



MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY BATHINDA-151001 (PUNJAB), INDIA

(A State University Estb. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)

Department: **COMPUTER SCIENCE AND ENGINEERING**

Giani Zail Singh Campus College of Engineering & Technology, MRSPTU

Program: **B Tech Computer Science and Engineering**

COs, POs, PSOs Mapping

Subject: Programming for Problem Solving	Subject Code: BCSCE0-101	Semester: 2nd
Credit: 3	L T P 3 0 0	41 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To learn the basic terms related to programming and understand arithmetic expressions.				1		1						3	3		3
CO2	To understand the concept of arrays.	3		3		2									1	
CO3	To implement functions and recursion.		3		2						3				2	
CO4	To learn structure, pointers and file handling.	3			2									3		

Enter Correction levels 1, 2 or 3 as defined below:

1. Slight (Low)- upto 30%

2. Moderate (Medium) – above 30% and upto 70%

3. Substantial (High) – above 70%

Subject: Programming for Problem Solving Laboratory	Subject Code: BCSCE0-102	Semester: 2nd
Credit: 2	L T P 0 0 4	

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	To learn the basic terms related to programming and understand arithmetic expressions.				1		1							3	3		3
CO2	To understand the concept of arrays.	3		3		2										1	
CO3	To implement functions and recursion.		3		2						3					2	
CO4	To learn structure, pointers and file handling.	3			2										3		

Subject: Data Structure &Algorithm	Subject Code: BCSES1-302	Semester: 3rd
Credit: 4	L T P 3 1 0	60Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	For a given algorithm student will be able to analyze the algorithms to determine the time and computation complexity and justify the correctness.		3											1		
CO2	For a given Search problem (Linear Search and Binary Search) student will be able to implement it.				2									2		
CO3	For a given problem of Stacks, Queues and linked list student will be able to implement it and analyze the same to determine the time and computation complexity.				2									2		
CO4	Student will be able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, QuickSort, Merge Sort, Heap Sort and compare their performance in terms of Space and Time complexity.		3	3												3

Subject: DIGITAL ELECTRONICS	Subject Code: BCSES1-303	Semester: 3rd
Credit: 4	L T P 3 1 0	60Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand working of logic families and logic gates.	3				2							3	3	2	3
CO2	Design and implement Combinational and Sequential logic circuits.	3		3		3							3	3	2	2
CO3	Understand the process of Analog to Digital conversion and Digital to Analog conversion.	3	2			3		1			3		3	3	1	1
CO4	Be able to use PLDs to implement the given logical problem.	2		3	3								3	3	2	2

Subject: DATA STRUCTURE & ALGORITHMS LABORATORY	Subject Code: BCSES1-304	Semester: 3rd
Credit: 2	L T P 0 0 4	

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To introduce the basic concepts of Data structure, basic data types, searching and sorting based on array data types.	1												2		
CO2	To introduce the structured data types like Stacks and Queue and its basic operation's implementation	1													2	
CO3	To introduce dynamic implementation of linked list				3	2									2	1
CO4	To introduce the concepts of Tree and graph and implementation of traversal algorithms.				3	2									2	

Subject: DIGITAL ELECTRONICS LABORATORY	Subject Code: BCSES1-305	Semester: 3rd
Credit: 1	L T P 0 0 2	

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To Familiarization with Digital Trainer Kit and associated equipment.	3	3	1	1	3	1						3	3	2	3
CO2	To Study and design of TTL gates	3	3	3	3	2					3		3	3	1	2
CO3	To learn the formal procedures for the analysis and design of combinational circuits.	3	3	3	2	3					3		3	3	2	2
CO4	To learn the formal procedures for the analysis and design of sequential circuits	3	3	3	2	3					3		3	3	2	2

Subject: COMPUTER ORGANIZATION & ARCHITECTURE	Subject Code: BCSES1-401	Semester: 4th
Credit: 3	L T P 3 0 0	45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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CO1	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.	3	3	1	1	3	1						3	3	2	3
CO2	Write assembly language program for specified microprocessor for computing 16-bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).	3	3	3	3	2					3		3	3	1	2
CO3	Write a flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.	3	3	3	2	3					3		3	3	2	2
CO4	To learn the formal procedures for the analysis and design of sequential circuits	3	3	3	2	3					3		3	3	2	2

Subject: OPERATING SYSTEMS	Subject Code: BCSES1-402	Semester: 4th
Credit: 4	L T P 3 1 0	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Create processes and threads.	1				1								1	2	
CO2	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time	1	3			1								1	3	
CO3	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.	2	3			1		1						2	2	
CO4	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.	3	2			1		2						1	3	

Subject: OBJECT ORIENTED PROGRAMMING	Subject Code: BCSES1-403	Semester: 4th
Credit: 4	L T P 3 1 0	60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To introduce the basic concepts of object-oriented	1												1		

Subject: Formal languages and Automata Theory	Subject Code: BCSES1-503	Semester: 5th
Credit: 3	L T P <u>3 1 0</u>	Duration: 45 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Design finite automata to accept a set of strings of a language.	3	3	3	2	x	x	x	x	1	x	x	2	x	1	x
CO2	Design context free grammars to generate strings of context free language.	3	3	3	2	x	x	x	x	x	x	1	2	x	1	x
CO3	Design Turing machine for accepting context sensitive languages.	3	3	3	2	x	x	x	x	x	x	1	2	x	1	x
CO4	To learn Rice's theorem.	1	x	x	x	x	x	x	x	x	x	x	2	x	x	1

Subject: Design & Analysis of Algorithms	Subject Code: BCSES1-504	Semester: 5th
Credit: 4	L T P <u>3 1 0</u>	Duration: 60 Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	For a given algorithms analyze worst-case running times of algorithms based on asymptoticanalysis and justify the correctness of algorithms..		2											1		
CO2	Describe the greedy paradigm and explain when an algorithmic design situation calls for it.			1	2										2	
CO3	Describe the different graph and tree traversal algorithms.	1													1	
CO4	Describe the computability of problem using Cook's theorem.					1										1

Subject: DATABASE MANAGEMENT SYSTEM LABORATORY	Subject Code: BCSES1-505	Semester: 5th
Credit: 2	L T P <u>0 0 4</u>	

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To understand basic DDL, DML, DCL commands	2				1									2	
CO2	To understand the SQL queries using SQL operators					3									2	
CO3	To understand the concept of relational algebra, date and group functions	1				2									2	
CO4	To implement checkpoints.					3									2	

Subject: DESIGN & ANALYSIS OF ALGORITHMS LABORATORY	Subject Code: BCSES1-506	Semester: 5th
Credit: 1	L T P 0 0 2	

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To perform different operations on integers.		2											1		
CO2	To sort number of elements of an array using different sorting techniques.			1	2										2	
CO3	To implement dynamic programming for various problems.	1													1	
CO4	To compute convex hull.					1										1

Subject: COMPUTER GRAPHICS	Subject Code: BCSED1-511	Semester: 5th
Credit: 3	L T P 3 0 0	Hours: 45

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Able to learn about the basics of graphics, its applications, uses and Knowledge to draw different shapes in graphics on computer.	3	x	x	x	x	x	x	x	x	x	x	2	1	x	x
CO2	Ability to apply different 2-D and 3-D transformations on an object.	3	2	3	x	x	x	x	x	x	x	x	2	x	1	x
CO3	Learn clipping operations and various object filling techniques, different projection techniques. Various hidden surface removal	2	2	1	x	x	x	x	x	x	x	x	1	1	x	x
CO4	Knowledge of Rendering techniques, Fractals and different colour models.	2	x	x	2	2	x	x	x	x	x	x	2	x	1	x

Subject: GRAPH THEORY	Subject Code: BCSED1-512	Semester: 5th
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Credit: 3	L T P 3 0 0	Hours: 45
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COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To have knowledge of the basic concepts of graph	3	3	2	1	1	x	x	x	x	1	x	x	1	x	x
CO2	To have a knowledge of classes of graphs and its properties.	3	3	2	x	x	x	x	x	x	x	x	1	1	x	x
CO3	To have knowledge of graph algorithms.	2	3	1	1	x	x	x	x	x	x	x	x	1	x	x
CO4	Be exposed to constrained and unconstrained optimization techniques	1	x	1	x	x	x	x	x	x	x	x	1	x	x	1

Subject: WEB TECHNOLOGIES	Subject Code: BCSED1-513	Semester: 5th
Credit: 3	L T P 3 0 0	Hours: 45

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To understand the HTML and Style Sheets	3		3		3					2		3	3	3	3
CO2	To have knowledge of client-side scripting using JSP	3	3				3		2	2	3		3	3	3	2
CO3	To understand the basics and object-oriented concepts of PHP.	3	3		2	1						1	3	3	3	2
CO4	To access database using PHP programming.	3	1	2	2	2	1		2	2	2	2	3	3	3	3

Subject: JAVA PROGRAMMING	Subject Code: BCSED1-514	Semester: 5th
Credit: 3	L T P 3 0 0	Hours: 45

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To learn the basics of Java and to understand the implementation of Classes and Inheritance with respect to Java.	2												1	1	
CO2	To describe the concept of handling of exceptions and multithreading.	2												2		
CO3	To understand how to implement I/O, Applets and Graphics in Java		2	3											2	
CO4	To comprehend the advanced topics of Java Programming	2		2										1		

Subject: SOFTWARE ENGINEERING	Subject Code: BCSES1-601	Semester: 6th
Credit: 3	L T P 3 0 0	Hours: 45

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To study how software engineering principles evolve and to analyse the various software models that can be followed to develop software.	2												1	1	
CO2	To understand the software analysis and design step of software development	2												2		
CO3	To study coding, testing and reliability of a software.		2	3											2	
CO4	To highlight the various management activities and related terms of a software.	2		2										1		

Subject: COMPUTER NETWORKS	Subject Code: BCSES1-602	Semester: 6th
Credit: 4	L T P 3 1 0	Hours: 60

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Explain the functions of the different layer of the OSI Protocol.	3				2		2			1		1	1		
CO2	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				1		1		2	1		1	2	1	
CO3	For a given problem related TCP/IP protocol developed the network programming.	3				2	2				1		1	2	1	
CO4	Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.	3				3	3				1		1	1		1

Subject: COMPUTER NETWORKS LABORATORY	Subject Code: BCSES1-603	Semester: 6th
Credit: 1	L T P 0 0 2	

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Explain the functions of the different layer of the OSI Protocol.	3		1							3			1		

CO2	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	1			3								1	2	
CO3	For a given problem related TCP/IP protocol developed the network programming.	3	2		3									1		3
CO4	Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW,HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.	3	1						3					1	2	1

Subject: MACHINE LEARNING	Subject Code: BCSED1-612	Semester: 6th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To learn the concept of learning algorithm	2	x	1	2	2	x	x	x	x	x	x	2	1	x	x
CO2	To learn representation of decision trees.	x	x	3	1	1	x	x	x	x	x	x	2	1	x	x
CO3	To learn unsupervised learning.	x	x	1	2	1	x	x	x	x	x	x	2	1	x	x
CO4	To learn about SVMs.	x	x	1	2	1	x	x	x	x	x	x	2	1	x	x

Subject: DISTRIBUTED SYSTEMS	Subject Code: BCSED1-613	Semester: 6th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To learn architecture of DDBS.	1	2											3		
CO2	To learn different design strategies and query processing		2												2	
CO3	To Optimize Distributed queries.					2									2	
CO4	To learn reliability issues.						2							2		

Subject: SIGNALS AND SYSTEMS	Subject Code: BCSED1-614	Semester: 6th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Analyze the properties of signals & systems and	3			1	3					3		3	3	1	1

	representation in time and frequency domain.															
CO2	Classify systems based on their properties and determine the response of LSI system.	3	2		1	3					3		3	2		1
CO3	Apply random signal theory and understand various types of noise.	3		1	3	1							3	1		1
CO4	Understand the process of sampling and reconstruction.	3	3		2								3	2	1	2

Subject: DATA MINING	Subject Code: BCSED1-621	Semester: 6th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To introduce the basic concepts of Data Mining techniques.		2											2		
CO2	To have knowledge of decision trees and algorithms used for it.		1			3									3	
CO3	To learn the concept of search engines.		1			3								2		
CO4	To understand web mining.		1											2		

Subject: CLOUD COMPUTING	Subject Code: BCSED1-622	Semester: 6th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To learn basic terms used in cloud computing and its benefits.	2	2	x	x	x	x	x	x	x	x	x	2	1	x	x
CO2	To learn architecture of Hadoop	2	1	2	1	x	x	x	x	x	x	x	2	1	x	x
CO3	To implement cloud security.	2	x	x	1	x	x	x	1	x	x	x	1	x	1	x
CO4	To manage services provided by cloud.	2	1	x	x	x	x	x	x	x	1	x	1	x	x	1

Subject: PARALLEL PROCESSING	Subject Code: BCSED1-623	Semester: 6th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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	roles in building intelligent machines															
CO2	To have knowledge of neural networks-I	1				1								1		
CO3	To have knowledge of neural networks-II.	1				1								1		
CO4	To learn the concepts of genetic algorithms.	1			1									1		

Subject: HUMAN COMPUTER INTERACTION	Subject Code: BCSED1-713	Semester: 7th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To have knowledge of task centred systems design	2					1						1	1		
CO2	Understand the fundamental aspects of designing and evaluating interfaces			2	1		1							1	1	
CO3	To understand different design principles			2	1		1							1		
CO4	To learn different HCI design standards.			2	1									1		

Subject: Ad-hoc and SENSOR NETWORKS	Subject Code: BCSED1-714	Semester: 7th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To be able to learn wireless technologies.	2		3		1								2		
CO2	To be able to learn different protocols for ad-hoc networks.	3			3	1								2	1	
CO3	To learn different routing algorithms used for ad-hoc networks.	2		1		1								2	1	
CO4	To learn how to synchronize network nodes.	2		1		1								2	1	

Subject: BIOINFORMATICS	Subject Code: BCSED1-721	Semester: 7th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To learn basic concepts of bioinformatics.		2											1	2	
CO2	To learn different motif models.	1		2										1	2	
CO3	To learn the concept of genomics.	1	2			3								1	2	

CO4	To analyse DNA data.		2	2		1									1	
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Subject: IMAGE PROCESSING	Subject Code: BCSED1-722	Semester: 7th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To give introduction of image processing.	1												3		
CO2	To understand image enhancement.		2											3	1	
CO3	To have knowledge of image Compression Redundancy models		3	2										2		
CO4	To have knowledge of Image Segmentation.		2										1	2		

Subject: CRYPTOGRAPHY & NETWORK SECURITY	Subject Code: BCSED1-723	Semester: 7th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	To understand security trends.	3									3			2	2	1
CO2	To implement various cryptographic algorithms.	1		2	1				3					2	3	
CO3	To implement public key cryptography.	1			1				3					2	3	
CO4	To implement IP Security.	1			3	2	3						3	2	3	1

Subject: ARTIFICIAL INTELLIGENCE	Subject Code: BCSED1-724	Semester: 7th
Credit: 3	L T P 3 0 0	45Hrs.

COs	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Understand the concept of Artificial intelligence, problem solving and various types of search strategies.	2	2	1	x	x	x	x	x	2	2	1	3	1	x	x
CO2	Understand the concept of Knowledge base, knowledge representation, AI languages & tools and various planning techniques.	1	2	1	1	1	x	x	x	1	2	1	2	1	x	x
CO3	Identify uncertainty and understand fuzzy logic concept to	1	2	1	1	1	x	x	x	1	2	x	2	x	1	x

	manage and deliver qualified product and plan the activities within time schedules with CPM and PERT Analysis.														
CO2	For managing the quality of product and managing the risk involved					1		1							1
CO3	Managing team and measuring and tracking the planning								2		2				1
CO4	To learn Configuration management and project monitoring and control										1	1	1		