3rd Semester		Contact Hrs.			Marks			Credits
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext**	**Total**	
Departmental Elective-V		3	0	0	40	60	100	3
MCSCE1-382	Mobile Applications and Services							
MCSCE1-383	Compiler for HPC							
MCSCE1-384	Optimization Techniques							
Open Elective		3	0	0	40	60	100	3
MMECE0-F91	Industrial Safety							
MMECE0-F92	Operations Research							
MMECE0-F93	Cost Management of Engineering Projects							
MMECE0-F94	Composite Materials							
MMECE0-F95	Waste to Energy							
MCSCE1-308	Dissertation-I /Industrial Project	**0**	**0**	**16**	**60**	**40**	**100**	**10**
Total		**6**	**0**	**16**	**140**	**160**	**300**	**16**

Note:

1. **Students going for Industrial Project/Thesis will complete these courses through MOOCs.**
2. **Choose any one Open Course in the table for 3rd semester.**

4th Semester		Contact Hrs.			Marks			Credits
Code	**Course**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCSCE1-409	Dissertation II	0	0	32	60	40	100	16
Total		**0**	**0**	**32**				**16**

MOBILE APPLICATIONS AND SERVICES

Subject Code: MCSCE1-382 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

COURSE OBJECTIVES:

- This course presents the three main mobile platforms and their ecosystems, namely Android, iOS, and PhoneGap/WebOS.
- It explores emerging technologies and tools used to design and implement feature-rich mobile applications for smartphones and tablets
- It also take into account both the technical constraints relative to storage capacity, processing capacity, display screen, communication interfaces, and the user interface, context and profile

COURSE OUTCOMES: On completion of the course the student should be able to
CO1 Identify the target platform and users and be able to define and sketch a mobile application
CO2 Understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap
CO3 Design and develop a mobile application prototype in one of the platform (challenge project)

COURSE CONTENT:

UNIT-I (13 HRS.)

Introduction: Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User
More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider

UNIT-II (11 HRS)

Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony
Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics

UNIT-III (11 HRS)

Putting It All Together: Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android
Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia

UNIT-IV (10 HRS)

Platforms and Additional Issues: Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing, Security and Hacking, Active Transactions, More on Security, Hacking Android
Recent trends in Communication protocols for IOT nodes, mobile computing techniques in IOT, agents based communications in IOT

RECOMMENDED BOOKS:

1. Wei-Meng Lee, Beginning Android™ 4 Application Development, 2012 by John Wiley & Sons

COMPILER FOR HPC

Subject Code: MCSCE1-383 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

Course Objectives:
The objective of this course is to introduce structure of compilers and high performance compiler design for students. Concepts of cache coherence and parallel loops in compilers are included.

COURSE OUTCOMES:
After completion of course, students would be able to:
CO1: Familiar with the structure of compiler.
CO2: Parallel loops, data dependency and exception handling and debugging in compiler.

UNIT–I (11 Hrs)

High Performance Systems, Structure of a Compiler, Programming Language Features, Languages for High Performance.

Data Dependence: Data Dependence in Loops, Data Dependence in Conditionals, Data Dependence in Parallel Loops, Program Dependence Graph.

Scalar Analysis with Factored Use-Def Chains: Constructing Factored Use- Def Chains, FUD Chains for Arrays, Induction Variables Using FUD Chains, Constant Propagation with FUD Chains, Data Dependence for Scalars. Data Dependence Analysis for Arrays.

UNIT–II (12 Hrs.)

Array Region Analysis, Pointer Analysis, I/O Dependence, Procedure Calls, Inter-procedural Analysis.

Loop Restructuring: Simple Transformations, Loop Fusion, Loop Fission, Loop Reversal, Loop Interchanging, Loop Skewing, Linear Loop Transformations, Strip-Mining, Loop Tiling, Other Loop Transformations, and Inter-procedural Transformations.

Optimizing for Locality: Single Reference to Each Array, Multiple References, General Tiling, Fission and Fusion for Locality**.**

UNIT–III (11 Hrs.)

Concurrency Analysis: Concurrency from Sequential Loops, Concurrency from Parallel Loops, Nested Loops, Round off Error, Exceptions and Debuggers.

Vector Analysis: Vector Code, Vector Code from Sequential Loops, Vector Code from For all Loops, Nested Loops, Round off Error, Exceptions, and Debuggers, Multi-vector Computers.

UNIT – IV (11 Hrs.)

Message-Passing Machines: SIMD Machines, MIMD Machines, Data Layout, Parallel Code for Array Assignment, Remote Data Access, Automatic Data Layout, Multiple Array Assignments, Other Topics.

Scalable Shared-Memory Machines: Global Cache Coherence, Local Cache Coherence, Latency Tolerant Machines.

Recent trends in compiler design for high performance computing and message passing machines and scalable shared memory machine.

RECOMMENDED BOOKS:

1. Michael Wolfe, High-Performance Compilers for Parallel Computing, Pearson

OPTIMIZATION TECHNIQUES

Subject Code: MCSCE1-384 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

COURSE OBJECTIVES:

The objective of this course is to provide insight to the mathematical formulation of real world problems.

To optimize these mathematical problems using nature based algorithms. And the solution is useful especially for NP-Hard problems.

COURSE OUTCOMES:

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

CO1: Formulate optimization problems.

CO2: Understand and apply the concept of optimality criteria for various types of optimization problems.

CO3: Solve various constrained and unconstrained problems in Single variable as well as multivariable.

CO4: Apply the methods of optimization in real life situation.

UNIT-I (11 Hrs.)

Engineering application of Optimization, Formulation of design problems as mathematical programming problems.

General Structure of Optimization Algorithms, Constraints, The Feasible Region.

UNIT-II (11 Hrs.)

Branches of Mathematical Programming: Optimization using calculus, Graphical Optimization, Linear Programming, Quadratic Programming, Integer Programming, Semi Definite Programming.

UNIT-III (13 Hrs.)

Optimization Algorithms like Genetic Optimization, Particle Swarm Optimization, Ant Colony Optimization etc.

Real life Problems and their mathematical formulation as standard programming problems.

UNIT-IV (10 Hrs.)

Recent trends: Applications of ant colony optimization, genetics and linear and quadratic programming in real world applications.

RECOMMENDED BOOKS:

1. Laurence A. Wolsey (1998). Integer programming. Wiley. ISBN 978-0-471-28366-9.
2. Practical Optimization Algorithms and Engineering Applications Andreas Antoniou.
3. An Introduction to Optimization Edwin K., P. Chong & Stanislaw h. Zak.
4. Dimitris Bertsimas; Robert Weismantel (2005). Optimization over integers. Dynamic Ideas. ISBN 978-0-9759146-2-5.
5. John K. Karlof (2006). Integer programming: theory and practice.CRC Press. ISBN 978-0-8493- 1914-3.
6. H. Paul Williams (2009). Logic and Integer Programming. Springer. ISBN 978-0-387-92279-9.
7. Michael Jünger; Thomas M. Liebling; Denis Naddef; George Nemhauser; William R. Pulleyblank; Gerhard Reinelt; Giovanni Rinaldi; Laurence A. Wolsey, eds. (2009). 50 Years of Integer Programming 1958-2008: From the Early Years to the State-of-the- Art. Springer. ISBN 978-3- 540-68274-5.
8. Der-San Chen; Robert G. Batson; Yu Dang (2010). Applied Integer Programming: Modeling and Solution. John Wiley and Sons. ISBN 978-0-470-37306-4.

INDUSTRIAL SAFETY

Subject Code: MMECE0-F91 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

COURSE OBJECTIVES:

The objective of course is to provide insight to distributed database, normalization techniques and integrity rules. It also includes parallel database systems along with object oriented models.

COURSE OUTCOMES:

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

CO1: Understand relational database management systems, normalization to make efficient retrieval from database and query.

UNIT-I (12 Hrs.)

Introduction: Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department,

Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-II (11Hrs.)

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-III (11 Hrs.)

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-IV (11 Hrs.)

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

RECOMMENDED BOOKS:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

OPERATIONS RESEARCH

Subject Code: MMECE0-F92 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

COURSE OUTCOMES:
At the end of this course, students will be able to
CO1: Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
CO2: Students should able to apply the concept of non-linear programming
CO3: Students should able to carry out sensitivity analysis
CO4: Student should able to model the real world problem and simulate it.

UNIT-I (11 Hrs.)

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

UNIT-II (12 Hrs.)

Formulation of a LPP, Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming
Nonlinear programming problem, Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT-III (11 Hrs.)

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-IV (11 Hrs.)

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

RECOMMENDED BOOKS:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

COST MANAGEMENT OF ENGINEERING PROJECTS

Subject Code: MMECE0-F93 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

UNIT-I (11 Hrs.)

Introduction and Overview of the Strategic Cost Management Process
Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

UNIT-II (12 Hrs.)

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution

Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

UNIT-III (11 Hrs.)

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT-IV (11 Hrs.)

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory**.**

Recommended Books:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

COMPOSITE MATERIALS

Subject Code: MMECE0-F94 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

COURSE OBJECTIVES:
COURSE OUTCOMES:

UNIT-I (12 Hrs.)

Introduction: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT-II (11 Hrs.)

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT-III (11 Hrs.)

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT-IV (11 Hrs.)

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight

strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

RECOMMENDED BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

REFERENCES:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

WASTE TO ENERGY

Subject Code: MMECE0-F95 **L T P C** **Duration: 45 Hrs.**
3 0 0 3

COURSE OBJECTIVES:

COURSE OUTCOMES:

UNIT-I (12 Hrs.)

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT-II (11 Hrs.)

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-III (11 Hrs.)

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-IV (11 Hrs.)

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India**.**

RECOMMENDED BOOKS:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.