledge of graph algorithms.
4.Be exposed to constrained and unconstrained optimization techniques

COURSE CONTENTS:

UNIT I (11 Hrs)

BASICS OF GRAPH THEORY: Graphs - Data structures for graphs – Sub graphs - Operations on Graphs Connectivity - Networks and the maximum flow - Minimum cut theorem.

Trees - Spanning trees - Rooted trees - Matrix representation of graphs.

UNIT II (11 Hrs)

CLASSES OF GRAPHS: Eulerian graphs and Hamiltonian graphs - Standard theorems - Planar graphs - Euler's formula. Five colour theorem - Coloring of graphs - Chromatic number (vertex and edge) properties and examples - Directed graphs.

UNIT III (12 Hrs)

GRAPH ALGORITHM: Computer Representation of graphs - Basic graph algorithms - Minimal spanning tree algorithm - Kruskal and Prim's algorithm. Shortest path algorithms - Dijsktra's algorithm, DFS and BFS algorithms.

UNIT IV (11 Hrs)

OPTIMIZATION TECHNIQUES: Single variable and multivariable optimization - Lagrangian method - Kuhn-Tucker conditions. Random pattern and Random search methods.

RECOMMENDED BOOKS

1. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science.
2. Rao S.S, Engineering Optimization: Theory and Practice, New AgeInternational Pvt. Ltd., 3rd Edition1998.

WEB TECHNOLOGIES

Subject Code- BCSED1-513 **L T P C** **Duration – 45 Hrs.**
3 0 0 3

COURSE OBJECTIVE:

1. Designing the HTML pages along with style sheets

2. Familiar with client and server side scripting.
3. Able to develop a web application.
4. Students will gain the skills and project-based experience needed for entry into web application and development careers.

COURSE OUTCOMES:

1. To understand the HTML and Style Sheets
2. To have knowledge of client side scripting using JSP.
3. To understand the basics and object oriented concepts of PHP.
4. To access database using PHP programming.

COURSE CONTENTS:

UNIT – I (12 Hrs)

Introduction, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images and Multimedia, Links and webs, Document Layout, Creating Forms, Frames and Tables.

Style sheets : Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS.

UNIT – II (09 Hours)

Javascript : What is Javascript, Client side scripting, Data types, variables, operators, conditional statements, loops and repetition, array object, date object, string object, Document object model - Event handling.

UNIT – III (12 Hours)

Introduction to PHP, Writing PHP, Control Structures, if-else, switch, ?operator, while, do-while, for, for each, break, continue, goto, exit, arrays, functions

Introduction – Declaring a class – Objects – constructor – Destructor – Public ,private, protected – Static properties and method – Inheritance

UNIT – IV (12 Hours)

Working with data, form element, Get, Post, Request, Cookies, Sessions and Access Control: Cookies - PHP and HTTP Authentication – sessions - using Auth_HTTP to Authenticate.

Working MySQL with PHP-database connectivity- usage of MYSQL commands in PHP, processing result sets of queries- handling errors-debugging and diagnostic functions-validating user input through Database layer and Application layer- formatting query output.

RECOMMENDED BOOKS:

1. PHP: The Complete Reference, “Steven Holzner”, Tata McGraw Hill.
2. Programming PHP, “Kevin Tetroi”, O' Reilly.
3. Robin Nixon, Learning PHP, MySQL, and JavaScript, Shroff/O'Reilly
4. VikramVaswani, “PHP and MySQL”, Tata McGraw-Hill, 2005
5. Marty Hall, Larry Brown, ‘Core Servlets and Java Server Pages Vol. 1: Core Technologies’, 2nd Edn., Pearson, 2003.
6. Dietel, Niet, ‘Internet and World Wide Web – How to Program’, 5th Edn., PHI/Pearson Education, 2011.

7. Wang, 'An Introduction to web Design and Programming', 1st Edn.,Cengage COURSE, 2003.
8. Thomas A Powell, The Complete Reference HTML & CSS, 5th Edition, Tata McGraw Hill
9. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, 'Mastering HTML, CSS &Javascript Web Publishing', Sams Teach Yourself.
10. Sebesta, 'Programming World Wide Web', 4th Edn., Pearson, 2008

JAVA PROGRAMMING

Subject Code- BCSED1-514 **L T P C** **Duration – 45 Hrs.**
3 0 0 3

COURSE OBJECTIVE:
1. To learn the basic and advanced concepts of Java Programming language.
2. To experience the working environment required for programming in Java language and enhances their programming skills.

COURSE OUTCOMES:
1. To learn the basics of Java and to understand the implementation of Classes and Inheritance with respect to Java.
2. To describe the concept of handling of exceptions and multithreading.
3. To understand how to implement I/O, Applets and Graphics in Java
4. To comprehend the advanced topics of Java Programming

COURSE CONTENTS:

UNIT-I (12 Hrs)

Introduction to Java: Features of Java, difference between Java and C++, JVM, Bytecode, data types, variables, arrays, Type Conversion and Casting.

Classes and Inheritance: Class Fundamentals, methods, constructors, garbage collection, this keyword, Overloading constructors, Nested and Inner classes. Basics and types of inheritance, Method Overriding, Abstract Classes, final keyword, packages and interfaces.

UNIT-II (12 Hrs)

Exception Handling: Basics, Exception Types, uncaught exceptions, try and catch, throwing exceptions.

Introduction to Multithreading: Java thread model, thread priorities, synchronization, interthread communication, creating, suspending, resuming threads.

UNIT-III (12 Hrs)

I/O: Input/Output, reading and writing files.

Applets and Graphics: Applet basics, Applet class, Applet initialization and termination, event handling, keyboard and mouse events, AWT class, Layout managers, panels, canvases, Frame windows, drawing lines, rectangles, ellipses.

UNIT-IV (09 Hrs)

Advance Concepts: JDBC Connectivity, Introduction to Java Beans, Java Swings, Java Server Pages.

RECOMMENDED BOOKS:

1. Patrick Naughton & Herbert Schildt, 'The Complete Reference Java 2', 5th Edn., Tata McGraw Hill, **2002**.
2. Balagurusamy, 'Programming in JAVA', BPB Publications, **2006**.
3. Deitel and Deitel, 'Java: How to Program', 10th Edn., Pearson Education, **2014**

FINANCE & ACCOUNTING

Subject Code: BHSMC0-015 **L T P C** **Duration- 45 Hrs**
3 0 0 3

Course Objectives:

The main aim of this course is:

1. To provide an in-depth view of the process in financial management of the firm
2. To develop knowledge on the allocation, management and funding of financial resources.
3. To improving students‟ understanding of the time value of money concept and the role of a financial manager in the current competitive business scenario.
4. To enhancing student‟s ability in dealing short-term and long term dealing with day-to-day working capital decision and raising finance.

Course Outcomes: After completing this course the students should be able to:

1. Explain the concept of fundamental financial concepts, especially time value of money.
2. Apply capital budgeting projects using traditional methods.
3. Analyze he main ways of raising capital and their respective advantages and disadvantages in different circumstances
4. Integrate the concept and apply the financial concepts to calculate ratios and do the capital budgeting

Unit-I (12 Hrs.)

Introduction to Accounting: Meaning, Objectives, Basic Accounting Terms. Accounting Principles: Meaning and Nature, Accounting Concepts, Bases of Accounting, Nature of Accounts, Origin of Transactions Source Documents and Vouchers Accounting Equations Rules of Debit and Credit Recording of Transactions: Book of Original Entry-Journal, Ledger Posting from Journal and Ledger Balancing, Subsidiary Books

Unit-II (11 Hrs.)

Nature, Scope and Objectives of Financial Management, Profit Maximization Vs Wealth Maximization, Financial Planning, Forms of Business Organization, Role of Financial Manager.

Capital Structure – Introduction, Factors Affecting Capital Structure, Liquidity Ratios. Capital Structure Theories: Net Income Approach, Net Operating Income Approach, Traditional Approach, Modigliani-Miller Model (MM).

Unit-III (11 Hrs.)

Working Capital Decision: Meaning, Nature and Scope of Working Capital - Component of Working Capital – Factors affecting Working Capital, Working Capital Strategies, Capital Budgeting Techniques: Discounted and Non-Discounted Methods (Pay Back, ARR, NPV, IRR, Benefit Cost Ratio), Long Term and Short Term Sources of Funds.

Unit-IV (11 Hrs.)

Long Term Sources of Funds: Equity share, Preference shares, Debentures, Bonds, Warrants, Venture capital and Ploughing back of profits. Short Term Sources of Funds: Commercial Paper, Certificate of Deposit, Treasury Bills.

Recommended Books

1. Brigham, „Financial Management: Text & Cases", Cengage Learning.
2. Brealy&Myres, „Principles of Corporate Finance", Tata McGraw Hill.
3. Ambrish Gupta, „Financial Accounting for Management", 2nd Edn., Pearson Education.
4. I.M. Pandey, „Financial Management", Vikas Publishers.
5. S.P. Jain and K.L. Narang,„Principles of Accounting",Kalyani Publishers, New Delhi, 2004.

SOFTWARE ENGINEERING

Subject Code- BCSES1-601 **L T P C** **Duration – 45Hrs.**
3 0 0 3

COURSE OBJECTIVE:

To enable the students to learn the principles and methodologies followed to develop good software.

COURSE OUTCOMES:

1. To study how software engineering principles evolve and to analyze the various software models that can be followed to develop software.
2. To understand the software analysis and design step of software development.
3. To study coding, testing and reliability of a software.
4. To highlight the various management activities and related terms of a software.

COURSE CONTENTS:

UNIT-I (10 Hrs)

Introduction: Evolution and impact of Software engineering, Software crisis, Principles of Software Engineering, Feasibility study

Software Life Cycle Models: Waterfall, prototyping, Evolutionary, and Spiral models, Comparison of software models.

UNIT-II (11 Hrs)

Scheduling and Planning: Management Activities, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts.

Requirement Analysis: Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

UNIT-III (14 Hrs)

Software Design: Basic principles of software design, modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, Design specifications, Design metrics, Verification and validation, User Interface design.

Coding: Coding standards and Code review techniques, Coding styles, Coding metrics.

Software Testing: Fundamentals of testing, Types of software testing, White-box, and black-box testing, test case design techniques, mutation testing and Testing metrics.

UNIT-IV (10 Hrs)

Reliability: Software reliability metrics, reliability growth modelling.

Software Quality Management: Risk Management, Quality management, ISO and SEI CMMI, Six Sigma, Computer aided software engineering, Software maintenance, Software Configuration Management, Component-based software developments

RECOMMENDED BOOKS:

1. Pressman, „Software Engineering: A Practitioner‟s Approach‟, 3rd Edn., TMH, **2004**
2. Flecher and Hunt, „Software Engineering and CASE: Bridging and Culture Gap‟, **2000**.
3. Shepperd, „Software Engineering, Metrics‟, Vol.-1 (EN), McMillan, **1999.**
4. Robert S. Arnold, „Software Re–engineering‟, IEEE Computer Society, **1994**.
5. Pankaj Jalote, „An Integrated Approach to Software Engineering‟, 3rd Edn., Narosa Publishers, **2006**.
6. Ghezzi, Cario, „Fundamentals of Software Engineering‟, 2nd Edn., PHI, **2002**.

COMPUTER NETWORKS

Subject Code- BCSES1-602 **L T P C** **Duration – 60Hrs.**
3 1 0 4

COURSE OBJECTIVE:

1. To develop an understanding of modern network architectures from a design andperformance perspective.
2. To provide an opportunity to do network programming
3. To provide a WLAN measurement ideas.

COURSE OUTCOMES:

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given problem related TCP/IP protocol developed the network programming.
4. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW,HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

COURSE CONTENTS:

UNIT I (15 Hrs)

Data communication Components: Representation of data and its flow Networks, VariousConnection Topology, Protocols and Standards, OSI model, Transmission Media, LAN:Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques forBandwidth utilization: Multiplexing - Frequency division, Time division and Wavedivision, Concepts on spread spectrum.

UNIT II (15 Hrs)

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error controlprotocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window,Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA,CSMA/CD,CDMA/CA

UNIT III (15 Hrs)

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping –ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Transport Layer: Process to Process Communication, User Datagram Protocol(UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT IV (15 Hrs)

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts ofCryptography

RECOMMENDED BOOKS

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson PrenticeHall India.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4.Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.

5. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

COMPUTER NETWORKS LABORATORY

Subject Code- BCSES1-603 **L T P C**
0 0 2 1

COURSE OBJECTIVE:
This practical course will enable students to implement networking in real world.

COURSE OUTCOMES:
1. To become familiarize with different networking components.
2. To learn the concept of data transmission using different cables.
3. To learn different topologies and implement file sharing.
4. To implement different networks.

PRACTICALS
1. Write specifications of latest desktops and laptops.
2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
3. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
4. To Prepare straight and cross cables.
5. Study of various LAN topologies and their creation using network devices, cables and computers.
6. Configuration of TCP/IP Protocols in Windows and Linux.
7. Implementation of file and printer sharing.
8. Designing and implementing Class A, B, C Networks
9. Subnet planning and its implementation
10. Installation of ftp server and client

MOBILE APPLICATION DEVELPOMENT

Subject Code- BCSED1-611 **L T P C** **Duration – 45Hrs.**
3 0 0 3

COURSE OBJECTIVE:
This course will help to manage mobile application data by integrating them with cloud services. This course also helps to understand different testing methodologies for mobile application.

COURSE OUTCOMES:
1. To learn application models of mobile application frameworks.
2. To learn Mobile OS architectures.
3. To be database access in different mobile OS.
4. To learn testing methodologies for mobile applications.

COURSE CONTENTS:

UNIT I (11Hrs)

Introduction to mobile devices: Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile devices vs. desktop devices, ARM and intel architectures, Power management, screen resolution,Touch interfaces, Application deployment, App Store, Google play, Windows Store.

UNIT II (11 Hrs)

Mobile OS Architectures: Comparing and contrasting architectures of all three- Android, iOS and Windows, Underlying OS, Kernel structure and native level programming. Approaches to power management, Security.

UNIT III (12 Hrs)

Android/iOS/Win8 Apps: DB Access, network access, contacts/ photos/ etc. Underneath the frameworks: Native level programming on Android, Low Level programming on iOS, Windows low level APIs

Intents and services: Android intents and services, characteristics of mobile applications, Successful mobile development.

UNIT IV (11 Hrs)

Storing and Retrieving data: Synchronizationand replication of mobile data,Androidstoring and retrieving data, working with content provider, Putting it all together: packaging and deploying, Performance best practices, Android field service app.

RECOMMENDED BOOKS:

1. Bill Philips, Chris Stewart, Brian Hardy, "Android Programming".
2. Brian Fling, "Mobile Design and Development".
3. Valentino Lee, Heather Schneidar, "Mobile applications: Architecture, Design, Development".

MACHINE LEARNING

Subject Code- BCSED1-612 **L T P C** **Duration – 45Hrs.**
3 0 0 3

COURSE OBJECTIVE:

1. To learn applications of machine learning.
2. To learn different learning algorithms.

COURSE OUTCOMES:

1. To learn the concept of learning algorithm.
2. To learn supervise learning.
3. To learn unsupervised learning.
4. To learn about SVMs.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Introduction: Introduction to machine learning, use of machine learning, type of machine learning: supervised, unsupervised and reinforcement learning, Main challenges in machine learning

Preparation of Model: Introduction to Statistical Learning, Significance of Mean, Mode, Median, variance, standard deviation, Basic types of data in machine learning, Exploring structure of data, Data quality and remediation, Data pre-processing.

Modelling and evaluation: Model Selection, Training, Model representation and interpretability, evaluating performance of a model.

UNIT-II (08 Hrs)

Supervised Learning (Regression/Classification):
Basic methods: Distance-based methods, Decision Trees, random forest model, Naive Bayes
Linear models: Simple Linear Regression, Multiple linear regression, Polynomial regression, Logistic Regression.

UNIT-III (15 Hrs)

Unsupervised Learning (Clustering): Different types of clustering techniques, K-medoids, K-means/Kernel K-means, Hierarchical clustering

Dimensionality Reduction: Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Introduction to Matrix Factorization and Matrix Completion

UNIT-IV (10 Hrs)

Support Vector Machines(SVM): Linear learning machines and Kernel space, Making Kernels and working in feature space, SVM for classification and regression problems. Recent trends in machine learning.

RECOMMENDED BOOKS:

1. Saikat Dutt , Subramanian Chandramouli and Amit Kumar Das, „Machine Learning", Pearson, 2019.
2. Oliver Theobald, „Machine Learning For Absolute Beginners: A Plain English Introduction (Second Edition).

DISTRIBUTED SYSTEMS

Subject Code- BCSED1-613 **L T P C** **Duration – 45Hrs.**
3 0 0 3

COURSE OBJECTIVE:
This course will help to understand the concepts of Distributed Systems.

COURSE OUTCOMES:

1. To learn architecture of DDBS.
2. To learn different design strategies and query processing.
3. To Optimize Distributed queries.
4. To learn reliability issues.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Introduction: Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database, Distributed Database Management System Architecture: Transparencies in a distributed DBMS; Distributed DBMS architecture;

UNIT-II (11 Hrs)

Distributed Database: Design Alternative design strategies; Distributed design issues; Fragmentation; Data allocation. QUERY PROCESSING ISSUES, Objectives of query processing, Layers of query processing, Query decomposition

UNIT-III (11 Hrs)

Distributed Query Optimization: Factors governing query optimization; Centralized query optimization; Transaction Management The transaction concept; Goals of transaction

management; Characteristics of transactions, Concurrency control in centralized database systems and DDBSs.

UNIT-IV (11 Hrs)

Reliability: Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols. Parallel Database Systems: Parallel architectures; parallel query processing.

Recommended Books:

1. M.T. Ozsu and P. Valduriez, „Principles of Distributed Database Systems", Prentice Hall, 1991.
2. D. Bell and J. Grimson, „Distributed Database Systems", Addison Wesley, 1992.

SIGNALS AND SYSTEMS

Subject Code- BCSED1-614 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:

1. To introduce the students about the theoretical concepts associated with processing continuous & discrete time signals & systems.
2. To make the students aware about the signal transmission through linear networks.
3. To be able to think critically & to apply problem solving & reasoning strategies to the analysis of various types of signals & systems.
4. To impart them knowledge of various types of noises.

COURSE OUTCOMES:

1. Analyze the properties of signals & systems and representation in time and frequency domain.
2. Classify systems based on their properties and determine the response of LSI system.
3. Apply random signal theory and understand various types of noise.
4. Understand the process of sampling and reconstruction.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Classification of Signals and Systems: Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals, System properties: linearity, additivity and homogeneity, shiftinvariance, causality, stability, realizability. **FourierRepresentation:** The notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality, Convolution theorem and its graphical interpretation.

UNIT-II (11 Hrs)

Linear Shift-invariant (LSI) Systems: Impulse response and step response, convolution, input-output behaviour with aperiodic convergent inputs. Characterization of causality and stability of linear shift invariant systems, System representation through differential equations and difference equations, Periodic and semi-periodic inputs to an LSI system.

Introduction to Noise: Thermal Noise, Shot noise, Partition noise, Flicker noise, Gaussian Noise. Equivalent input noise, Signal to Noise Ratio (SNR), Noise Temperature, Noise equivalent Bandwidth, Noise Figure.

UNIT-III (11 Hrs)

Random Signal Theory: Introduction to Probability Theory, Joint and Conditional Probability, Random Events, Probability Mass Function, Statistical Averages. Probability Density Functions (PDF) and Statistical Averages, mean, moments and expectations, standard deviation and variance, Probabilitymodels: Uniform, Gaussian, Binomial, Examples of PDF, Transformation of Random Variables, Random Processes, Stationary and Ergodicity, Auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density.

UNIT-IV (11 Hrs)

Sampling and Reconstruction: Sampling Theorem and its implications- Spectra of sampled signals, Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on, Aliasing and its effects, Relation between continuous and discrete time systems. Concept of State-space analysis: State-space analysis and multi-input, multi-output representation, the state-transition matrix and its role.

RECOMMENDED BOOKS:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall, 1983.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems - Continuous and Discrete", 4th edition, Prentice Hall, 1998.
3. A. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.
4. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998.
5. Douglas K. Lindner, "Introduction to Signals and Systems", Mc-Graw Hill International Edition: c1999.
6. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, c1998.
7. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems", John Wiley and Sons (SEA) Private Limited, c1995.
8. M. J. Roberts, "Signals and Systems - Analysis using Transform methods and MATLAB", Tata Mc Graw Hill Edition, 2003.
9. I. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2001.
10. Ashok Ambardar, "Analog and Digital Signal Processing", Second Edition, Brooks/ ColePublishing Company (An international Thomson Publishing Company), c1999.

DATA MINING

Subject Code- BCSED1-621 | **L T P C** | **Duration – 45Hrs**

3 0 0 3

COURSE OBJECTIVE:

1. To cover powerful data mining techniques including clustering, association rules, and classification.
2. Web mining is also introduced.

COURSE OUTCOMES:

1. To introduce the basic concepts of Data Mining techniques.
2. To have knowledge of decision trees and algorithms used for it.
3. To learn the concept of search engines.
4. To understand web mining.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Data Mining: Introduction to data mining, introduction to data warehousing, architecture of data warehouse, association rules in mining, Naive algorithm, Apriori algorithm, direct hashing and pruning (DHP), Dynamic Item set counting (DIC), Mining frequent pattern without candidate generation (FP, growth), performance evaluation of algorithms.

UNIT-II (11 Hrs)

Classification: Introduction, decision tree, tree induction algorithms – split algorithm based on information theory, split algorithm based on Gini index; naïve Bayes method; estimating predictive accuracy of classification method

UNIT-III (11 Hrs)

Cluster Analysis: Introduction, partitional methods, hierarchical methods, density based methods, dealing with large databases, cluster software; Search engines: Characteristics of Search engines, Search Engine Functionality, Search Engine Architecture, Ranking of web pages, The search engine history, Enterprise Search, Enterprise Search Engine Software.

UNIT IV(11 Hrs)

Web Data Mining: Web Terminology and Characteristics, Locality and Hierarchy in the web, Web Content Mining, Web Usage Mining, Web Structure Mining, Web mining Software.

RECOMMENDED BOOKS:

1. Carlo Vercellis, „Business Intelligence: Data Mining and Optimization for Decision Making", 1st Edn., WILEY, **2009**.
2. J. Han, M. Kamber and J. Pei, „Data Mining Concepts and Techniques", 3rd Edn., Morgan Kaufmann Publishers, **2011**.
3. V. Pudi, P.R. Krishana, „Data Mining", 1st Edn., Oxford University Press, **2009**.
4. P. Adriaans, D. Zantinge, „Data Mining", 1st Edn., Pearson Education Press, **1996**.
5. P. Pooniah, „Data Warehousing Fundamentals", 1st Edn., Willey Interscience Publication, **2001**.

CLOUD COMPUTING

Subject Code- BCSED1-622 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:

1. To understand what is cloud storage, characteristics of cloud computing,
2. To know about cloud computing services and cloud hosting, cloud data storage and deployment models.
3. To learn cloud computing companies and cloud service providers, cloud infrastructure.
4. To learn advantages of cloud computing and issues with cloud computing.

COURSE OUTCOMES:

1. To learn basic terms used in cloud computing and its benefits.
2. To learn architecture of Hadoop.
3. To implement cloud security.
4. To manage services provided by cloud.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Cloud Computing Fundamentals: Introduction to Cloud Computing, private, public and hybrid cloud. Cloud types: IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, Role of virtualization in enabling the cloud; Benefits and challenges to Cloud architecture.

UNIT-II (12 Hrs)

Hadoop - Apache Hadoop Architecture, Hadoop YARN, Comparison of Traditional system & Hadoop Ecosystem, Installation steps of Hadoop (1.x), Moving Data in and out of Hadoop, need for Record Reader and Record writer, understanding inputs and outputs file format of Map Reduce.

UNIT-III (10 Hrs)

Cloud Security and Trust Management, Open Source Clouds -Baadal, Open Stack, Cloud Stack

UNIT-IV (11 Hrs)

Cloud Applications, Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment, computing infrastructures available for implementing cloud based services.

RECOMMENDED BOOKS:

1. Chris Eaton, Dirk deroos et al., „Understanding Big data", 1st Edn., McGraw Hill, **2015**.
2. Tom White, „HADOOP: The definitive Guide", 4th Edn., O Reilly, **2015**.
3. Gautam Shroff, „Enterprise Cloud Computing Technology Architecture Applications", 1st Edn., Cambridge University Press, **2010**.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, „Cloud Computing, A Practical Approach", 1st Edn., McGraw Hill Education, **2009**.
5. Thomas Erl, ' Big Data Fundamentals', 1st Edn., Pearson Education, **2016**
6. Srinivasan, ' Cloud Computing', 1st Edn,, Pearson Education, **2016.**

PARALLEL PROCESSING

Subject Code- BCSED1-623 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
Students will have skills in RISC as well as CISC architectures and can design or analyses different problems associated with this domain.

COURSE OUTCOMES:
1. Design and analyze the parallel algorithms for real world problems and implement them on available parallel computer systems.
2. To implement basic communication operations.
3. To implement various threads.
4. To learn different sorting algorithms.

COURSE CONTENTS:

Unit-I (12 Hrs)

Introduction: Implicit parallelism, Limitations of memory system performance, control structure, communication model, physical organization, and communication costs of parallel platforms, Routing mechanisms for interconnection networks, Mapping techniques.
Parallel algorithm design: Preliminaries, decomposition techniques, tasks and interactions, mapping techniques for load balancing, methods for reducing interaction overheads, parallel algorithm models.

UNIT- II (11 Hrs)

Basic communication operations: Meaning of all-to-all, all-reduce, scatter, gather, circular shift and splitting routing messages in parts.
Analytical modeling of parallel programs: sources of overhead, performance metrics, the effect of granularity on performance, scalability of parallel systems, minimum execution time, minimum cost-optimal execution time, asymptotic analysis of parallel programs.

UNIT III (11 Hrs)

Programming using message passing paradigm: Principles, building blocks, MPI, Topologies and embedding, Overlapping communication and computation, collective communication operations, Groups and communicators
Programming shared address space platforms: Threads, POSIX threads, Synchronization primitives, attributes of threads, mutex and condition variables, Composite synchronization constructs, OpenMP Threading Building blocks; An Overview of Memory Allocators, An overview of Intel Threading building blocks.

UNIT IV (11 Hrs)

Dense Matrix Algorithms: matrix vector multiplication, matrix-matrix multiplication, solving system of linear equations.
Sorting: Sorting networks, Bubble sort, Quick sort, Bucket sort and other sorting algorithms Graph algorithms: Minimum spanning tree, single source shortest paths, all-pairs shortest paths, Transitive closure, connected components, algorithms for sparse graphs.

RecommendedBooks

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar : Introduction to Parallel Computing, Second Edition Pearson Education – 2007
2. Michael J. Quinn (2004), Parallel Programming in C with MPI and OpenMP McGraw-Hill International Editions, Computer Science Series

EMBEDDED SYSTEMS

Subject Code- BCSED1-624 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
This course helps to understand the basic concepts of embedded systems.

COURSE OUTCOMES:
1. To learn specifications and analysis of embedded systems.
2. To estimate hardware and software costs.
3. To learn arm programming instruction set.
4. To learn IDE.

COURSE CONTENTS:

Unit-I (11 Hrs)

Introduction: Specifications and analysis of embedded systems, interface to the real time operating systems, verification of embedded systems like formal verification, co simulation

Unit-II (11 Hrs)

Estimation of hardware and software costs, partitioning, synthesis (hardware, software,memory, bus), retargetable usage of the software, specification and verificationof the OS schedules, hard and soft realtime operating systems, and faulttolerant systems.

Unit-III (11 Hrs)

Arm Programming Instructions Instruction Set: Data processing instructions, Addressing modes, Load Store Instructions, PSR (Program Status Register) Instructions, Conditional Instructions, Interrupt Instructions

Unit-IV (12 Hrs)

C Programming Integrated Development Environment (IDE) for C/C++ Programming, C/C++ Programs using Function Calls, Pointers, Structures, Integers &Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution & Loops

Recommended Books:

1. Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, ―ARM System Developer‟s Guide Designing and Optimizing System Software‖, Elsevier 2008.
2. Brooks, Cole, ―Embedded Microcontroller Systems, Real Time Interfacing‖, Thomson Learning 1999
3. Steve Furber, ―ARM system on Chip Architecture‖, Addision Wesley
4. Trevor Martin, ―The Insider's Guide to The Philips ARM7 - Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series‖ Hitex Ltd.

DISTRIBUTED OPERATING SYSTEMS

Subject Code- BCSED1-711 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
This course will help to understand the concepts of distributed operating systems.

COURSE OUTCOMES:
1. To learn architecture of distributed operating systems.
2. To learn resource management.
3. To learn distributed OS implementation.
4. To learn multiprocessor system.

COURSE CONTENTS:

UNIT I (12 Hrs)

Distributed operating system: Architectures, Issues in Distributed operating systems, Limitations of Distributed Systems, Lampert‟s logical clock, Global states, Chandy-Lampert‟s global state recording algorithm,Basic concepts of Distributed Mutual Exclusion ,Lampert‟s Algorithm, Ricart-Agrawala Algorithm; Basic concepts of Distributed deadlock detection, Distributed File system, Architecture, Design issues, SUN Network File system Basic concepts of Distributed shared memory, Basic concepts of Distributed Scheduling, Load balancing, Load sharing.

UNIT II (10 Hrs)

Distributed Resource Management: Distributed File systems, Architecture, Mechanisms, Design Issues, Distributed Shared Memory, Architecture, Algorithm, Protocols - Design Issues. Distributed Scheduling, Issues, Components, Algorithms.

UNIT III (12 Hrs)

Distributed OS Implementation: Models, Naming, Process migration, Remote Procedure Calls. Failure Recovery and Fault Tolerance: Basic Concepts-Classification of Failures, Basic

Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Checkpointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Nonblocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols

UNIT IV (11 Hrs)

Multiprocessor System: Definition, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements; Design & Implementation Issue; Introduction to parallel programming; Multiprocessor Synchronization.

RECOMMENDED BOOKS

1. OperatingSystemsConcepts &design-MilanMilenkovic,TMH
2. OperatingSystem- H.M. Deitel,Pearsons.
3. Mukesh Singhal and N. G. Shivaratri, “Advanced Concepts in Operating Systems”, McGraw- Hill, 2000
4. Abraham Silberschatz, Peter B. Galvin, G. Gagne, “Operating System Concepts”, Sixth Addison n Wesley Publishing Co., 2003.
5. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.

SOFT COMPUTING

Subject Code- BCSED1-712 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:

1. To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
2. To implement soft computing based solutions for real-world problems.

COURSE OUTCOMES:

1. Identify and describe soft computing techniques and their roles in building intelligent machines
2. To have knowledge of neural networks-I
3.To have knowledge of neural networks-II.
4. To learn the concepts of genetic algorithms.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Introduction to Soft Computing and Neural Networks: Introduction to soft computing, soft computing constituents, difference between soft computing and hard computing,Applications of Soft Computing.

Fuzzy Logic: Basic Concepts, Fuzzy Sets and Operations, Properties of Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Defuzzification methods, Industrial applications.

UNIT-II (10 Hrs)

Neural Networks-I: (Introduction & Architecture): Biological Neuron, Machine Learning Using Neural Network, Artificial Neuron and its model, activation functions, Supervised, unsupervised and reinforcement Learning, feedforward networks and feedback networks, learning rules – Hebbian, Delta, Perceptron learning and Windrow-Hoff,winner-take-all.

UNIT-III (12 Hrs.)

Neural Networks-II: Supervised learning- Perceptron learning, single layer/multilayer perceptron, linear separability, hidden layers, back propagation algorithm, Radial Basis Function network; Unsupervised learning - Kohonen, SOM, k-means clustering, Adaptive Resonance Theory (ART), Application of neural networks.

UNIT-IV (11 Hrs)

Genetic Algorithms: Concept of Introduction to Genetic Algorithms (GA),GA operators: Encoding, Crossover, Selection, Mutation, Fitness function, population, Simple GA (SGA), other types of GA,Applications of GA .

Recommended Books:

1. Jyh: Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, „Neuro: Fuzzy and Soft Computing17", Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, „Fuzzy Sets and Fuzzy Logic: Theory and Applications17", Prentice Hall, 1995. 3. MATLAB Toolkit Manual

HUMAN COMPUTER INTERACTION

Subject Code- BCSED1-713 **L T P C** **Duration – 45 Hrs.**
3 0 0 3

COURSE OBJECTIVE:

1. Describe and apply core theories, models and methodologies from the field of HCI
2. Discuss current research in the field of HCI

COURSE OUTCOMES:

1. To have knowledge of task centred systems design.
2. Understand the fundamental aspects of designing and evaluating interfaces
3. To understand different design principles.
4. To learn different HCI design standards.

COURSE CONTENTS:

UNIT-I (11 Hrs)

Introduction, Task-centred system design, User-centred design and prototyping: Human-Computer Interaction. Task-centred system design: Task-centered process, development of task examples, evaluation of designs through a task-centered walk-through.
User-centred design and prototyping: Assumptions, participatory design, methods for involving the user, prototyping, low fidelity prototypes, medium fidelity

UNIT-II (12 Hrs)

Methods for evaluation of interfaces with users and Psychology of everyday things: Goals of evaluation, approaches, ethics, introspection, extracting the conceptual model, direct observation, constructive interaction, interviews and questionnaires, continuous evaluation via user feedback and field studies, choosing an evaluation method.

Psychology of everyday things: Psychopathology of everyday things, examples, concepts for designing everyday things. Beyond screen design: characteristics of good representations, information visualization, Tufte‟s guidelines, visual variables, metaphors, direct manipulation

UNIT-III (11 Hrs)

Graphical screen design, Design principles and usability heuristics: Graphical design concepts, components of visible language, graphical design by grids. Design principles and usability heuristics: Design principles, principles to support usability, golden rules and heuristics, HCI patterns

UNIT-IV (11 Hrs)

HCI design standards, Past and future of HCI: Process-oriented standards, product-oriented standards, strengths and limitations of HCI Standards. Past and future of HCI: The past, present and future, perceptual interfaces, context-awareness and perception

Recommended Books:

1. Dix A., Finlay J., Abowd G. D. and Beale R., Human Computer Interaction, Pearson Education, 3rd edition, 2005.
2. Preece J., Rogers Y., Sharp H., Baniyon D., Holland S. and Carey T. Human Computer Interaction, Addison Wesley, 1st edition, 1994.

Ad-hoc and SENSOR NETWORKS

Subject Code- BCSED1-714 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
This course will help to learn the concepts of ad-hoc and sensor networks.

COURSE OUTCOMES:
1. To be able to learn wireless technologies.
2. To be able to learn different protocols for ad-hoc networks.
3. To learn different routing algorithms used for ad-hoc networks.
4. To learn how to synchronize network nodes.

COURSE CONTENTS:

UNIT I (12 Hrs)

Introduction: Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example commercial applications of Ad hoc networking. Cellular architecture, co-channel interference, frequency reuse,capacity increase by cell splitting, handoff, types of handoffs, Mobile IP, Cellular IP.
Introduction to Wireless sensor networks, Single-sink single-hop WSN, Single-sink multi-hop WSN, Multi-sink multi-hop WSN, Advantages of ad-hoc/sensor networks,Node and Network Architectures of WSN.

UNIT-II (12 Hrs)

MAC protocols for Ad hoc Networks: Design issues, Classifications, Contention based protocols, MACAW, FAMA, BTMA, DBTMA, MACABI, Real-Time MAC protocol, Multichannel protocols, Power aware MAC

MAC protocols in WSN: Scheduled protocols, LEACH IEEE 802.15.4 MACprotocol, Guo protocol, TRAMA protocol, Contention-based protocols, Zhong protocol, DMAC protocol, PAMAS protocol, SMAC protocol.

UNIT-III (09 Hrs)

Routing protocols in Ad hoc Networks: Design issues, Table-driven protocols - DSDV, WRP, CGSR, On-Demand protocols - DSR, AODV, TORA, LAR, ABR, Zone Routing Protocol, ZRP, ZHLS, Power Aware Routing protocols.

UNIT-IV (12 Hrs)

Routing protocols in WSN: Issues in designing routing protocols, Classification of routing protocols, Flat routing, Flooding and gossiping, SPIN protocol, PEGASIS protocol, TEEN protocol, MECN protocol, SPAN protocol, Location-based routing protocols, GAF protocol, GEAR protocol,
Introduction to Technologies for WSNs: ZigBee technology, Ultrawide bandwidth technology, Bluetooth technology, Comparison among technologies.

RECOMMENDED BOOKS:
1. Roberto Verdone, Davide Dardari, Gianluca Mazzini and Andrea Conti, “Wireless Sensor and Actuator Networks: Technologies, Analysis and Design”, Academic Press, 2008.
2. Miguel A. Labrador and Pedro M. Wightman, “Topology Control in Wireless Sensor Networks-with a companion simulation tool for teaching and research”, Springer Science, 2009.
3. Edgar H. Callaway, “Wireless Sensor Networks: Architectures and Protocols”, CRC Press, 2004.
4. Xian-Yang Li, “Wireless Ad Hoc and Sensor Networks: Theory and Applications”,

Cambridge University Press 2008.
5. Feng Zhao and Leonidas J. Guibas, "Wireless Sensor Networks: An Information Processing Approach", Morgan Kaufmann Publishers, 2008.
6. C. Siva Ram Murthy and B. S. Manoj, „Ad Hoc Wireless Networks: Architectures and Protocols", Pearson Education, 2007.
7. C.K. Toh, „Ad Hoc Mobile Wireless Networks: Protocols and Systems", Pearson Education, 2007.

BIOINFORMATICS

Subject Code- BCSED1-721 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
The main objective of this course is to make student able to understand the basic concepts of bioinformatics and also give knowledge about the algorithms used in bioinformatics.

COURSE OUTCOMES:
1. To learn basic concepts of bioinformatics.
2. To learn different motif models.
3. To learn the concept of genomics.
4. To analyse DNA data.

COURSE CONTENTS:

UNIT- I (12 Hrs)

Introduction: Sequence similarity, homology, and alignment.

Pairwise alignment: scoring model, dynamic programming algorithms, heuristic alignment, and pairwise alignment using Hidden Markov Models.

UNIT – II (12 Hrs)

Multiple alignment: scoring model, local alignment gapped and ungapped global alignment.

Motif finding: motif models, finding occurrence of known sites, discovering new sites.

UNIT – III (09 Hrs)

Genomicsand Structural Genomics: Genes, genomes, Gene cloning, mapping and DNA sequencing.

UNIT – IV (12 Hrs)

Analysis of DNA microarray data: using hierarchical clustering, model-based clustering, expectation-maximization clustering, Bayesian model selection.

RECOMMENDED BOOKS:

1. Matthias Dehmer, Frank Emmert-Streib, Analysis of Microarray Data: A Network-Based Approach.
2. JinXiong, Essential Bioinformatics.
3. Teresa Attwood, David Parry-Smith, Introduction to Bioinformatics.
4. Pierre Baldi, G. Wesley Hatfield, DNA Microarrays and Gene Expression: From Experiments to Data Analysis and Modelling.

IMAGE PROCESSING

Subject Code- BCSED1-722 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
This course will help to understand the different techniques used for image processing.

COURSE OUTCOMES:
1. To give introduction of image processing.
2. To understand image enhancement.
3. To have knowledge of image Compression Redundancy models
4. To have knowledge of Image Segmentation.

Unit-I (14 Hrs)

Digital Image Fundamentals: Simple image model, sampling and quantization, imaging geometry, digital geometry, different types of digital images, image formation, Elements of Storage, Relationships between pixels-neighbours of pixel, application of image Processing.
Bilevel Image Processing: Digital distance, distance transform, medial axis transform, component labeling, thinning, morphological processing, extension to grey scale morphology.

Unit-II (12 Hrs)

Image Enhancement: Point processing, spatial filtering, frequency domain methods, multi-spectral image enhancement, image restoration.
Color Image Processing: Color representation, laws of color matching, chromaticity diagram, color enhancement, color image segmentation, color edge detection.

Unit-III (09 Hrs)

Image Compression Redundancy models, error free compression, Lossy compression, Image compression standards.

Unit-IV (10 Hrs)

Image Segmentation Detection of Discontinuity, Edge detection, Boundary detection, Thresholding, Regional oriented segmentation, use of motion in segmentation.

RECOMMENDED BOOKS:
1. Digital Image Processing - by Rafact Gonzalez and Richard E. Woods, Pearson Education Society.
2. Digital Image Processing - by Keenneth R Castleman, Pearson Education Society.
3. A. K. Jain, ―Fundamental of Digital Image Processing‖, PHI

CRYPTOGRAPHY & NETWORK SECURITY

Subject Code- BCSED1-723 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
The main objective of this course is to make student able to understand the basic concepts, services, threats and principles in network security, various security services and mechanisms in the network protocol stack.

COURSE OUTCOMES:
1. To understand security trends.
2. To implement various cryptographic algorithms.
3. To implement public key cryptography.
4. To implement IP Security.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Security trends, Attacks and services, Classical crypto systems, Different types of ciphers, LFSR sequences, Basic Number theory, Congruence, Chinese Remainder theorem, Modular exponentiation, Fermat and Euler's theorem, Legendre and Jacobi symbols, Finite fields, continued fractions.

UNIT-II (09 Hrs)

Simple DES, Differential crypto analysis, DES – Modes of operation, Triple DES, AES, RC4, RSA, Attacks – Primality test – factoring.

UNIT-III (12 Hrs)

Discrete Logarithms, Computing discrete logs, Diffie-Hellman key exchange, ElGamal Public key cryptosystems, Hash functions, Secure Hash, Birthday attacks, MD5, Digital signatures, RSA, ElGamal DSA.

UNIT-IV (12 Hrs)

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME – IP security – Web Security – SSL, TLS, SET. Intruders, Malicious software, viruses and related threats, Firewalls, Security Standards.

RECOMMENDED BOOKS:

1. Wade Trappe, Lawrence C Washington, „Introduction to Cryptography with Coding Theory", 2nd Edn., Pearson, **2007**.

2. William Stallings, „Cryptography and Network Security Principles and Practices", 4th Edn., Pearson/PHI, **2006**.

3. W. Mao, „Modern Cryptography – Theory and Practice", 2nd Edn., Pearson Education, **2007**.

4. Charles P. Pfleeger, Shari Lawrence Pfleeger, „Security in Computing", 3rd Edn., Prentice Hall of India, **2006**.

5. Behrouz Forouzan, „Cryptography & Network Security", 2nd Edn., McGraw-Hill, **2011.**

ARTIFICIAL INTELLIGENCE

Subject Code- BCSED1-724 **L T P C** **Duration – 45Hrs**

3 0 0 3

COURSE OBJECTIVE:

1. Introduce the basic principles in artificial intelligence research.
2. Explore Areas of application such as knowledge representation, natural language processing, expert systems, vision and robotics.

COURSE OUTCOMES:

1. Understand the concept of Artificial intelligence, problem solving and various types of search strategies.
2. Understand the concept of Knowledge base, knowledge representation, AI languages & tools and various planning techniques.
3. Identify uncertainty and understand fuzzy logic concept to handle uncertainty.
4. Understand the COURSE of AI agents and various COURSE methods it also includes neural network and includes the communication of AI agents and natural language processing.

COURSE CONTENTS:

UNIT-I (12 Hrs)

Introduction: History of AI - Intelligent agents – AI and Applications - Problem spaces and search - Heuristic Search techniques – Best-first search – Informal search strategies-A* algorithm, Iterative deepening A*(IDA), small memory A*(SMA). Game Playing: Minimax search procedure - Adding alpha-beta cutoffs

UNIT-II (12 Hrs)

Knowledge Representation: Approaches and issues in knowledge representation Knowledge - Based Agent- Propositional Logic – Predicate logic –Reasoning, AI languages Prolog, Lisp.

UNIT-III (09 Hrs)

Reasoning under uncertainty: Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems - Bayesian networks, Fuzzy Logic.

UNIT IV (12 Hrs)

Planning and COURSE: Basic representation of plans - conditional planning - Multi-Agent planning. Forms of COURSE - inductive COURSE - Reinforcement COURSE - COURSE decision trees - Neural Networks. Communication: Natural language processing, Formal Grammar, Parsing

RECOMMENDED BOOKS:

1. Elaine Rich, Kevin Knight and Shivashankar B.Nair, „Artificial Intelligence", 3rd Edn., Tata McGraw-Hill, **2009**.

2. Stuart J. Russell and Peter Norvig, „Artificial Intelligence: A Modern Approach", Pearson Education Asia, 2nd Edn., **2003**.

3. N.P. Padhy, „Artificial Intelligence and Intelligent System", Oxford University Press, 2nd Edn., **2005**.

4. Rajendra Akerkar, „Introduction to Artificial Intelligence", Prentice-Hall of India, **2005**.

5. Patrick Henry Winston, „Artificial Intelligence", Pearson Education Inc., 3rd Edn., **2001**.

6. Eugene Charniak and Drew Mc Dermott, „Introduction to Artificial Intelligence", Addison-Wesley, ISE Reprint, **1998**.

7. Nils J. Nilsson, „Artificial Intelligence - A New Synthesis", Harcourt Asia Pvt. Ltd., Morgan Kaufmann, **1988**.

ENVIRONMENTAL SCIENCES

Subject Code: BMNCC0-002 **L T P C** **Duration: 30 Hrs.**

2 0 0 0

COURSE OBJECTIVES:

1. To identify global environmental problems arising due to various engineering/industrial and technological activities and the science behind these problems.
2. To identify the major pollutants and abatement devices for environmental management and sustainable development.
3. To estimate the current world population scenario and calculating the economic growth, energy requirement, demand and also their related problems and plausible solutions.

COURSE OUTCOMES:

1. Students are able to identify global environmental problems arising due to various engineering/industrial and technological activities and the science behind these problems.
2. Students are able to classify the major pollutants and abatement devices for environmental management and sustainable development.

3. Students can evaluate the current world population scenario and calculating the economic growth, energy requirement, demand and also their related problems and plausible solutions.

. UNIT-I

1. The Multidisciplinary Nature of Environmental Studies:

Definition, scope and importance, Need for public awareness.

2. Natural Resources

Renewable and Non-renewable Resources: Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

UNIT-II

Environmental Pollution: Definition

(a) Causes, effects and control measures of:

i) Air pollution

ii) Water pollution

iii) Soil pollution

iv) Marine pollution

v) Noise pollution

vi) Thermal pollution

vii) Nuclear pollution

(b) **Solid Waste Management**: Causes, effects and control measures of urban and industrial wastes.

(c) Role of an individual in prevention of pollution.

(d) Pollution Case Studies.

(e) Disaster management: floods, earthquake, cyclone and landslides.

UNIT-III

Social Issues and the Environment

(a) From unsustainable to sustainable development

(b) Urban problems and related to energy

(c) Water conservation, rain water harvesting, Watershed Management

(d) Resettlement and rehabilitation of people; its problems and concerns, Case studies.

(e) Environmental ethics: Issues and possible solutions

(f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies.

(g) Issues involved in enforcement of environmental legislation

UNIT-IV

Human Population and the Environment

(a) Population growth, variation among nations

(b) Population explosion – Family Welfare Programmes

(c) Environment and human health

(d) Human Rights

(e) Value Education

(f) Women and Child Welfare

(g) Role of Information Technology in Environment and Human Health

(h) Case Studies.

Environmental Science related activities:

We as human being are not an entity separate from the environment around us rather we are a constituent seamlessly integrated and co-exist with the environment around US. We are not an entity so separate from the environment that we can think of mastering and controlling it rather we must understand that each and every action of ours reflects on the environment and vice versa. Ancient wisdom drawn from Vedas about environment and its sustenance reflects these ethoses. There is a direct application of this wisdom even in modern times. Idea of an activity based course on environment protection is to sensitize the students on the above issues through following two types of activities.

(a) Awareness Activities:

i) Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste.

ii) Slogan making event

iii) Poster making event

iv) Cycle rally

v) Lectures from experts.

(b) Actual Activities:

i) Plantation

ii) Gifting a tree to see its full growth

iii) Cleanliness drive

iv) Drive for segregation of waste

v) To live some big environmentalist for a week or so to understand his work

vi) To work in kitchen garden for mess

vii) To know about the different varieties of plants

viii) Shutting down the fans and ACs of the campus for an hour or so

Recommended Books

1. Agarwal, K. C. 2001 Environment Biology, Nidi Publ. Ltd. Bikaner.
2. Jadhav, H & Bhosale, V.M. 1995. Environment Protection and Laws. Himalaya Pub House, Delhi 284p.
3. Rao M. N. & Datta A.K. 1987. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345 p.
4. Principle of Environment Science by Cunninghan, W.P.
5. Essentials of Environment Science by Joseph.

ENTERPRISE RESOURCE PLANNING

Subject Code- BCSED1-811 **L T P C** **Duration – 45Hrs**
3 0 0 3

COURSE OBJECTIVE:
The course has all the required contents that are necessary for a graduate to understand the different strategies of an organization.

COURSE OUTCOMES:
1. To understand the concepts of ERP and its related technologies.
2. To understand the implementation of ERP in an organization.
3. To have a deep understanding of different business modules of an organization.
4. To have a basic understanding of applications of ERP and various ERP software"s.

COURSE CONTENTS:

UNIT-I (12 Hrs)

ERP AND TECHNOLOGY: Introduction, Related Technologies, Business Intelligence, E-Commerce and E-Business, Business Process Reengineering, Data Warehousing, Data Mining, OLAP, Product life Cycle management, SCM, CRM

UNIT II (12 Hrs)

ERP IMPLEMENTATION: Implementation Challenges, Strategies, Life Cycle, Methodologies Package selection, Project Teams, Vendors and Consultants, Data Migration, Project management

UNIT-III (12 Hrs)

ERP IN ACTION & BUSINESS MODULES: Operation and Maintenance, Business Modules, Finance, Manufacturing, Human Resources, Plant maintenance, Materials Management, Quality management, Marketing, Sales, Distribution and service.

UNIT-IV (09 Hrs)

ERP Application: Enterprise Application Integration, ERP II, Total quality management
ERP CASE STUDY: SAP AG, JD Edwards.

RECOMMENDED BOOKS:
1. Alexis Leon, „ERP DEMYSTIFIED", 2nd Edn., Tata McGraw Hill, **2008**.
2. Mary Sumner, „Enterprise Resource Planning", Pearson Education, **2007**.
3. Jim Mazzullo, „SAP R/3 for Everyone", 2nd Edn., Pearson, **2007**.
4. Jose Antonio Fernandz, „The SAP R /3 Handbook", Tata McGraw Hill, **2000**.
5. Biao Fu, „SAP BW: A Step-by-Step Guide", 1st Edn., Pearson Education, **2003**.

INTERNET OF THINGS

Subject Code- BCSED1-812 **L T P C** **Duration – 45Hrs.**
3 0 0 3

COURSE OBJECTIVE:
The purpose of this course is to impart knowledge on IoT Architecture and various protocols, study their implementations

COURSE OUTCOMES:
1. To Understand the Architectural Overview of IoT

2. To Understand Raspberry.
3. To Understand the various IoT Protocols (Data link, Network)
4. To understand sensor applications.

COURSE CONTENTS:

UNIT I (12 hours)

OVERVIEW: Introduction to IOT, how does it work? Difference between Embedded device and IoT device, Properties of IoT device, IoT Ecosystem, IoT Decision Framework, IoT Solution Architecture Models, Major IoT Boards in Market , Privacy issues in IOT

UNIT II (11 hours)

Setting Up Raspberry Pi/Arduino to Create Solutions Explore Raspberry Pi, setting up Raspberry Pi, showing working of Raspberry Pi using Secure Shell (SSH) Client and Team Viewer, Understand Sensing actions, Understand Actuators and Micro electromechanical Systems (MEMS).

UNIT III (12 hours)

IOT DATA LINK LAYER & NETWORK LAYER PROTOCOLS: Communication Protocols used in IoT Types of wireless communication, Major wireless Short-range communication devices, properties, comparison of these devices (Bluetooth, Wireless Fidelity(WiFi), ZigBee, Low-power Wireless Personal Area Network(6LoWPAN)), Major wireless Long-range communication devices, properties, comparison of these devices (Cellular IoT, Low-Power Wide-Area Network(LPWAN))

UNIT IV (10hours)

Sensors Applications of various sensors: Google Maps, Waze, WhatsApp, Ola Positioning sensors: encoders and accelerometers, Image sensors: cameras Global positioning sensors: Global Positioning System (GPS), Global Navigation Satellite System (GLONASS), Indian Regional Navigation Satellite System (IRNSS).

RECOMMENDED BOOKS:

1. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-onApproach)”, 1 st Edition, VPT, 2014.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Willy Publications

ADVANCED DATABASE MANAGEMENT SYSTEMS

Subject Code- BCSED1-813 **L T P C** **Duration – 45Hrs.**
3 0 0 3

COURSE OBJECTIVE:

This course helps to understand the advance concepts used in database management systems.

COURSE OUTCOMES:

1. To be able to use different database analyse techniques.

2. To learn about query compiler.
3. To learn different distributed database models.
4. To learn emerging models and techniques in databases.

COURSE CONTENTS:

UNIT I (12 Hrs)

DataBase Analysis and Design Techniques: Review of basic Database Concepts, Database Design Methodologies. ER Modelling: Specialization, Generalization, Aggregation. Advanced Transaction Processing and Concurrency Control: Transaction **Concepts, Concurrency Control:** Locking Methods, Timestamping Methods, Optimistic Methods for Concurrency Control, Concurrency Control in Distributed Systems.

UNIT II (12 Hrs)

Introduction to PL/SQL: Introduction to PL/ SQL, cursors triggers

Operations: Query Evaluation: Introduction, Approaches to QE, Transformation of relational expressions in Query optimization, selection, project heuristic optimization, cost estimation for various operations, transformation rule.

UNIT III (12 Hrs)

Distributed Database, Centralized DBMS and Distributed DBMS, functions and architecture of a DDBMS, Distributed Data Storage, Transparency issues in DDBMS, Query Processing DDBMS, Distributed transaction Management and Protocols, Distributed Concurrency Control. Object Oriented Database Data Definition, ODBMS Fundamentals, issues in OODBMS, OODBMS systems.

UNIT IV (09Hrs)

Emerging Database Models, Technologies and Applications, Multimedia database- Emergence, difference from other data types, structure, deductive databases, GIS and spatial databases, Knowledge database, introduction to Digital libraries, web databases.

RECOMMENDED BOOKS:

1. Advanced database management system by RiniChkrabarti and ShibhadraDasgupta, Dreamtech.
2. Distributed Databases by Ozsu and Valduriez ,Pearson Education.
3. Fundamentals of Database Systems by RamezElmasri, ShamkantNavathe, Pearson Education
4. Database System Concepts by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Tata McGraw-Hill.

SOFTWARE PROJECT MANAGEMENT

Subject Code- BCSED1-814 **L T P C** **Duration – 45Hrs.**
3 0 0 3

COURSE OBJECTIVE:

It gives an in depth knowledge of software project management and project planning. It also covers the Step Wise framework in project planning

COURSE OUTCOMES:

1. Apply the basics of Software Project Management in order to manage and deliver qualified product and plan the activities within time schedules with CPM and PERT Analysis.
2. For managing the quality of product and managing the risk involved
3. Managing team and measuring and tracking the planning
4. To learn Configuration management and project monitoring and control

COURSE CONTENTS:

UNIT-I (12 Hrs)

Project Planning: Characteristics of a software project, Software scope and feasibility, resources, the SPM plan.

Software Project Estimation: Size/scope estimation, Decomposition techniques, WBS. Effort estimation: Sizing, Function point, LOC, FP vs LOC. Schedule estimation: GANTT Charts, Activity networks, PERT/CPM networks. Cost estimation: Models: COCOMO-I, COCOMO-II.

UNIT-II (12 Hrs)

Quality Planning: Quality control, Quality assurance, Formal Technical Reviews, The SQA Plan, ISO and CMM standards.

Risk Management: Reactive vs proactive Risk strategies, Risk projection, Risk Refinement, Risk Monitoring, Monitoring and management, RMMM plan.

UNIT-III (12 Hrs)

Measurement and Tracking Planning: Earned Value Analysis.

Team Management: Team structures: hierarchical, Egoless, chief programmer, mixed; Team software Process; Resource levelling, Building a team: Skill sets.

UNIT-IV (09 Hrs)

Configuration Management: Baselines, Configurable items, SCM repository, SCM process, version control change control, configuration audit**.**

Project Monitoring and Control: Audits and Reviews.

RECOMMENDED BOOKS:

1. Bob Hughes and Mike Cotterell, „Software Project Management", 5th Edn., Tata McGraw Hill, **2009.**

2. Roger Pressman, „A Practitioner"s Guide to Software Engineering", 8th Edn., Tata McGraw Hill, **2014.**

3. „Head First PMP: A Brain Friendly Guide to Passing the Project Management Professional Exam", **2013.**

CONSTITUTION OF INDIA

Subject Code- BMNCC0-001 **L T P C**
2 0 0 0

COURSE OBJECTIVE:

The student will be able to learn different perspectives of constitution of India.

COURSE OUTCOMES:

1. To learn the meaning and historical perspective of law.
2. To have deep knowledge of fundamental rights.
3. To learn different policies implemented by Constitution of India.
4. To learn Article 19 and 21.

COURSE CONTENTS:

1. Meaning of the constitution law constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of fundamental duties and its legal status.
6. The Directive principles of State Policy – Its importance and implementation.

7. Federal structure and distribution of legislative and financial powers between the Union and states.
8. Parliamentary form of Government of India- The Constitution powers and status of the President of India.
9. Amendment of Constitutional Powers and Procedure.
10. The historical perspectives of constitutional amendments in India.
11. Emergency Provisions: National Emergency, President Rule, financial emergency.
12. Local Self Government- Constitutional Scheme in India.
13. Scheme of Fundamental Right to Equality.
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

ESSENCE OF INDIAN KNOWLEDGE TRADITION

Subject Code- BMNCC0-006 **L T P C**
2 0 0 0

COURSE OBJECTIVE:
The course is introduced
1. To get a knowledge in Indian Philosophical Foundations.
2. To Know Indian Languages and Literature and the fine arts in India & Their Philosophy.
3. To explore the Science and Scientists of Medieval and Modern India

COURSE OUTCOMES:
After successful completion of the course the students will be able to
1. Understand philosophy of Indian culture.
2. Distinguish the Indian languages and literature among difference traditions.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India.
5. Know the contribution of scientists of different eras.
6. The essence of Yogic Science for Inclusiveness of society.

COURSE CONTENTS:

UNIT – I

Introduction to Indian Philosophy: Basics of Indian Philosophy, culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian culture, Ancient Indian, Medieval India, Modern India.

Indian Philosophy & Literature: Vedas Upanishads, schools of Vedanta, and other religion Philosophical Literature. Philosophical Ideas the role of Sanskrit, significance of scriptures to current society, Indian Philosophies, literature of south India.

UNIT – II

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT – III

Indian Fine Arts & Its Philosophy(Art, Technology & Engineering): Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in Indian, development of science in ancient, medieval and modern Indian.

UNIT – IV

Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Scientists of

Medieval India, Scientists of Modern India. The role Gurukulas in Education System, Value based Education.

RECOMMENDED BOOKS:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition"", ISBN: 81246033375, 2005
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN-13:978-8187276333,2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre"", ISBN 81-7450-494-X, 2006
4. S. Narain, "Examination in Ancient India", Arya Book Depot, 1993
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989
6. M.Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN-13: 978- 8120810990,2014
7. Chatterjee. S & Dutta "An Introduction to Indian Philosophy".

AWS CLOUD PRACTITIONER

COURSE CODE: MOOCCSE-A01 **DURATION: 10 Weeks.**

Course Prerequisites:

Basic knowledge of Computer Networking, Operating Systems

Learning Outcomes:

1. Cloud Practitioner,
2. Architect, Operations

Course Description:

AWS Cloud Practitioner validates cloud expertise to help professionals highlight in-demand skills and organizations build effective, innovative teams for cloud initiatives using AWS.

COURSE DETAILS

MODULE 1: (Introduction to AWS)

TOPIC 1: (Introduction)

Lecture 1.1: Introduction to AWS
Lecture 1.2: Introduction to AWS WEB Services
Lecture 1.3: Types of Cloud Computing
Lecture 1.4: Cloud Computing Architecture
Lecture 1.5: AWS Global Infrastructure
Lecture 1.6: AWS Management Console
Lecture 1.7: Amazon EBS (Elastic Block Store) VS Object Storage.

MODULE 2: (EC2 Instances)

TOPIC 1: (EC2 Instances win & Linux)

Lecture 1.1: EC2 Instances 1
Lecture 1.2: EC2 Instances 2
Lecture 1.3: Create an Image of EC2 Instance

MODULE 3: (ELB (Elastic Load Balancing)

TOPIC 1: (ELB)

Lecture 1.1: ELB (Elastic Load Balancing)
Lecture 1.2: How to create load balancer in AWS?

MODULE 4: (S3 Buckets)

TOPIC 1: (Introduction S3)

Lecture 1.1: What is Amazon S3?
Lecture 1.2: Amazon S3
Lecture 1.3: Amazon Cloud front
Lecture 1.4: Brief Introduction Cloud Front

MODULE 5: (DNS)

TOPIC 1: (Introduction DNS)

Lecture 1.1: Domain Name System (DNS)

Lecture 1.2: Types of Domain Name System (DNS)

MODULE 6: (RDS)

TOPIC 1: (Introduction of RDS)

Lecture 1.1: Amazon Relational Database Service (RDS)

MODULE 7: (Snapshots)

TOPIC 1: (Introduction Snapshots)

Lecture 1.1: Amazon EBS Snapshots

Lecture 1.2: Creating windows machine snapshot AWS

Lecture 1.3: Elastic IP Addresses

MODULE 8: (AWS Cloud Trail)

TOPIC 1: (Introduction AWS Cloud Trail)

Lecture 1.1: AWS Cloud Trail

Lecture 1.2: Amazon EC2 Reserved instances

MODULE 9: (Identity and Access Management (IAM)

TOPIC 1: (Introduction Identity and Access Management (IAM)

Lecture 1.1: What is IAM?

Lecture 1.2: Introduction to AWS Billing

MODULE 10: (AWS Cloud Practitioner)

TOPIC 1: (Introduction AWS Cloud Practitioner (Billing))

Lecture 1.1: AWS Cloud Practitioner (Billing)

BASICS OF C#

COURSE CODE: MOOCCSE-A02 **DURATION: 8 Weeks.**

Course Prerequisites:

You should know how to use a computer at a basic level.

Learning Outcomes:

1. The fundamentals of C#
2. Control Flow: Decision making statements & Conditional Statements
3. Conditional Statements
4. Methods and Classes
5. Arrays & List
6. Different Methods of String & String Builder
7. DateTime & TimeSpan

Course Description:

This course is designed for the complete beginners to C# Programming. This course aims to teach programming at a steady pace which will help you to gasp complex C# topics in a simple way.

COURSE DETAILS

MODULE 1: (Introduction to C#)

TOPIC 1: (Introduction)

Lecture 1.1: (Introduction to .Net & C#)
Lecture 1.2: (Architecture of .net)
Lecture 1.3: (Getting Visual Studio)
Lecture 1.4: (Creating First Application)

MODULE 2: (C# Basics)

TOPIC 1: (Introduction C# Basics)

Lecture 1.1: (Variables)
Lecture 1.2: (Identifiers and Keyword)
Lecture 1.3: (Data Types)
Lecture 1.4: (Type Casting)
Lecture 1.5: (User Inputs)
Lecture 1.6: (Introduction to Operators)
Lecture 1.7: (Arithmetic Operators)
Lecture 1.8: (Assignment Operators)
Lecture 1.9: (Comparison Operators)
Lecture 1.10: (Logical Operators)
Lecture 1.11: (Comments)

MODULE 3: (Conditional Statements)

TOPIC 1: (Introduction of Conditional Statements)

Lecture 1.1: (If Statement)
Lecture 1.2: (If Else Statement)

Lecture 1.3: (If Else If Statement)
Lecture 1.4: (Nested If Statement)
Lecture 1.5: (Switch Statement)
Lecture 1.6: (Ternary Operator)

MODULE 4: (Iterative Statements)

TOPIC 1: (Introduction of Iterative Statements)

Lecture 1.1: (For Loop)
Lecture 1.2: (While Loop)
Lecture 1.3: (Do While Loop)
Lecture 1.4: (For Each Loop)
Lecture 1.5: (Goto Statement)
Lecture 1.6: (Continue Statement)

MODULE 5: (Methods and Classes)

TOPIC 1: (Introduction of Methods and Classes)

Lecture 1.1: (Introduction to Methods)
Lecture 1.2: (Call by Value)
Lecture 1.3: (Call by Reference)
Lecture 1.4: (Out Parameter)
Lecture 1.5: (Classes)
Lecture 1.6: (Constructors)
Lecture 1.7: (This Keyword)
Lecture 1.8: (Static Keyword)

MODULE 6: (Arrays & List)

TOPIC 1: (Introduction of Arrays & List)

Lecture 1.1: (Arrays)
Lecture 1.2: (Multi-dimensional Array)
Lecture 1.3: (Jagged Array)
Lecture 1.4: (Passing Array to a function)
Lecture 1.5: (Array Class)
Lecture 1.6: (List)

MODULE 7: (Strings)

TOPIC 1: (Introduction of Strings)

Lecture 1.1: (What is String?)
Lecture 1.2: (String Methods: Length, Concate & Join)
Lecture 1.3: (String Methods: Split & SubString)
Lecture 1.4: (String Methods: StartsWith & EndWith)
Lecture 1.5: (String Methods: Contains, Replace & Trim)
Lecture 1.6: (Comparing Two Strings)
Lecture 1.7: (String Escape Sequence)
Lecture 1.8: (String Builder)

MODULE 8: (Working with Date and Time)

TOPIC 1: (Introduction of Working with Date and Time)

Lecture 1.1: (DateTime)
Lecture 1.2: (TimeSpan)

CYBER SECURITY & ETHICAL HACKING

COURSE CODE: MOOCCSE-A11 **DURATION: 8 Weeks**

Course Outcomes:

1. BASICS OF SECURITY
2. WINDOWS & AD FUNDAMENTALS
3. TCP/IP & NETWORK SERVICES
4. BASICS OF ETHICAL HACKING
5. SCANNING OF SYSTEMS/APPLICATIONS
6. SECURING WEB APPLICATIONS

COURSE DESCRIPTION:

Build Your Career With the Most In-Demand field.

The Cyber Security & Ethical Hacking Program will equip you with the skills needed to become familiar in this rapidly growing domain. You will learn hacking tools, methodologies and techniques and learn how to secure them from these hackers.

COURSE DETAILS

MODULE 1: (Title of the Module)

TOPIC 1: (Introduction)

Lecture 1.1: Cyber space
Lecture 1.2: Encryption
Lecture 1.3: Email security
Lecture 1.4: Antiviruses
Lecture 1.5: Career in cyber sec

MODULE 2: (Microsoft OS)

TOPIC 1: (Windows)

Lecture 1.1: File System
Lecture 1.2: System Configuration
Lecture 1.3: Computer Management
Lecture 1.4: System Information
Lecture 1.5: Resource Monitor
Lecture 1.6: Command Prompt
Lecture 1.7: Registry Editor

TOPIC 2: (Active Directory)

Lecture 2.1: Domain Controller
Lecture 2.2: Forest
Lecture 2.3: Users & Groups
Lecture 2.4: Domain Authentication

MODULE 3: (Networking)

Lecture 1.1: TCP/IP
Lecture 1.2: Layers in TCP/IP
Lecture 1.3: Ports & Sockets
Lecture 1.4: Firewall

Lecture 1.5: Network Services
Lecture 1.6: DNS, Telnet, SSH
Lecture 1.7: Video Forensic

MODULE 4: (Ethical Hacking)

Lecture 1.1: What is Hacking?
Lecture 1.2: Types of Hackers
Lecture 1.3: Google Dorks as Hacking Tools
Lecture 1.4: Phases of Hacking
Lecture 1.5: Passive Reconnaissance
Lecture 1.6: Active Reconnaissance
Lecture 1.7: Port Scanning
Lecture 1.8: NMAP as Scanning Tool
Lecture 1.9: NMAP Scripting Tool
Lecture 1.10: Exploit Searching
Lecture 1.11: Video Password Cracking

MODULE 5: (Websites)

Lecture 1.1: Working of Website
Lecture 1.2: HTML
Lecture 1.3: HTTP
Lecture 1.4: HTTP Methods
Lecture 1.5: Headers & Cookies

MODULE 6: (Web Applications)

Lecture 1.1: Walking a Application
Lecture 1.2: Browser Developer Tools

RESOURCES:

- OWASP Installation - Vulnerable Web Application
- DIRB & Whatweb For Website Identification
- Hydra - Bruteforcing Any Login Page
- Burpsuite Introduction & Configuration
- Command Injection & Target Exploitation
- Combining Our Python Tool With Command Injection Vulnerability
- XSS Attack Theory
- Finding XSS Vulnerability On A Webpage
- Solving XSS Challenges On An Online Lab
- HTML Character Encoding To Exploit an XSS Vulnerability

MODULE 7: (Web Applications Security Risks)

Lecture 1.1: Injection

RESOURCES:

- HTML Code Injection Vulnerability
- What is SQL & SQL Injection Theory
- Stealing Database Passwords With Advance Manual SQL Injection
- Broken Access Control
- Sensitive Data Exposure
- Security Misconfigurations

MODULE 8: (Hacking)

Lecture 1.1: Password Tool John the Ripper
Lecture 1.2: Hacking Video

DATABASE MANAGEMENT SYSTEM

COURSE CODE: MOOCCSE-A10 **DURATION: 06 Weeks**

Course Prerequisites:
Introduction to Computer Science and Engineering, Programming Fundamentals

Course Outcomes:
1. Fundamental elements of relational database management systems and non-relational database
2. Design ER-models to represent simple database application scenarios
3. Able to create SQL queries using multiple tables.
4. Improve the database design by normalization.
5. Database indexing (B and B+ Trees).

Course Description:
The main objective of this course is to provide students with the background to design, implement, and use database management systems. This course offers a good understanding of database systems concepts and prepares the student to be in a position to use and design databases for different applications. Behind the development and design of this course is to know.

1. How to design, manipulate and manage databases.
2. The course participants are exposed to the various forms, types and models of database systems to enable them make viable choices.
3. Supportive and complementary concepts of managing data and documents are thoroughly examined to give a wholesome view of data/information management.

COURSE DETAILS

MODULE 1 (Introduction to Database Systems)

Topic 1: (DBMS and File System)
Lecture 1.1: (File Systems Versus a DBMS)
Lecture 1.2: (Advantages of a DBMS)

Topic 2: (Architectures)
Lecture 2.1: (Components of DBMS)
Lecture 2.2: (Architecture of DBMS)

Topic 3: (Data Abstraction and Schemas)
Lecture 3.1: (Database System Architecture)
Lecture 3.2: (Data Independence and Schemas)

MODULE 2 (Relational Database)

Topic 1: (Types of Databases)
Lecture 1.1: (CRUD Operations)
Lecture 1.2: (Types of Databases, Relational Database)

Topic 2: (Non-Relational Database)
Lecture 2.1: (Non-Relational Database)

Topic 3: (Basics of SQL)
Lecture 3.1: (Creating Tables, Rows and Keys)
Lecture 3.2: (What is SQL?, SQL as DML, DDL and DCL)

MODULE 3 (Lets Start SQL)

Topic 1: (SQL Workbench)

Lecture 1.1: (SQL Workbench - Apex)

Topic 2: (Creating Database for SQL)

Lecture 2.1: (Creating Database)

Topic 3: (SQL Clauses and Operations)

Lecture 3.1: (Select Clause)

Lecture 3.2: (Where Clause And Clause)

Lecture 3.3: (Practice SQL Operators on Workbench)

MODULE 4 (Types of File Organization and Practice SQL)

Topic 1: (What is File Organization?)

Lecture 1.1: (File Organization and SQL – OR Operator)

Lecture 1.2: (5 types of File Organization and SQL – IN, Between, Null Clause)

Topic 2: (Different Types of File Organization and SQL hands-on Practice)

Lecture 2.1: (Types of Hashing, SQL – Query Filtering Conditions, Operator Precedence)

Lecture 2.2: (Cluster, B+ Tree file Organization, SQL–Ordering, Concatenation, Aliasing Query)

Topic 3: (Indexing and SQL Functions)

Lecture 3.1: (What is Indexing? , SQL Function – SumThese, Use of Concat, Pipes)

MODULE 5 (Data Models in Database Management System and Practice SQL)

Topic 1: (Hierarchical Model)

Lecture 1.1: (Hierarchical Model , SQL Functions – Upper , Lower , DUAL Table)

Topic 2: (Network Model)

Lecture 2.1: (Network Model , SQL Functions – Using Functions in Where Clause)

Topic 3: (Entity Relationship Model)

Lecture 3.1: (ER Model , SQL Functions – Initcap Function and Length Function)

Resources: PDF:

KEYS & Constraints (Primary Key, Foreign Key, Unique, Not Null, Check)

JOIN Queries

MODULE 6 (Normal Forms, Functional Dependency and ACID Properties)

Topic 1: (Types of Functional Dependencies)

Lecture 1.1: (Functional Dependency and SQL – SUBSTR Function)

Topic 2: (Normal Forms and SQL Functions)

Lecture 2.1: Different Normal Forms, SQL – LPAD, RPAD, LTRIM, RTRIM Functions)

Topic 3: (ACID Properties)

Lecture 3.1: (ACID Properties)

FUNDAMENTAL OF JAVA

COURSE CODE: MOOCCSE-A09 **DURATION: 7 Weeks.**

Course Prerequisites:

You should know how to use a computer at a basic level

Course Outcomes:

1. The fundamentals of Java
2. The building blocks of java program.
3. Conditional Statements
4. Iterative Statements
5. Object-Oriented Programming

Course Description:

This course is designed for the complete beginners to java programming. This course aims to teach programming at a steady pace which will help you to gasp complex java topics in a simple way.

COURSE DETAILS

MODULE 1: (Basic of Java Language Part-1)

TOPIC 1: (Introduction)

Lecture 1.1: Introduction to Java Language
Lecture 1.2: Installing JDK & IDE
Lecture 1.3: First Program in Java
Lecture 1.4: User Input using Scanner Class
Lecture 1.5: Comments

MODULE 2: (Basic of Java Language Part-2)

TOPIC 1: (Basic Language of Elements)

Lecture 1.1: Variables
Lecture 1.2: Datatypes
Lecture 1.3: Type Casting in Java
Lecture 1.4: Operators in Java
Lecture 1.5: Strings
Lecture 1.6: Array

MODULE 3: (Conditional Statements)

TOPIC 1: (Conditional Statements)

Lecture 1.1: If Statement
Lecture 1.2: If-else Statement
Lecture 1.3: If-else-if ladder
Lecture 1.4: Nested if-statement
Lecture 1.5: Switch Statement

MODULE 4: (Iterative Statements)

TOPIC 1: (Iterative Statements)

Lecture 1.1: Do-While Loop
Lecture 1.2: While Loop
Lecture 1.3: For Loop
Lecture 1.4: For Each Loop
Lecture 1.5: Break Statement

Lecture 1.6: Continue Statement

MODULE 5: (OOPs: Object Class Part-1)

TOPIC 1: (Basics of OOPS Concepts in Java)

Lecture 1.1: OOPs Concept in Java
Lecture 1.2: Object and Class
Lecture 1.3: Method
Lecture 1.4: Constructor
Lecture 1.5: Static Keyword
Lecture 1.6: This Keyword

MODULE 6: (OOPs: Object Class Part-1)

TOPIC 1: (Inheritance & Overloading)

Lecture 1.1: Basics Inheritance
Lecture 1.2: Single and Multilevel Inheritance
Lecture 1.3: Hierarchical Inheritance
Lecture 1.4: Basics of Polymorphism
Lecture 1.5: Method Overloading
Lecture 1.6: Super keyword

MODULE 7: (Abstraction & Encapsulation)

TOPIC 1: (Abstraction & Encapsulation)

Lecture 1.1: Abstraction: Abstract Class
Lecture 1.2: Abstraction: Interface
Lecture 1.3: Basic of Encapsulation
Lecture 1.4: Encapsulation: Package
Lecture 1.5: Encapsulation: Access Modifiers

RESOURCES: PDF: Exceptional handling

JDBC with MYSQL

- Types of JDBC Drivers
- JDBC Classes/Interfaces
- JDBC Connectivity Steps
- Establishing connection with the database
- Reading data from database
- Creating Table using Statement
- Insert using Statement
- Update using Statement
- Delete using Statement
- Statement Vs PreparedStatement
- Insert using PreparedStatement
- Update using PreparedStatement
- Delete using PreparedStatement
- CallableStatement:
- CallableStatement:
- ResultSetMetaData
- DatabaseMetaData
- Storing Image
- Retrieving Image
- Storing File
- Retrieving File

INTRODUCTION TO CLOUD COMPUTING

COURSE CODE: MOOCCSE-A04 **DURATION: 06 Weeks.**

Course Prerequisites:

Basic knowledge of Computer

Learning Outcomes:

1. Learn general Cloud Computing Concepts.
2. Gain and understand the fundamental systems on which the cloud is based.
3. Build knowledge from beginner level.
4. You will learn about the various cloud service models & deployment models of cloud computing.

Course Description:

You will learn general cloud computing concepts and this cloud computing full course will provide you with everything you need to know about cloud computing. Starting from introduction of cloud computing, why cloud computing came to existence, Service models of cloud computing & we will also cover cloud storage & cloud security. Even though this course does not require any prior cloud computing.

COURSE DETAILS

MODULE 1: (Introduction)

TOPIC 1: (Introduction of Cloud Computing)

Lecture 1.1: **(**What is Cloud Computing?**)**

Lecture 1.2: **(**Why Cloud Computing?**)**

MODULE 2: (Deployment Models)

TOPIC 1: (Introduction of Deployment Model & Types)

Lecture 1.1: **(**Deployment Models (Public Cloud, Private Cloud, Hybrid Cloud & Community Cloud)

MODULE 3: (Service Models)

TOPIC 1: (Introduction & Types of Service Models)

Lecture 1.1: **(**Introduction & Infrastructure as a Service(Iaas)**)**

Lecture 1.2: **(**Platform as a Service (Paas))

Lecture 1.3: (Software as a Service (Saas))

Lecture 1.4: **(**Iaas vs. Paas vs. Saas**)**

MODULE 4: (Cloud Computing Architecture & Components)

TOPIC 1: (Cloud Computing Architecture)

Lecture 1.1: **(**What is Cloud Computing Architecture?)

Lecture 1.2: **(**Important Components of Cloud Computing**)**

Lecture 1.3: **(**Essential Characteristics of Cloud Computing**)**

TOPIC 2: (Challenges of Cloud Computing)

Lecture 2.1: **(**Most common challenges of Cloud Computing**)**

MODULE 5: (Cloud Storage)

TOPIC 1: (Introduction of Cloud Storage)

Lecture 1.1: **(**What is Cloud Storage?**)**

Lecture 1.2: **(**Types of Cloud storage)

Lecture 1.3: **(**Benefits of Cloud storage adoption**)**

MODULE 6: (Cloud Security and Career Opportunities)

TOPIC 1: (Cloud Security)

Lecture 1.1: **(**What is Cloud Security?)

Lecture 1.2: **(**How cloud security works?)

Lecture 1.3: **(**Measures & Controls in Cloud Security)

Lecture 1.4: **(**Facts about Cloud Computing Security)

TOPIC 2: (Career Opportunities in Cloud Computing & Cloud Comparison)

Lecture 2.1: **(**Career opportunities in Cloud Computing)

Lecture 2.2: **(**Cloud Comparison)

OFFICE AUTOMATION

COURSE CODE: MOOCCSE-A05 **DURATION: 04 Weeks**

Course Prerequisites:

Basic Programming fundamentals

Learning Outcomes:

1. Office Automation Concepts
2. MS Word
3. MS PowerPoint
4. Basics of MS Excel
5. Internet Basics

Course Description:

Introduces the basic features of Microsoft Office. Develops familiarity with Word, Excel, PowerPoint, email & Internet basics. Learners use Microsoft Office programs to create personal, academic & business documents.

COURSE DETAILS

MODULE 1: (MS-WORD)

TOPIC 1: (Working with Documents)

Lecture 1.1: (How to Create & Add Text in Word File)
Lecture 1.2: (How to Save File)
Lecture 1.3: (How to Open and Selecting Text in Word Document)
Lecture 1.4: (Cut, Copy, Paste)
Lecture 1.5: (Find and Replace)
Lecture 1.6: (Undo and Redo)

TOPIC 2: (Formatting Documents)

Lecture 2.1: (Type Face - Bold, Italic, Underline, Subscripts)
Lecture 2.2: (Text Effects- Font, Text Highlight Colour, Font Colour, Font Style, Font Size, Increase Font Size and Decrease Font Size)
Lecture 2.3: (Styles, Alignments, Bullets, Numbering & Multilevel list)
Lecture 2.4: (Increase Indent and Decrease Indent)
Lecture 2.5: (Change Case- Sentence Case, Lowercase, UPPERCASE, Capitalised Each Word, tOggle Case)

TOPIC 3: (Setting Page Style)

Lecture 3.1: (Formatting Page)
Lecture 3.2: (Tab Stops)
Lecture 3.3: (Margins, Border & Shading, Columns)
Lecture 3.4: (Header & Footer)

TOPIC 4: (Creating Tables)

Lecture 4.1: (Inserting Table & Draw Table - How to do Settings (Borders, Alignments, Insertion, deletion, Merging, Splitting)

Lecture 4.2: (How to Add Excel Spreadsheet and Quick Tables)

TOPIC 5: (Page Background)

Lecture 5.1: (Watermark, Page Colour & Page Borders)

Lecture 5.2: (Proofing and Speech)

Lecture 5.3: (Print and Export a File)

Lecture 5.4: (How to Print and Export a File?)

MODULE 2: (MS-PowerPoint)

TOPIC 1: (Introduction to Presentation)

Lecture 1.1: (How to Create a New Presentation)

Lecture 1.2: (How to Open and Save Presentation)

Lecture 1.3: (Selecting Backgrounds)

Lecture 1.4: (Different Presentation Templates)

Lecture 1.5: (Selecting Presentation Layouts)

TOPIC 2: (Creating a Presentation)

Lecture 2.1: (Setting Presentation style)

Lecture 2.2: (Adding text to the Presentation)

TOPIC 3: (Formatting a Presentation)

Lecture 3.1: (Adding Style, Colour, Gradient fills)

Lecture 3.2: (Arranging Objects, Adding Header and Footer)

TOPIC 4: (Adding Graphics to Presentation)

Lecture 4.1: (Insert Pic)

Lecture 4.2: (Insert Table)

TOPIC 5: (Adding Effects to Presentation)

Lecture 5.1: (Setting Animation)

Lecture 5.2: (Transition Effect)

MODULE 3: (MS-EXCEL)

TOPIC 1: (Basics of MS-Excel)

Lecture 1.1: (Excel Screen and How to create a Workbook)

Lecture 1.2: (Spreadsheet, Rows & Columns, Cells, Scroll Bar)

Lecture 1.3: (How to zoom in & zoom out in Workbook, Formula Bar, Sheets & Selecting Ranges)

Lecture 1.4: (Simple Data Entry)

Lecture 1.5: (Saving Workbook Formats)

TOPIC 2: (Formatting Workbook)

Lecture 2.1: (Setting Font Styles in Workbook)

Lecture 2.2: (Setting Alignments in Workbook)

Lecture 2.3: (How to Merge & Centre Cells)

TOPIC 3: (How to work with Cells)

Lecture 3.1: (How to Insert and Delete Cells)

Lecture 3.2: (Basic Formula used in Excel (Add, Subtract, Multiply, Divide, Sum, Average, Count, Min, Max and Current time)

MODULE 4: (Internet & Mail)

TOPIC 1: (Introduction of Internet & Mail)

Lecture 1.1 (Basics of Internet)

Lecture 1.2 (How to send a Mail)

OPERATING SYSTEM

COURSE CODE: MOOCCSE-A06 **DURATION: 05Weeks.**

Course Prerequisites:

Basic Knowledge of Computer

Learning Outcomes:

1. You will become very familiar with the core concepts of Operating Systems
2. Understand how Operating Systems work
3. You will view Computer Science in a different dimension
4. Understand how Process scheduling is done in Operating Systems
5. Understand Memory management in Operating Systems

Course Description:

In this course, you will learn what is an Operating system, and how it works. You will gain about how operating system works, how multitasking works, how scheduling works, what is a process, thread, deadlock and much more. This course will equip learners with foundational knowledge of operating systems. This course is designed to give you the operating system skills you need to crack the interview questions on operating system, so this course is for you.

COURSE DETAILS

MODULE 1 (Overview of Operating System)

TOPIC 1: (Operating System)

Lecture 1.1: (Definition of operating system)

TOPIC 2: (Functions and Operations of Operating System)

Lecture 2.1: (Functions of Operating System)
Lecture 2.2: (Operations of Operating System)

MODULE 2 (Process & Thread Management)

TOPIC 1: (Process Management)

Lecture 1.1: (Process in Operating System)
Lecture 1.2: (Process Synchronization)
Lecture 1.3: (Process Scheduling)
Lecture 1.4: (Context Switching)

TOPIC 2: (Multi-threading)

Lecture 2.1: (Introduction of Threads)
Lecture 2.2: (Types of Threading)

MODULE 3 (Resource Management & Communication)

TOPIC 1: (Resource Management & Communication)

Lecture 1.1: (What is Resource Management in Operating System?)

Lecture 1.2: (Inter Process Communication)

Lecture 1.3: (I/0 Management)

TOPIC 2: (Memory Management)

Lecture 2.1: (Introduction of Memory Management)

MODULE 4 (Distributed System in Operating System)

TOPIC 1: (Distributed System)

Lecture 1.1: (Overview of Distributed System in operating system)

MODULE 5 (Deadlocks)

TOPIC 1: (Explain and understanding Deadlocks)

Lecture 1.1: (Deadlocks)

PHP

COURSE CODE: MOOCCSE-A07 **DURATION: 8 Weeks**

Course Prerequisites:

Basic Knowledge of Computer

Learning Outcomes:

Some basic concept of computers.

Course Description:

You will learn the concept of programming using php & project from scratch.

COURSE DETAILS

MODULE 1: Introduction & environment setup

TOPIC 1: Introduction

Lecture 1.1: Overview details of programing & Web Development
Lecture 1.2: Installation of XAMPP on windows
Lecture 1.3: Installation of XAMPP on mac.
Lecture 1.4: phpstrom installation on windows
Lecture 1.5: phpstrom installation on mac.

MODULE 2: PHP Basics

TOPIC 1: Introduction PHP Basics

Lecture 1.1: Syntax of php.
Lecture 1.2: Data types in php.
Lecture 1.3: Variables in php.
Lecture 1.4: Our first program in php.
Lecture 1.5: Task for addition
Lecture 1.6: Solution of addition

MODULE 3: Operators in PHP

TOPIC 1: Introduction of Operators in PHP

Lecture 1.1: Use of concatenation.
Lecture 1.2: Addition & subtraction of numbers.
Lecture 1.3: Divide, multiply of numbers & modules.

MODULE 4: Condition statements in PHP

TOPIC 1: Introduction Condition statements in PHP

Lecture 1.1: Logical & Comparison operators.
Lecture 1.2: If Statements
Lecture 1.3: If Else statements
Lecture 1.4: Else If Statements
Lecture 1.5: Task for greetings
Lecture 1.6: Solution of greetings

MODULE 5: Loops & Iterations in PHP

TOPIC 1: Introduction of Loops & Iterations in PHP

Lecture 1.1: For Loops
Lecture 1.2: While Loops
Lecture 1.3: Foreach Loops
Lecture 1.4: Do-While Loops
Lecture 1.5: Break & continue

MODULE 6: Pre-defined & Custom functions in PHP

TOPIC 1: Introduction Of Pre-defined & Custom functions in PHP

Lecture 1.1: Function definition
Lecture 1.2: Parameters in functions
Lecture 1.3: Global Variables
Lecture 1.4: Call by value
Lecture 1.5: Call by reference.
Lecture 1.6: Default arguments
Lecture 1.7: Variable arguments
Lecture 1.8: Arrays
Lecture 1.9: Strings

MODULE 7: HTML forms in PHP

TOPIC 1: Introduction of HTML forms in PHP

Lecture 1.1: Basics of HTML
Lecture 1.2: Form Creation & Sublimations
Lecture 1.3: HTTP Methods in php
Lecture 1.4: Validation of html forms
Lecture 1.5: Form Example

MODULE 8: Object oriented programing in PHP

TOPIC 1: Introduction of Object-oriented programing in PHP

Lecture 1.1: Classes & Object
Lecture 1.2: Constructors
Lecture 1.3: Inheritance in OOPS

PYTHON FOR DATA SCIENCE

COURSE CODE: MOOCCSE-A08 **DURATION: 7 Weeks.**

Course Prerequisites:

Beginner Level Python

Course Outcomes:

1. Working ON Python Environment (Jupyter Notebook)
2. Python operation for data analysis
3. Libraries like Numpy and Pandas
4. Data Handling
5. Data Manipulation

Course Description:

Data science can be defined as a blend of mathematics, business acumen, tools, algorithms and machine learning techniques, all of which help us in finding out the hidden insights or patterns from raw data which can be of major use in the formation of big business decisions. In this course we are going to learn data handling and manipulation methods with the help of Python.

COURSE DETAILS

MODULE 1: (Introduction Part)

TOPIC 1: (Introductory part)

Lecture 1.1: (Introduction)
Lecture 1.2: (Introduction to Jupyter Notebook)

TOPIC 2: (List and Set)

Lecture 2.1: (Revising List)
Lecture 2.2: (List and Sets)
Lecture 2.3: (More on Sets)

TOPIC 3: (Dictionaries and Tuples)

Lecture 3.1: (Intro to Dictionaries)
Lecture 3.2: (More on Dictionaries)
Lecture 3.3: (Intro to Tuples)
Lecture 3.4: (More on Tuples)

MODULE 2: (Functions and Recursion)

TOPIC 1: (Understanding Function)

Lecture 1.1: (Intro to Functions)
Lecture 1.2: (Examples using functions)
Lecture 1.3: (Type of function argument)

TOPIC 2: (Recursion)

Lecture 2.1: (Recursion in Python)
Lecture 2.2: (More examples on recursion)
Lecture 2.3: (Sorting Recursively)

MODULE 3: (While and for loops)

TOPIC 1: (Lambda Function)

Lecture 1.1: (Introduction to Lambda Functions)

Lecture 1.2: (Lambda Functions part 2)

TOPIC 2: (Datetime Module)

Lecture 2.1: (Introduction to Datetime Module)

Lecture 2.2: (Datetime Module Part 2)

TOPIC 3: (Handling TXT File)

Lecture 3.1: (R/W on txt Files)

Lecture 3.2: (Text File Handling)

MODULE 4: (Numpy and CSV files)

TOPIC 1: (All about Numpy)

Lecture 1.1: (Intro to Numpy)

Lecture 1.2: (Numpy part 1)

Lecture 1.3: (Numpy part 2)

TOPIC 2: (Handling CSV files)

Lecture 2.1: (Reading CSV files)

Lecture 2.2: (Why Pandas?)

MODULE 5: (Pandas Series and DataFrmae)

TOPIC 1: (Introduction to Pandas)

Lecture 1.1: (pandas part 1)

Lecture 1.2: (pandas part 2)

TOPIC 2: (Dataframe and Series)

Lecture 2.1: (Dataframe and Series)

TOPIC 3: (Data Viewing)

Lecture 3.1: (Data Viewing Part 1)

Lecture 3.2: (Data Viewing Part 2)

MODULE 6: (Data Handling and Manipulation)

TOPIC 1: (Missing Data Management)

Lecture 1.1: (Handling Missing Data)

TOPIC 2: (Statistical Operations)

Lecture 2.1: (Descriptive Stats using pandas)

TOPIC 3: (Data Merge and Group)

Lecture 3.1: (Data Merging)

Lecture 3.2: (Data Grouping)

Lecture 3.3: (Stack in pandas)

MODULE 7: (Data Handling and Manipulation)

TOPIC 1: (Pivot Table)

Lecture 1.1: (Pivot Table and Cut function)

TOPIC 2: (Date Time in Pandas)

Lecture 2.1: (DateTime part 1)

Lecture 2.2: (DateTime part 2)

TOPIC 3: (Categoricals and Different file types)

Lecture 3.1: (Categoricals in Pandas)

Lecture 3.2: (Reading and Writing different types of Files)