Academic Programme Guide

Bachelor of Technology
(Computer Science & Engineering)
(B.Tech. CSE)

Session: 2021-22

Department of Computer Science & Engineering

BRCM

College of Engineering & Technology

Vision and Mission of the Department

Vision

To be a Model in Quality Education for producing highly talented and globally recognizable students with sound ethics, latest knowledge, and innovative ideas in Computer Science & Engineering.

MISSION

To be a Model in Quality Education by

M1: Imparting good sound theoretical basis and wide-ranging practical experience to the Students for fulfilling the upcoming needs of the Society in the various fields of Computer Science & Engineering.

M2: Offering the Students an overall background suitable for making a Successful career in Industry/Research/Higher Education in India and abroad.

M3: Providing opportunity to the Students for Learning beyond Curriculum and improving Communication Skills.

M4: Engaging Students in Learning, Understanding and Applying Novel Ideas.

Program Specific Outcomes (PSO)

At the end of the program, the student

PSO1: Should be able to apply the Concepts of Mathematics, Algorithms, Data Structures, Programming Languages, Databases, Multimedia, Operating Systems, Computer Networks, Computer Architecture, Big Data Analysis, Artificial Intelligence and Machine Learning to solve computation tasks and develop applications of varying complexity.

PSO2: Should be able to understand and make a contribution in the areas of Computer Science & Engineering through the design & planning of Software based real-world applications and also demonstrate professional ethics & concern for social well-being.

Program Educational Objectives (PEO)

After 3-5 years our graduates will be:

PEO1: Have a successful carrier in Industry, Government, or other working environments as a Computer Engineer with an ability to solve a wide range of real life problems.

PEO2: Exhibit Good communication skills, Ethical conduct and sense of responsibility to serve the society and protect the environment.

PEO3: Be knowledgeable, inspired and a valued professional in the different working surroundings.

Program Outcomes (PO) as defined by NBA

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of theinformation to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant tothe professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and needfor sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B.Tech. (Computer Science and Engineering)

Common with B.Tech. (Information Technology) &

B.Tech. (Computer Science and Information Technology)

Scheme of Studies/Examination w.e.f. 2020-21

SEMESTER- 3

Sr. No.	Course Code	Course Title	Hours per week			Tot al Con tact Hrs. per week	Cr e dit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	The ory	Pra ctic al	Tot al	
1	PCC-CSE-201G	Database Management Systems	3	0	0	3	3	25	75		100	3
2	PCC-CSE-203G	Data Structures & Algorithms	3	0	0	3	3	25	75		100	3
3	ESC-CSE-205G	Digital Electronics	3	0	0	3	3	25	75		100	3
4	PCC-CSE-207G	Python Programming	3	0	0	3	3	25	75		100	3
5	BSC-MATH -203G	Mathematics - III (Multivariable Calculus and Differential Equations)	2	0	0	2	2	25	75		100	3
6	HSMC-01G	Economics for Engineers	3	0	0	3	3	25	75		100	3
7	LC-CSE-209G	Database Management Systems LAB	0	0	3	3	1.5	25		25	50	3
8	LC-ESC-211G	Digital Electronics LAB	0	0	3	3	1.5	25		25	50	3
9	LC-CSE-213G	Data Structures & Algorithms LAB Using C	0	0	3	3	1.5	25		25	50	3
10	LC-CSE-215G	Python Programming LAB	0	0	3	3	1.5	25		25	50	3
						Total	23				800	

Database Management Systems (PCC-CSE-201G)

Course code	PCC-CSE-201G				
Category	Professional Core Course				
Course title	Database Management System				
Scheme and Credits	L	T	P	Credits	Semester 3
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Credits 03 **L T P**
3 0 0

Class Work: 25 Marks
Semester Exam: 75 Marks

Syllabus

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT: 1
Data base system architecture: 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, data manipulation operations.
UNIT: 2
Relational query languages : Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS-MYSQL, ORACLE, DB2, SQL server.
Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Loss less design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.
UNIT: 3
Storage strategies: Indices, B trees, hashing, Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and time stamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

UNIT: 4
Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. Advanced topics : Object oriented and object relational databases, Logical databases, Web data bases, Distributed databases, Data warehousing and data mining.

SUGGESTEDBOOKS:

- "Database System Concepts", 6th Edition by Abraham Silberschatz, HenryF.Korth, S.Sudarshan, McGraw-Hill.

SUGGESTEDREFERENCEBOOKS

- "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

- "Fundamentals of Database Systems",5th Edition by R.Elmasri and S.Navathe, Pearson Education
- Foundations of Databases", Reprint by SergeAbiteboul, Richard Hull,Victor Vianu, Addison-Wesley

Course Outcomes (CO) & CO-PO Mapping

Course Database Management Systems
Course Code: PEC-CSE-201G

CO (Course Outcomes)		Principal PO	Revised Bloom's Taxonomy
CO1	To **Describe** the concepts of DBMS Architecture and database objects and their Applications.	PO1	L2(Understand)
CO2	To **Summarize** transaction processing, concurrency control and database recovery protocols in databases.	PO3	L2(Understand)
CO3	To **Apply** Relational algebra operation & Structured Query Language (SQL) for database manipulation.	PO2	L3(Apply)
CO4	To **Apply** normalization algorithms using database design theory for different applications.	PO2	L3(Apply)
CO5	To **Design** Relational database systems for different applications to interact with databases.	PO3	L4(Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	1
CO2	2	3	2									1	3	2
CO3	2	2	3	2								1	2	1
CO4	2	2		2								1	2	2
CO5	1	2	3	2								1	1	1

Data Structure & Algorithms
(PCC-CSE-203G)

Course code	PCC-CSE-203G				
Category	Professional Core Course				
Course title	Data Structure & Algorithms				
Scheme and Credits	L	T	P	Credits	Semester 3
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Credits 03 **L T P**
3 0 0

Class Work: 25 Marks
Semester Exam: 75 Marks

Syllabus

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT1:

Introduction: Basic Terminologies: Concept of Data Structure, Choice of right Data Structure, Algorithms, how to design and develop algorithm, Complexity of algorithm. Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

UNIT2:

Stacks and Queues: Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: ExpressionConversionandevaluation-correspondingalgorithmsandcomplexity analysis. queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

UNIT3:

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, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.

UNIT4:

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Selection Sort Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis. Minimum Spanning Tree: Kruskal's Algorithm, Prim's Algorithm.

SUGGESTEDBOOKS:

"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

SUGGESTEDREFERENCEBOOKS:

Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by MarkAllen Weiss, Addison-Wesley Publishing Company

"How to Solve it by Computer",2nd Impression by R.G.Dromey, Pearson Education.

Course Outcomes (CO) & CO-PO Mapping

Course: Data Structure & Algorithms
Course Code: PCC-CSE-203G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Explain** the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.	L1(Remember)
CO2	To **Describe** insertion, deletion and traversing operations on Data Structures.	L2(Understand)
CO3	To **Solve** problems using Algorithms such as the sorting, searching and hashing.	L3(Apply)
CO4	To **Solve** Problems using Data Structures such as Lists, Graphs, Queues.	L3(Apply)
CO5	To **Design** programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.	L6(Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											1	3	3
CO2	2	3										1	3	2
CO3	2	2	3									1	3	2
CO4	2		3									1	3	2
CO5	2	2	3	1								1	3	2

Digital Electronics
(ESC-CSE-205G)

Course code	PCC-CSE-205G				
Category	Professional Core Course				
Course title	Digital Electronics				
Scheme and Credits	L	T	P	Credits	Semester 3
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Credits 03 **L T P**
3 0 0

Class Work: 25 Marks
Semester Exam: 75 Marks

Syllabus

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

UNIT1:

FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes.

UNIT2:

COMBINATIONAL DIGITAL CIRCUITS: Standard representation for logic functions, K-map representation and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De Multiplexer/ Decoders, Adders, Sub tractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design ,popular MSI chips, digital comparator, parity checker/generator,codeconverters,priorityencoders,decoders/drivers for display devices, Q-M method of function realization.

UNIT3:

SEQUENTIAL CIRCUITS AND SYSTEMS: A1-bitmemory, the circuit properties of Bit table 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.

UNIT4:

A/D AND D/A CONVERTERS: Digital to analog converters: weighted resistor/ converter,R-2R Ladder D/A converter, specificationsforD/Aconverters,examplesofD/AconverterlCs,sampleandholdcircuit, Analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter

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),RO PLD, ,Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array(FPGA).

REFERENCES:

1. R. P. Jain, "Modern Digital Electronics", Mc Graw 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.
4. Nasib Singh Gill and J B Dixit, “Digital Design and Computer Organization”, University Science Press, New Delhi

Course Outcomes (CO) & CO-PO Mapping

Course: Digital Electronics
Course Code: ESC-CSE-205G

CO (Course Outcomes)		RBT*- Revised Bloom’s Taxonomy
CO1	To **Recall** the basics of Digital Electronics	L1 (Remember)
CO2	To **Summarize** the minimization techniques of Digital Circuits.	L2 (Understand)
CO3	To **Apply** the working mechanism and design guidelines of different combinational, and sequential circuits.	L3 (Apply)
CO4	To **Analyze** different types of Digital Electronic circuits using various Matrices and mathematical methods.	L4 (Analyze)
CO5	To **Design** different types of Digital Circuits.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	2
CO2	3	2										1	3	2
CO3	2	2	3									1	2	2
CO4	2	2	3									1	2	2
CO5	2	2	3									1	1	1

Python Programming (PCC-CSE-207G)

Course code	PCC-CSE-207G				
Category	Professional Core Course				
Course title	Python Programming				
Scheme and Credits	L	T	P	Credits	Semester 3
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Credits 03 **L T P**
3 0 0

Class Work: 25 Marks
Semester Exam: 75 Marks

Syllabus

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit: 1
Introduction: Installing Python; basic syntax, interactive shell, editing, saving, and running a script; data types; variables, assignments; numerical types; arithmetic operators and expressions; Loops and selection statements, Control statements, String manipulations: subscript operator, indexing, slicing a string; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file

Unit: 2
Lists, dictionary and Design with functions: Basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding, and removing keys, accessing and replacing values; traversing dictionaries. Hiding redundancy, complexity; arguments and return values; Program structure and design. Recursive functions.

Unit: 3
Simple graphics and image processing: Simple graphics, Turtle operations, manipulating turtle screen, drawing two dimensional shapes, examining an object attributes, taking a random walk, Color and RGB scheme, Image processing: Image manipulation operations, properties of images, image module, copying, blurring and reducing image. Graphical User Interfaces: Terminal based and GUI based programs, Simple GUI-Based Programs, Windows and Window Components, Input and Output with Entry Fields, Defining and Using Instance Variables, Other Useful GUI Resources.

Unit: 4
Object Oriented concepts: Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modelling; persistent storage of objects, Inheritance, polymorphism, operator overloading; abstract classes; exception handling, try block. Multithreading: Threads and Processes, Sleeping Threads,

Producer, Consumer, and Synchronization, The Readers and Writers Problem, Shared Cell Class, Thread-Safe Class

Suggested books:

- "Fundamentals of Python: First Programs" Kenneth Lambert, Course Technology, Cengage Learning, 2012

Suggested reference books

- "Introduction to Computer Science Using Python: A Computational Problem-Solving Focus", By Charles Dierbach, John Wiley & Sons, December 2012.

Course Outcomes (CO) & CO-PO Mapping

Course: Python Programming
Course Code: PCC-CSE-207G

CO (Course Outcomes)		Principal PO	Revised Bloom's Taxonomy
CO1	To **Define** the basic concepts of Python programming.	PO1	L1 (Remember)
CO2	To **Explain** the string manipulation and text files of Python programming.	PO2	L2 (Understand)
CO3	To **Apply** various Lists, Dictionaries and Functions used in Python language.	PO3	L3 (Apply)
CO4	To **Analyze** Object-Oriented aspects in Python programming such as inheritance, polymorphism etc.	PO3	L3 (Apply)
CO5	To **Design** and plan software solutions to problems using an object-oriented strategy.	PO3	L6 (Create)

CO PO Mapping

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	3
CO2	2	3										1	2	2
CO3	2	2	3									1	2	2
CO4	2	2	3	2								1	2	1
CO5	2		3									1	1	1

Mathematics-III (Multivariable Calculus and Differential Equations)

Course code	BSC-MATH-203G				
Category	Basic Science Course				
Course title	Mathematics-III (Multivariable Calculus and Differential Equations)				
Scheme and Credits	L	T	P	Credits	Semester 3
	2	0		2	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Credits 02 **L T P**
2 0 0

Class Work: 25 Marks
Semester Exam: 75 Marks

Syllabus

UNIT-I

Multivariable Differential Calculus: Limit, Continuity and Partial derivatives, Homogeneous functions, Euler's Theorem, Total derivative, Maxima, Minima and Saddle points, Lagrange's method of undetermined multipliers

UNIT-II

Multivariable Integral Calculus: Double integral, Change of order of integration, Change of variables, Applications of double integral to find area enclosed by plane curves, Triple integral

UNIT-III

Ordinary Differential Equations of first order: Linear and Bernoulli's equations, Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order and first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories

UNIT-IV

Ordinary Differential equations of second and higher order: Linear differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations, Simultaneous linear differential equations with constant coefficients, Applications of linear differential equations to oscillatory electric circuits

REFERENCE BOOKS:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company

Limited.
4. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
5. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
6. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary ValueProblems,Wiley India.
7. S. L. Ross, Differential Equations, Wiley India.
8. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India.
9. E. L. Ince, Ordinary Differential Equations, Dover Publications

Course Outcomes (CO) & CO-PO Mapping

Course: Math-III (Multivariable Calculus, Differential Equations)
Course Code: BSC-MATH-203G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** The mathematical tools needed in evaluating multiple integrals and their usage.	L1(Remember)
CO2	To **Understand** the effective mathematical tools for the solutions of differential equations that model physical processes.	L2(Understand)
CO3	To **Apply** the tools of differentiation and integration of functions that are used in various techniques dealing engineering problems.	L3(Apply)
CO4	To **Analyze** how to deal with functions of several variables that are essential in most branches of engineering.	L4(Analyze)
CO5	To **Evaluate/solve** the mathematical problems related to multivariable differentiation and integration.	L5(Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	3
CO2	3	2										1	3	3
CO3	2	3										1	3	3
CO4	2	3										1	2	3
CO5	2	3										1	3	2

ECONOMICS FOR ENGINEERS

Course code	HSMC- 01G				
Category	Humanities and Social Sciences including Management courses				
Course title	Economics For Engineers				
Scheme and Credits	L	T	P	Credits	Semester 3
	3	0	0	3	
Branches (B. Tech.)	Common For All Branches				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Credits 03 **L T P**
3 0 0

Class Work: 25 Marks
Semester Exam: 75 Marks

UNIT-1

Definition of Economics- Various definitions, types of economics- Micro and Macro Economics, nature of economic problem, Production Possibility Curve, Economic laws and their nature, Relationship between Science, Engineering, Technology and Economic Development.

Demand- Meaning of Demand, Law of Demand, Elasticity of Demand- meaning, factors effecting it,its practical application and importance,

UNIT 2

Production- Meaning of Production and factors of production, Law of variable proportions, and Returns to scale, Internal external economies and diseconomies of scale. Various concepts of costof production- Fixed cost, Variable cost, Money cost, Real cost, Accounting cost, Marginal cost, Opportunity cost. Shape of Average cost, Marginal cost, Total cost etc. in short run and long run.

UNIT-3

Market- Meaning of Market, Types of Market- Perfect Competition, Monopoly,Monopolistic Competition and Oligopoly (main features).Supply- Supply and law of supply, Role of demand & supply in price determination and effect ofchanges in demand and supply on prices.

UNIT-4

Indian Economy- Nature and characteristics of Indian economy as under developed, developing and mixed economy (brief and elementary introduction), Privatization - meaning, merits and demerits.

Globalization of Indian economy - merits and demerits.

Banking- Concept of a Bank, Commercial Bank- functions, Central Bank- functions, Difference between Commercial & Central Bank.

REFERENCES:

1.Jain T.R.,Economics for Engineers,VKPublication.

2.ChopraP.N.,PrincipleofEconomics,KalyaniPublishers.

3.DewettK.K.,Moderneconomictheory,S.Chand.

4.H.L.Ahuja.,Moderneconomictheory,S.Chand.

5.DuttRudar&SundhramK.P.M.,IndianEconomy.

6.MishraS.K.,ModernMicroEconomics,PragatiPublications.

7.SinghJaswinder,ManagerialEconomics,dreamtechpress.

8.ATextBookofEconomicTheoryStonierandHague(Longman'sLandon

).9.MicroEconomicTheory–M.L.Jhingan(S.Chand).

10. MicroEconomicTheory-H.L.Ahuja(S.Chand).

11.ModernMicroEconomics:S.K.Mishra(PragatiPublications).

12.EconomicTheory-A.B.N.Kulkarni&A.B.Kalkundrikar(R.Chand& Co).

Course: Economics for Engineers
Course Code: HSMC-01G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the Basics of Economic Theories terminology, Cost concepts and Pricing Policies Used in Engineering Economics.	L1 (Remember)
CO2	To **Summarize** the measures of national income, the functions of banks and concepts of globalization.	L2 (Understand)
CO3	To **Discuss** how supply and demand change when a product's price changes.	L2 (Understand)
CO4	To **Use** the Concept of Demand to explain the Outcomes of markets for individuals firms and society.	L4 (Analyze)
CO5	To **Analyze** how a change in price and income affects the behavior of buyers and sellers.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1						3					2	1	1	2
CO2						2			3		2	1	1	2
CO3						3					3	1	1	2
CO4						3					2	1	3	2
CO5						3			2		2	1	3	1

Database Management System Lab

Course code	LC-CSE-209G				
Category	Professional Core Course				
Course title	Database Management System Lab				
Scheme and Credits	L	T	P	Credits	Semester 3
	0	0	3	1.5	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

CONTENTS:

i. Creation of a database and writing SQL queries to retrieve information from the database.

ii. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records basedon conditions.

iii. Creation of Views, Synonyms, Sequence, Indexes, Save point.

iv. Creating an Employee database to set various constraints.

v. Creating relationship between the databases.

vi. Study of PL/SQL block.

vii. Write a PL/SQL block to satisfy some conditions by accepting input from the user.

viii. Write a PL/SQL block that handles all types of exceptions.

ix. Creation of Procedures.

x. Creation of database triggers and functions

xi. Mini project (Application Development using Oracle/ MySQL)

a) Inventory Control System

b) Material Requirement Processing.

c) Hospital Management System.

d) Railway Reservation System.

e) Personal Information System.

f) Web Based User Identification System.

g) Time Table Management System.

h) Hotel Management

Course: Data base Management Systems LAB
Course Code: LC-CSE-209G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **List** of various of SQL Command	L2(Understand)
CO2	To **Demonstrate** SQL queries using SQL operators.	L2(Understand)
CO3	To **Create** a database by using data definition, data manipulation and control languages.	L6 (Create)
CO4	To **Create** a Database application and retrieve the values with the help of queries using SQL.	L6 (Create)
CO5	To **Create** views, cursor and triggers.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	1
CO2	2	3	2		2							1	3	2
CO3	2	2	3	2	2							1	2	1
CO4	2	2		2	2							1	2	2
CO5	2	2	3	2	2							1	1	1

Digital Electronics Lab

Course code	LC-CSE-211G				
Category	Professional Core Course				
Course title	Digital Electronics Lab				
Scheme and Credits	L	T	P	Credits	Semester-3
	0	0	3	1.5	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

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.
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.
7. Demultiplexer: Truth-table verification and realization of Half subtractor and Full subtractor.
8. Flip Flops: Truth-table verification of JK Master Slave FF, T-type and D-type FF.
9. Asynchronous Counter: Realization of 4-bit up counter and Mod-N counter.
10. Synchronous Counter: Realization of 4-bit up/down counter and Mod-N counter.
11. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO & Shift left operations.
12. DAC Operation: Study of 8-bit DAC , obtain staircase waveform.
13. ADC Operations: Study of 8-bit ADC

Course: Digital Electronics LAB
Course Code: LC-ESC-211G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To Recall the basic knowledge about measuring instrument and kit.	L1 (Remember)
CO2	To Explain the asynchronous, synchronous digital circuit and Flip-Flop conversion. Also basic knowledge about TTL and Flip- Flop Gates.	L2 (Understand)
CO3	To Analyze the function using k-maps and operation of shift register	L4 (Analyze)
CO4	To Verify the operation of Multiplexer, Demultiplxer & counter.	L6 (Create)
CO5	To Design counter and seven segment display unit.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	1
CO2	2	3	2		2							1	3	2
CO3	2	2	3	2	2							1	2	1
CO4	2	2		2	2							1	2	2
CO5	2	2	3	2	2							1	1	1

Data Structures and Algorithms Lab Using C

Course code	LC-CSE-213G				
Category	Professional Core Course				
Course title	Data Structures and Algorithms Lab Using C				
Scheme and Credits	L	T	P	Credits	Semester-3
	0	0	3	1.5	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Data Structures Lab List of practical exercises, to be implemented in C Language.

1. Write a menu driven program that implements following operations (using separate functions) on a linear array:
    - Insert a new element at end as well as at a given position
    - Delete an element from a given whose value is given or whose position is given
    - To find the location of a given element
    - To display the elements of the linear array
2. Write a menu driven program that maintains a linear linked list whose elements are storedin on ascending order and implements the following operations (using separate functions):
    - Insert a new element
    - Delete an existing element
    - Search an element
    - Display all the elements
3. Write a program to demonstrate the use of stack (implemented using linear array) in converting arithmetic expression from infix notation to postfix notation.
4. Program to demonstrate the use of stack (implemented using linear linked lists) in evaluating arithmetic expression in postfix notation.
5. Program to demonstration the implementation of various operations on a linear queue represented using a linear array.
6. Program to demonstration the implementation of various operations on a circular queue represented using a linear array.
7. Program to demonstration the implementation of various operations on a queue represented using a linear linked list (linked queue).
8. Program to illustrate the implementation of different operations on a binary search tree.

9. Program to illustrate the traversal of graph using breadth-first search
10. Program to illustrate the traversal of graph using depth-first search.
11. Program to sort an array of integers in ascending order using bubble sort.
12. Program to sort an array of integers in ascending order using selection sort.
13. Program to sort an array of integers in ascending order using insertion sort.
14. Program to sort an array of integers in ascending order using radix sort.
15. Program to sort an array of integers in ascending order using merge sort.
16. Program to sort an array of integers in ascending order using quick sort.
17. Program to sort an array of integers in ascending order using heap sort.
18. Program to sort an array of integers in ascending order using shell sort.
19. Program to demonstrate the use of linear search to search a given element in an array.
20. Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order.

Course: Data Structures & Algorithms LAB Using C
Course Code: LC-CSE-213G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Choose** appropriate data structure while designing the applications.	L2(Understand)
CO2	To **Solve** the problems of various data structures such as stack, queue and tree.	L2(Understand)
CO3	To **Analyze** the complexity of the algorithms.	L4 (Analyze)
CO4	To **Implement** various searching and sorting techniques.	L6 (Create)
CO5	To **Implement** linear and non-linear data structures using linked list	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											1	2	3
CO2	2	3			2							1	2	2
CO3	2	2	3		2							1	2	2
CO4	2		3		2							1	3	2
CO5	2	2	3	1	2							1	3	2

Python Programming Lab

Course code	LC-CSE-215G				
Category	Professional Core Course				
Course title	Python Programming Lab				
Scheme and Credits	L	T	P	Credits	Semester-3
	0	0	3	1.5	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

LIST OF PROGRAMS

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‘s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

Course: Python Programming LAB
Course Code: LC-CSE-215G

CO (Course Outcomes)		RBT*- Revised Bloom’s Taxonomy
CO1	To **Recall** the basic concepts of Python Programming.	L1 (Remember)
CO2	To **Describe** the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.	L2 (Understand)
CO3	To **Apply** the external modules and import specific methods from the package	L3 (Apply)
CO4	To **Demonstrate** proficiency in handling Strings and File Systems	L3 (Apply)
CO5	To **Design** a dynamic application through Python Programming.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										1	2	3
CO2	2	3			2							1	2	2
CO3	2	2	3		2							1	2	2
CO4	2	2	3	2	2							1	2	1
CO5	2		3		2							1	1	1

B.Tech. (Computer Science and Engineering)

Common with B.Tech. (Information Technology) &

B.Tech. (Computer Science and Information Technology)

Scheme of Studies/Examination w.e.f. 2020-21

SEMESTER-4

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
			L	T	P			Mark of Class work	Theory	Practical	Total	
1	PCC-CSE-202G	Discrete Mathematics	3	1	0	3	4	25	75		100	3
2	PCC-CSE-204G	Computer Organization & Architecture	3	0	0	3	3	25	75		100	3
3	PCC-CSE-206G	Operating System	3	0	0	3	3	25	75		100	3
4	PCC-CSE-208G	Object Oriented Programming	3	0	0	3	3	25	75		100	3
5	HSMC-02G	Organizational Behaviour	3	0	0	3	3	25	75		100	3
6	*MC-106G	Environmental Sciences	3	0	1	4	0	-	-	-	-	3
7	PCC-CSE-210G	Web Technologies	3	0	0	3	3	25	75		100	3
8	LC-CSE-212G	Operating System LAB	0	0	3	3	1.5	25		25	50	3
9	LC-CSE-214G	Object Oriented Programming LAB Using C++	0	0	3	3	1.5	25		25	50	3
10.	LC-CSE-216G	Web Technologies Lab	0	0	2	2	1	25		25	50	3
						Total	23				750	

*__MC-106G__ is a mandatory non –credit course in which the students will be required passing marks in theory.
NOTE: At the end of 4th semester each student has to undergo Practical Training of 4/6 weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluation shall be carried out in the 5th Semester.

Discrete Mathematics

Course code	PCC-CSE-202G				
Category	Professional Core Course				
Course title	Discrete Mathematics				
Scheme and Credits	L	T	P	Credits	Semester - 4
	3	1		4	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT-I

Sets, Relation, Function and Propositional Logic: Operations and Laws of Sets, Cartesian Products, Representation of relations, Binary Relation, Equivalence Relation, Partial Ordering Relation, POSET, Hasse Diagram, Lattices and its types, Function, Bijective functions, Inverse and Composite Function, Finite and infinite Sets, Countable and Uncountable Sets, Cantor's diagonal argument and The Power Set theorem, **S**chroeder-Bernstein theorem, Propositions, Logical operations, Conditional Statements, Tautologies, Contradictions, Logical Equivalence, The use of Quantifiers

UNIT-II

Basic Counting Techniques and Recurrence Relation: Pigeon-hole principle, Permutation and Combination**,** the Division algorithm: Prime Numbers, The GCD: Euclidean Algorithm, The Fundamental Theorem of Arithmetic., Linear recurrence relation with constant coefficients, Homogenous Solutions, Particular Solutions, Total Solutions, Solving recurrence relation using generating functions

UNIT-III

Algebraic Structures: Definitions and examples of Algebraic Structures with one Binary Operation: Semi Groups, Monoids, Groups; Congruence Relation and Quotient Structures, Permutation Groups, Cyclic groups, Normal Subgroups, Definitions and examples of Algebraic Structures with two Binary Operation: Rings, Integral Domain, Fields; Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT-IV

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Multigraph and Weighted graph, Shortest path in Weighted graphs, Eulerian paths and circuits, Hamiltonian path and circuits, Planar Graphs, Euler's formulae, Graph Colouring, Trees, Binary trees and its traversals, Trees Sorting, Spanning tree, Minimal Spanning tree.

REFERENCE BOOKS:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Satinder Bal Gupta: A Text Book of Discrete Mathematics and Structures, University SciencePress, Delhi.
3. C. L. Liu and D. P. Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, Tata McGraw – Hill.
4. J.P. Tremblay and R. Manohar, Discrete mathematical structures with applications to computer science, TMG Edition, Tata Mcgraw-Hill
5. Discrete Mathematics, Babu Ram, Pearson Publication
6. Discrete Mathematics, SemyourLipschutz and Marc Lipson, Schaum's outline

Course: Discrete Mathematics
Course Code: PCC-CSE-202G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the Concepts, design and implementation of Discrete mathematics	L1(Remember)
CO2	To **Perform** the operations associated with sets, relations, functions and discrete structures.	L2(Understand)
CO3	To **Apply** mathematical logic to solve problems.	L3(Apply)
CO4	To **Apply** the properties of Boolean algebra to simplify or convert a Boolean expression	L3(Apply)
CO5	To **Solve** real world problems using graphs and trees.	L4(Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2									1	2	2
CO2	2	3	2									1	1	1
CO3	3	2										1	2	1
CO4	3	2										1	2	2
CO5	2	2	3									1	2	2

Computer Organization & Architecture

Course code	PCC-CSE-204G				
Category	Professional Core Course				
Course title	Computer Organization & Architecture				
Scheme and Credits	L	T	P	Credits	Semester-IV
	3	0	0	3	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT 1

Data representation: Data Types, Complements, Fixed-Point Representation, Conversion of Fractions, Floating-Point Representation, Gray codes, Decimal codes, Alphanumeric codes, Error Detection Codes.

Register Transfer and Microoperations : Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

UNIT 2

Basic Computer Organization and Design : Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instruction, Input-Output Instruction, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

Central Processing Unit : General Register Organization, Stack organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC, CISC.

UNIT 3

Pipelining: Parallel Processing, Amdahl's law, Pipelining, Arithmetic Pipeline, Instruction Pipeline,Pipeline Hazards, RISC Pipeline.

Parallel Processors: Introduction to Parallel Processors, Concurrent access to memory and Cache Coherency.

Vector Processing : Vector Operations, Memory Interleaving, Supercomputers, Array Processors: Attached Array Processor, SIMD Array Processor.

UNIT 4

Input-output Organization : I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, Privileged and Non-Privileged Instructions, Software Interrupts.

Memory organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Associative Mapping, Direct Mapping, Set-Associative Mapping, Writing into Cache, Cache Initialization, Virtual Memory.

SUGGESTED BOOKS:

1) "Computer System Architecture", 3rd Edition by M.Morris Mano, Pearson.
2) "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3) "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 andHarry F. Jordan, Pearson Education.

Course: Computer Organization & Architecture
Course Code: PCC-CSE-204G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the basics of Computer Organization and Architecture and functionality of central processing unit.	L1 (Remember)
CO2	To **Explain** the basics of Data representation, components, and fixed point representation.	L2 (Understand)
CO3	To **Analyze** different modes of data transfer, classify interconnection structures and distinguish CPU vs. ALU architectures & computations.	L4 (Analyze)
CO4	To **Classify** cache memory Matrices techniques and examine register transfer between processor, memory & I/O.	L4 (Analyze)
CO5	To **Compare** Hardwired & CISC style processors of parallel processing, pipelining and inter-processor communication.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2									1	2	2
CO2	2	3	2									1	3	2
CO3	2	2	3									1	2	2
CO4	2	2	3									1	2	1

Operating System

Course code	PCC-CSE-206G				
Category	Professional Core Course				
Course title	Principles of Operating System				
Scheme and Credits	L	T	P	Credits	Semester-4
	3	0	0	3	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT 1:

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Multithreading.

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Schedulingalgorithms: Pre-emptive and Non-pre-emptive, FCFS, SJF, SRTF, RR Scheduling.

UNIT 2:

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, The Producer\Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT 3:

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), Optimal Page Replacement and Least Recently used (LRU).

UNIT 4:

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks. Case study on UNIX and WINDOWS Operating System.

Comparative Study of Latest Operating System: Evolution, Architecture and Characteristics of various Operating systems like MS-Windows, Ubuntu, Mac OS, Fedora, Solaris, Free BSD, Chrome OS, CentOS, Debian, Deepin

SUGGESTED BOOKS:

- Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
- Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

SUGGESTED REFERENCE BOOKS:

- Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, IrwinPublishing
- Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
- Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall ofIndia
- Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly andAssociates

Course: Operating System
Course Code: PCC-CSE-206G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the basic knowledge about the Operating System and Process.	L1 (Remember)
CO2	To **Describe** the conceptS of memory management including virtual memory.	L2 (Understand)
CO3	To **Apply** the concept of the different scheduling algorithms used for process management in operating system.	L3 (Apply)
CO4	To **Analyze**the issues related to file system interface and implementation, disk management.	L4 (Analyze)
CO5	To **Compare** various types of operating systems including Unix.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	1
CO2	2	3										1	1	2
CO3	2	3										1	1	2
CO4	2	3										1	2	2
CO5	1	3										1	1	1

Object Oriented Programming

Course code	PCC-CSE-208G				
Category	Professional Core Course				
Course title	Object Oriented Programming				
Scheme and Credits	L	T	P	Credits	Semester-4
	3	0	0	3	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT - I

Object-Oriented Programming Concepts: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming — concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers, static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

UNIT - II

Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors.

Pointers and Dynamic Memory Management: Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

UNIT - III

Constructors and Destructors: Need for constructors and destructors, copy constructor, dynamic constructors, explicit constructors, destructors, constructors and destructors with static members, initializer lists.

Operator Overloading and Type Conversion: Overloading operators, rules for overloading operators, overloading of various operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

Virtual functions & Polymorphism: Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract clasess, virtual destructors.

UNIT - IV

Exception Handling: Review of traditional error handling, basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions.

Templates and Generic Programming: Template concepts, Function templates, class templates, illustrative examples.

TEXT BOOKS, AND/OR REFERENCE MATERIAL:

1. Bjrane Stroustrup, "C++ Programming language",3rd edition, Pearson education Asia (1997)
2. Lafore R."Object oriented Programming in C++",4th Ed. Techmedia, New Delhi(2002).
3. Yashwant Kenetkar,"Let us C++",1stEd.,Oxford University Press(2006)
4. B.A. Forouzan and R.F. Gilberg,Compiler Science,"A structured approach using C++" Cengage Learning, New Delhi.

Course: Object Oriented Programming
Course Code: PCC-CSE-208G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the basic concept of OOPs and C++ language features.	L1 (Remember)
CO2	To **Demonstrate** the use of constructors, destructors and also the behaviour of inheritance and its implementation.	L2 (Understand)
CO3	To **Apply** the concept of Function overloading, operator overloading, Inheritance, virtual functions and polymorphism.	L3 (Apply)
CO4	To **Analyze** runtime Polymorphism and Generic Programming	L4 (Analyze)
CO5	To **Evaluate** Exception handling.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2									1	3	3
CO2	2	3	2									1	2	2
CO3	3	2	2									1	2	2
CO4	3	2	2									1	1	2
CO5	2	3	2									1	1	1

ORGANIZATIONAL BEHAVIOUR

Course code	HSMC-02G				
Category	Humanities and Social Sciences including Management courses				
Course title	ORGANIZATIONAL BEHAVIOUR				
Scheme and Credits	L	T	P	Credits	Semester 4
	3	0	0	3	
Branches (B. Tech.)	Common to all branches				
Class work	25				
Exam	75				
Total	100 Marks				
Duration of Exam	03 Hours				

SYLLBUS

UNIT - 1

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Difference between management and administration.

UNIT - 2

Introduction of organization:- Meaning and process of Organization, Management v/s Organization; **Fundamentals of Organizational Behavior:** Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB. **Individual Processes and Behavior-Personality**- Concept, determinants and applications; **Perception-** Concept, process and applications, **Learning**- Concept (Brief Introduction) ; **Motivation-** Concept, techniques and importance

UNIT - 3

Interpersonal Processes- Teams and Groups- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict; **Leadership:** Concept, function, styles & qualities of leadership. **Communication –** Meaning, process, channels of communication, importance and barriers of communication.

UNIT 4

Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior; **Organizational culture -** Elements, types and factors affecting organizational culture. **Organizational change:** Concept, types & factors affecting organizational change, Resistance to Change.

SUGGESTED BOOKS:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, PearsonEducation Asia, New Delhi.
2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, Organisational Behaviour: Text and cases. New Delhi: PearsonEducation.
5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press,New Delhi.
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, NewDelhi.
7. GhumanKarminder, Aswathappa K., Management concept practice and cases, McGraw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi

Course: Organizational Behaviour
Course Code: HSMC-02G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To be Able to resolve the conflicts within an organization.	L1 (Remember)
CO2	To **Learn** how effectively and efficiently a manager manages their employees.	L2 (Understand)
CO3	To **Understand** students their own behaviour, attitudes and ethical views.	L2 (Understand)
CO4	To **Analyze** how to improve the functional behaviour within an organization.	L4 (Analyze)
CO5	To **Develop** the communication and administrative skills.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1								2	3	1		2	1	2
CO2								2	3	1		2	1	2
CO3								3	2	1		2	1	2
CO4								2	3	1		2	2	2
CO5								2	3	3		2	3	3

Web Technologies

Course code	LC-CSE-210G				
Category	Professional Core Course				
Course title	Web Technologies				
Scheme and Credits	L	T	P	Credits	Semester 4
	3	0	0	3	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

DETAILED CONTENTS:

Unit 1:

Introduction: Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser.

HTML and CSS: History of HTML, Structure of HTML Document: Text Basics, Document: Images and Multimedia, Links and webs, Document Layout, Cascading Style Sheet: Need for CSS, introduction to CSS, basic syntax and structure using CSS, inline, internal and external CSS

Unit 2: XML: Introduction of XML- Some current applications of XML, Features of XML, Anatomy of XML document, structuring data, XML namespace, Document Type Definitions and Schemas, Document object model, DOM methods, XSL, SAX, SOAP

Unit 3: **PHP:** PHP Introduction, Structure of PHP, PHP Functions, String processing and regular expression, viewing client/server environment variable, form processing, Connecting to a database, cookies, operator precedence

Unit 4:AJAX: AJAX with PHP, PHP Code and the Complete AJAX Example, AJAX Database, Working of AJAX live search with PHP, Ajax PHP Database Form, AJAX PHP MySQL Database, connect, create DB, create table, insert data, select query

SUGGESTED BOOKS:

1. Steven Holzner,"HTML Black Book", Dremtech press.
2. Web Technologies, Black Book, Dreamtech Press
3. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
4. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel Pearson.

SUGGESTED REFERENCE BOOKS:

1. Paul Deitel , Harvey Deitel, Abbey Deitel ,"Internet and world wide web – How to Program",Prentice Hall

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Course: Web Technologies
Course Code: PCC-CSE-210G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the basic concept of internet & protocols of internet.	L1 (Remember)
CO2	To **Understand** HTML, CSS, XML & PHP for website preparation.	L2 (Understand)
CO3	To **Implement** AJAX with PHP for database connectivity.	L3 (Apply)
CO4	To **Analyze** different tools & Web development languages for Attractive Website.	L4 (Analyze)
CO5	To **Design** web pages using HTML, XML and DHTML.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	2
CO2	2	3										1	3	2
CO3	2	3	2									1	2	2
CO4	2	3	2									1	3	2
CO5	2	2	3									1	3	3

Operating System Lab

Course code	LC-CSE-212G				
Category	Professional Core Course				
Course title	Operating System Lab				
Scheme and Credits	L	T	P	Credits	Semester 4
	0	0	3	1.5	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

CONTENTS:

Course: Operating System LAB
Course Code: LC-CSE-212G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Discuss** UNIX File System & Commands for working in UNIX environment.	L2 (Understand)
CO2	To **Apply** the basic concepts of Shell Programming and control structures	L3 (Apply)
CO3	To **Analyze**LINUX kernel, shell, basic commands, pipe and filter commands.	L4 (Analyze)
CO4	To **Analyze** CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)	L4 (Analyze)
CO5	To **Evaluate**simulating FIFO, LRU, and OPTIMAL page replacement algorithm.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	1
CO2	2	3			2							1	1	2
CO3	2	3		2	2							1	1	2
CO4	2	3		2	2							1	2	2
CO5	1	3			2							1	1	1

Object Oriented Programming Lab Using C++

Course code	LC-CSE-214G				
Category	Professional Core Course				
Course title	Object Oriented Programming Lab Using C++				
Scheme and Credits	L	T	P	Credits	Semester 4
	0	0	3	1.5	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

CONTENTS:

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 dynamic constructor.
7. [Constructors and Destructors] Write a program to demonstrate the use of explicit constructor.
8. [Initializer Lists] Write a program to demonstrate the use of initializer list.
9. [Operator Overloading] Write a program to demonstrate the overloading of increment and decrement operators.
10. [Operator Overloading] Write a program to demonstrate the overloading of binary arithmetic operators.
11. [Operator Overloading] Write a program to demonstrate the overloading of memory management operators.
12. [Inheritance] Write a program to demonstrate the multilevel inheritance.
13. [Inheritance] Write a program to demonstrate the multiple inheritance.
14. [Inheritance] Write a program to demonstrate the virtual derivation of a class.
15. [Polymorphism] Write a program to demonstrate the runtime polymorphism.

16. [Exception Handling] Write a program to demonstrate the exception handling.
17. [Templates and Generic Programming] Write a program to demonstrate the use of function template.
18. [Templates and Generic Programming] Write a program to demonstrate the use of class template.

Course: Object Oriented Programming Using C++ LAB
Course Code: LC-CSE-214G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Explain** C++ compiler and translate basic C programs into C++ programs.	L2(Understand)
CO2	To **Apply** inheritance and polymorphism features to implement code reusability.	L3(Apply)
CO3	To **Analyze** Exception handling concepts to handle runtime errors.	L4(Analyze)
CO4	To **Create** programs on classes, objects, constructors and make use of access specified in classes.	L6(Create)
CO5	To **Create** programs using different operators, function overloading and operator overloading.	L6(Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2									1	3	1
CO2	2	3	2		2							1	1	1
CO3	3	2	2		2							1	2	2
CO4	3	2	2		2							1	3	3
CO5	2	3	2		2							1	3	3

Web Technologies Lab

Course code	LC-CSE-216G				
Category	Professional Core Course				
Course title	Web Technologies Lab				
Scheme and Credits	L	T	P	Credits	Semester 4
	0	0	2	1	
Branches (B. Tech.)	Computer Science and Engineering				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

CONTENTS:

HTML :

1. Simple HTML using
   a. Heading elements
   b. Text Elements
   c. Logical Styles
   d. Physical Styles
   e. Ordered , Unordered and Definition list
2. Hyper Links
   a. Image Link → Link to page containing Images and Videos
   b. File Link
   c. Single Page Link
3. Using Frames
   a. Navigation Frame
   b. Floating Frame
   c. Inline Frame
4. Registration Form with Table

CSS:

Inline Style , Internal Style ,and External Style Sheets

XML :

1. Create a any catalog
2. Display the catalog created using CSS or XSL

PHP:

1. File operation
2. Regular Expression, Array, Math, String, Date functions

Course: Web Technologies LAB
Course Code:LC-CSE-216G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** different commands of HTML, CSS, XML & PHP for website preparation.	L2(Understand)
CO2	To **Use** AJAX with PHP for database connectivity.	L3(Apply)
CO3	To **Analyze** a web page and identify its elements and attributes.	L4 (Analyze)
CO4	To **Create** XML documents and Schemas.	L6(Create)
CO5	To **Design** an Application with Back-end use PHP.	L6(Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	3
CO2	2	3			2							1	3	2
CO3	2	3	2		2							1	3	3
CO4	2	3	2		2							1	3	3
CO5	2	2	3		2							1	3	3

MC-106G : (ENVIRONMENT SCIENCE)

Course code	MC-106G				
Category	Mandatory Course				
Course title	Environmental Sciences				
Scheme and Credits	L	T	P	Credits	Semester 4
	3	0	1	0	
Branches (B. Tech.)	Common For All Branches				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit-1

The Multidisciplinary nature of environment studies. Definition, scope and importance.

Unit-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, environmentaleffects of extracting and using mineral resources, case 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.

f) Land resources : Land as a resource, land degradation,man induced landslides, soil erosion and desertification.

* Role of an individual in conservation of natural resources.

* Equitable use of resources for sustainable lifestyles.

Unit-3 Ecosystems : Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure andfunction of the following eco-system :Forest ecosystem. Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-4 Biodiversity and its conservation

Introduction - Definition : Genetic, Species andecosystem diversity. Value of biodiversity: consumptive use, productive use,social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity : In-situ and ex-situconservation of biodiversity.

Unit-5 Environmental pollution: Definition, causes, effects and control measures Of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards Solids waste management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management : floods, earthquake, cycloneand landslides.

Unit-6 Social issues and the Environment:

From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting,watershed management. Resettlement and rehabilitation of people : itsproblems and concerns case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layerdepletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of pollution) Act. Water (Prevention and Control of pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmentallegislation. Public awareness

Unit-7 Human population and the Environment. Population growth, variation among nations. Population xplosion- Family Welfare Programme.Environment and human health. Human Rights. Value Education. HIV/AIDS. Woman and Child Welfare. Role of Information Technology in Environment and humanhealth. Case Studies.

Unit-8 Field Work :Visit to a local area to document environmentalassets -river/forest/grassland/hill/mountain. Visit to a local polluted site-urban/Rural/ Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems- pond, river, hill slopes,etc.

REFERENCES

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Pub.Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India, MApin PublishingPvt. Ltd. Ahmedabad-380013, India, E-mail : mapin@icenet.net
3. Brunner R.C. 1989, Hazardous Waste Incineration, Mc.Graw Hill Inc. 480p.
4. Clark R.S., Marine pollution, Slanderson Press Oxford (TB).
5. Cunningham, W.P. Cooper, T.H. Gorhani, E &Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Pub. House, Mumbai 1196 p.
6. De A.K., Environmental Chemistry, WileyEastern Ltd.
7. Down to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993. Water in crisis, Pacific Institute for Studies in Dev. Environment & Security Stockholm Env. Institute, Oxford Univ. Press, 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History,Bombay Natural HistorySociety, Bombay(R).
10. Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge Uni. Press 1140p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
12. Mackinney, M.L. & Schoch, RM 1996, Environmental Science systems & solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Mayyer Hazardous, Tekchno-SciencePublications (TB).
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing
15. Odum, E.P. 1971, Fundamentals of Ecology. W.B.Saunders Co. USA, 574p.
16. Rao M.N. & Datta, A.K. 1987 Waste Water Treatment.Oxford & TBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma, B.K. 2001, Environmental Chemistry, GoalPubl. House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C., Harper J. and Michael Begon. Essentials ofEcology, Blackwell Science (TB).
20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Comliances and Standards, Vol. I and II Enviro Media (R).
21. Tridevi R.K. and P.K. Goal, Introduction to air pollution,Techno Science Publications (TR).
22. Wagner K.D., 1998, Environmental Management, W.B.Saunders co. Philadelphia, USA 499p.
23. A text book environmental education G.V.S. PublishersbyDr. J.P. Yadav.(M) Magazine(R) Reference(TB)

Course: Environmental Sciences

Course Code: MC-106G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Understand** the core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.	L2(Understand)
CO2	To **Discuss** Living Organisms, and various issues related to Environment.	L2(Understand)
CO3	To **Apply** the environment friendly techniques for healthy environment.	L3(Apply)
CO4	T**o Analyze** problems associated with environmental degradation including pollution related issues.	L4 (Analyze)
CO5	T**o Assess** the contribution of human behavior in environmental degradation.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3					2	2	2				2	1	1
CO2						3	2	2				2	1	2
CO3						3	2	2				2	1	2
CO4						3	2	2				2	1	2
CO5						3	2	2				2	1	1

Scheme of Studies and Examination
B.TECH. (Computer Science & Engineering)–5th Semester
w.e.f. 2020-21

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Mark of Class work	Theory	Practical	Total	
1	Engineering Science Course	ESC-CSE-301G	Microprocessor	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE-303G	Computer Networks	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-CSE-305G	Formal Languages & Automata	3	0	0	3	3	25	75		100	3
4	Professional Core Course	PCC-CSE-307G	Design & Analysis of Algorithms	3	0	0	3	3	25	75		100	3
5	Professional Core Course	PCC-CSE-309G	Programming in Java	3	0	0	3	3	25	75		100	3
6	Professional Elective Course	Refer to Annexure I	Elective–I	3	0	0	3	3	25	75		100	3
7	Engineering Science Course	LC-ESC-321G	Microprocessor Lab	0	0	2	2	1	25	-	25	50	3
8	Professional Core Course	LC-CSE-323G	Computer Networks Lab	0	0	3	3	1.5	25	-	25	50	3
9	Professional Core Course	LC-CSE-325G	Design & Analysis of Algorithms Using C++	0	0	3	3	1.5	25	-	25	50	3
10	Professional Core Course	LC-CSE-327G	Programming in Java Lab	0	0	3	3	1.5	25	-	25	50	3
11	Training	PT-CSE-329G	Practical Training-1	-	-	-	-	-	-	-	*Refer Note1		
		TOTALCREDIT						**23.5**				**800**	

Note:

1. The evaluation of Practical Training-I will be based on seminar, viva-voce, report submitted by the students. According to performance, the students are awarded grades A,B,C,F. A student who is awarded 'F'grade is required to repeat Practical Training. **Excellent:A; Good:B; Satisfactory:C; Not Satisfactory:F.**

Annexure I

Elective–I (Professional Elective Course)

1. PEC-CSE-311G: Software Engineering
2. PEC-CSE-313G:System Programming and System Administration
3. PEC-CSE-315G:Digital Image Processing

MICROPROCESSOR

Course code	ESC-CSE-301G				
Category	Engineering Science Course				
Course title	Microprocessor				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0		3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Unit: 1

THE 8085 PROCESSOR: Introduction to microprocessor, 8085 microprocessor: Architecture, instruction set, interrupt structure and Assembly language programming.

Unit: 2

THE 8086MICROPROCESSORARCHITECTURE: Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

Unit: 3

INSTRUCTION SET OF 8086: Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

Unit: 4

INTERFACING DEVICE: 8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237DMA controller.

TEXTBOOKS:

1. Microprocessor Architecture, Programming & Applications with 8085: Ramesh SGaonkar; Wiley Eastern Ltd.
2. Intel Microprocessors 8086- Pentium processor: Brey;PHI

REFERENCEBOOKS:

1. Microprocessors and interfacing : DVHall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing, Hardware & Applications : Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming &Design: Yu-ChangLiu & Glenn AGibson; PHI.
4. Advanced Microprocessors and Interfacing : BadriRam; TMH

Course: Microprocessor
Course Code: ESC-CSE-301G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Recall** the basic knowledge of microprocessor and interfacing devices.	L1 (Remember)
CO2	To **Understand** the construction, principle of operation and pin configuration and architecture of microprocessor (8085,8086 processor) and peripheral devices.	L2 (Understand)
CO3	To **Experiment** the programming by the understanding of instruction sets of microprocessor.	L3 (Apply)
CO4	To Analyze the interfacing of devices like 8255,8259,8237,8254.	L4 (Analyze)
CO5	To **Create** the programming of 8085 and 8086 microprocessor and interfacing the devices	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	2
CO2	2	3										1	1	2
CO3	2	2	3									1	1	2
CO4	2	2	3									1	1	2
CO5	2	2	3									1	1	1

COMPUTER NETWORKS

Course code	PCC-CSE-303G				
Category	Professional Core Course				
Course title	Computer Networks				
Scheme and Credits	L	T	P	Credits	Semester5
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Unit: 1

Introduction: Data communication, Components, Computer networks and its historical development, distributed processing, Internet

Network Models: OSI model and TCP/IP Model

Physical Layer – physical layer functions, Data Representation, Simplex, Half Duplex and Full Duplex Transmission, Modulation and Multiplexing, Packet and circuit switching, Transmission media, Topologies, connectionless and connection-oriented services.

Data Link Layer : Data link layer functions and services, MAC Addressing, Framing, Stop and Wait, Goback–N ARQ, Selective Repeat ARQ, Sliding Window Protocol.

Unit: 2

Medium Access Control: MAC layer functions, Random access, Controlled Access and channelization protocols.

Network Layer: Network layer functions and services, Logical addressing, IPv4 classful and class less addressing, subnetting, NAT, IPv4, ICMPv4, ARP ,RARP and BOOTP, IPv6, IPv6 addressing, DHCP.

Network Devices: Repeater, hub, switch, router and gateway.

Unit: 3

Routing Algorithms: introduction to routing, Shortest Path Algorithm, Flooding, Hierarchical Routing, Link State and Distance Vector Routing

Transport Layer: Transport layer functions and services, Process to Process Communication, User Datagram Protocol(UDP), Transmission Control Protocol (TCP),TCP connection management

Application Layer: Application layer functions and services, Domain Name Space (DNS), EMAIL, File Transfer Protocol (FTP), HTTP,SNMP

Unit: 4

Congestion Control, Quality of Service, QoS Improving techniques.

LAN: Ethernet, Token Bus, Token Ring, MAN Architecture- DQDB, WAN Architectures- Frame Relay, ATM, SONET/SDH

Network Security: Firewalls, security goals, types of attack, Introduction to cryptography, Types of ciphers : symmetric and asymmetric key ciphers.

Suggested books:

1. Data Communication and Networking ,4thEdition, BehrouzA .Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings ,Pearson Prentice Hall India.

Suggested reference books:

1. Computer Networks, 8thEdition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internet working with TCP/IP, Volume1,6thEdition Douglas Comer,Prentice Hall of India.
3. TCP/IPIllustrated, Volume1,W.RichardStevens,Addison-Wesley,UnitedStatesofAmerica.

Course: Computer Networks
Course Code: PCC-CSE-303G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Explain** Basic Computer Network Terms and Principles.	L1 (Remember)
CO2	To **Summarize** different protocols used at Application Layer i.e .FTP, DNS, HTTP, DNS, SNMP, SMTP.	L2 (Understand)
CO3	To **Examine** the functions of different layers in OSI and TCP/IP model.	L4 (Analyze)
CO4	To **Analyze** the different types of Network Topologies and Protocols.	L4 (Analyze)
CO5	To **Compare** different Network Layer Protocols and Routing Algorithms.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											1	2	3
CO2	2	3	2									1	1	2
CO3	3	2	2									1	2	2
CO4	2	2		3								1	3	3
CO5	2	3	2									1	3	1

FORMAL LANGUAGES AND AUTOMATA

Course code	PCC-CSE-305G				
Category	Professional Core Course				
Course title	Formal Languages & Automata				
Scheme and Credits	L	T	P	Credits	Semester5
	3	0		3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Unit1:

Finite Automata : Introduction: Set, Power Set, Super Set, Alphabet, languages and grammars, productions and derivation, Deterministic finite automata(DFA),Non-Deterministic finite automata (NDFA), Equivalence of DFA and NDFA, Conversion of NFA to DFA , minimization of finite automata, Finite automata with ϵ- moves, Acceptability of a string by a finite Automata.

Introduction to Machines: Properties and limitations of Finite Automata, Mealy and Moore Machines, Equivalence of Mealy and Moore machines.

Unit2:

Regular Expression: State and prove Arden'sMethod, Regular Expressions, Recursive definition of regular expression, Regular expression conversion to Finite Automata and vice versa.

Properties of regular languages: Regular language, pumping lemma for regular sets/languages, Application of regular languages.

Unit3:

Grammars: Chomsky hierarchy of languages, Relation between different types of grammars, Context-free grammar, Derivation tree / Parse tree, Ambiguity in regular grammar and their removal, Reduced Forms: Removal of useless symbols, null and unit productions, Normal Form: Chomsky Normal form (CNF) and Greibach Normal Form (GNF),

Push Down Automata: Introduction to PDA, Deterministic and Non-Deterministic PDA, Design of PDA: Transition table, Transition diagram and acceptability of strings by designed PDA,Push down automata (PDA)and equivalence with CFG.

Unit4:

Turing machines: The basic model for Turing machines(TM),Deterministic and Non-Deterministic Turing machines and their equivalence, Design of Turing Machines: Transition table, Transition diagram and acceptability of strings by designed turing machine. Variants of Turing machines, Halting problem of Turing machine, PCP Problem of Turing Machine, Linear Bounded Automata, TMsase numerators.

Undecidability: Church-Turingthesis,universalTuringmachine,theuniversalanddiagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages.

Suggested books:

1. IntroductiontoAutomataTheory,Languages,andComputation,3ndEdition,John E.Hopcroft, Rajeev Motwani, JeffreyD.Ullman, Pearson Education.
2. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.

Suggested reference books

1. K.L.PMishra, N.Chandrashekaran(2003),Theory of Computer Science-Automata Languages and Computation,2nd edition, Prentice Hall of India, India.
2. Raymond Greenlaw, H.James Hoover,Fundamentals of the Theory of Computation,Principles and Practice, MorganKaufmann,1998.
3. JohnC.Martin: Introduction to Languages and AutomataTheory,3rdedition,TataMcgraw-Hill,2007

Course: Formal Languages & Automata
Course Code: PCC-CSE-305G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To Understand designing of various kinds of Finite State Machines.	L2 (Understand)
CO2	To Analyze various types of grammars i.e. Context Free Grammars.	L4 (Analyze)
CO3	To Describe the basic concepts of computability using Turing Machines and Undecidability.	L2 (Understand)
CO4	To Examine the Regular Expressions and Properties of Regular languages.	L4 (Analyze)
CO5	To Conceptualize about parsing of grammars, finding out ambiguities and removing ambiguities from grammars.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2									1	1	1
CO2	2	3	2									1	1	2
CO3	2	2	3	2								1	1	1
CO4	2	3										1	2	2
CO5	2	2		2								1	3	2

DESIGN AND ANALYSIS OF ALGORITHMS

Course code	PCC-CSE-307G				
Category	Professional Core Course				
Course title	Design and Analysis of Algorithms				
Scheme and Credits	L	T	P	Credits	Semester5
	3	0		3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Unit1:

Introduction to Algorithms: Algorithm, Performance Analysis (Time and Space complexity), Asymptotic Notation (Big OH, Omega and Theta)-best, average and worst-case behaviour. Elementary Data Structures (Basic terminology of Stacks and Queues, Tree, Graph), Sets and Disjoint Set Union.

Divide and Conquer: General method, Binary Search, Merge Sort, Quick Sort, and other sorting algorithms with divide and conquer strategy, Strassen's Matrix Multiplication algorithms and analysis of these problems.

Unit2:

Greedy Method: General method, Fractional Knapsack problem, Job Sequencing with Deadlines, Minimum Cost Spanning Trees, Single source shortest paths.

Dynamic Programming: General method, Optimal Binary Search Trees, 0/1 knapsack, The Traveling Sales person problem.

Unit3:

Back Tracking: General method, The 8Queen's problem, Sum of subsets, Graph Colouring, Hamiltonian Cycles.

Branch and Bound: Themethod,0/1knapsack problem, Traveling Sales person problem, Efficiency considerations.

Unit4:

NP Hard and NP Complete Problems: Basic concepts, Cook's theorem, NP hard graph problems, NP hard scheduling problems, NP hard code generation problems, and Some simplified NP hard problems.

Suggested Text Books:

1. Fundamental of Computer algorithms, Ellis Horowitz and SartajSahni,1978, Galgotia Publication
2. Introduction to Algorithms,Thomas HCormen,Charles ELeiserson and Ronald LRivest:1990,TMH

Suggested Reference Books:

1. The Design and Analysis of Computer Algorithm, AhoA.V.HopcroftJ.E.,1974, Addison Wesley.
2. Algorithms The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P.,1986. JohanWiley &Sons,
3. Writing Efficient Programs,Bentley,J.L.,PHI
4. Introduction to Design and Analysis of Algorithm, Goodman, S.E.&Hedetnieni, 1997,MGH.
5. Introduction to Computers Science-An algorithms approach, Jean Paul Trembley, RichardB.Bunt, 2002, T.M.H.
6. Fundamentals of Algorithms: The Art of Computer Programming Vol Knuth, D.E.:1985, NareshPublication.

Course: Design & Analysis of Algorithms
Course Code: PCC-CSE-307G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the concept of algorithm designs a non-linear data structures.	L1 (Remember)
CO2	To **Describe** NP Hard and NP Complete Problems.	L2 (Understand)
CO3	To **Apply** Divide and Conquer, Greedy and Dynamic Programming algorithmic methods.	L3 (Apply)
CO4	To **Apply** efficient algorithms based on Backtracking and Branch & Bound approach in solving real time problems.	L3 (Apply)
CO5	To **Analyze** the asymptotic performance of algorithms.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2									1	3	3
CO2	2	3	2	2								1	2	2
CO3	2	2	3	2								1	2	2
CO4	2	2	3	2								1	2	2
CO5	2	2		3								1	3	2

PROGRAMMING IN JAVA

Course code	PCC-CSE-309G				
Category	Professional Core Course				
Course title	Programming in JAVA				
Scheme and Credits	L	T	P	Credits	Semester5
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Unit1:

Introduction to Java: Evolution of Java, Object Oriented Programming Structure, Overview and characteristics of Java, Java program Compilation and Execution Process, Organization of the Java Virtual Machine, Client side Programming, Platform Independency & Portability, Security, Relation b/w JVM, JRE and JDK, Introduction to JAR format, Naming Conventions, Data types & Type casting, operators, Security Promises of the JVM, Security Architecture and Security Policy, security aspects, and box model

Unit2:

OOPS Implementation: Classes, Objects, attributes, methods, data encapsulation, reference variables, Constructors, Anonymous block, Method Overloading, Static Data members, Block & methods; Memory Structure: Stack, Heap, Class & Method area

Class loading & Execution flow: Static vs Dynamic Class loading, implicit vs explicit class loading, class loading operations; Argument Passing Mechanism: Passing primitive arguments, passing objects, Wrapper Classes; This keyword: Referencing instance members, Intra class constructor chaining, Method chaining; Inheritance & code reusability: Extending classes for code reusability, Usage of super keyword, Method Overriding, Object class

Inheritance & Runtime Polymorphism: Static & Dynamic binding, Inheritance and Is-A relation, Runtime Polymorphism and Generalization, Abstract classes & methods, Final Keyword; Interfaces and Role based Inheritance: Feature & Role based Inheritance, Static & Dynamic classing Environment, classes & interfaces, interface applications in real scenarios; Has-Arelation:Aggregation&Composition,Nestedclasses,Innerclasses,AnonymousInnerclasses,StringBuffe rClass,tokenizer,applets,Lifecycleofappletand Security concerns.

Unit3:

Threads: CreatingThreads,ThreadPriority,BlockedStates,ExtendingThreadClass,Runnable Interface, Starting Threads, Thread Synchronization, Synchronize Threads, SyncCodeBlock,OverridingSyncedMethods,ThreadCommunication,wait,notifyandnotifyall.

Swing & AWT : Swing class hierarchy, containers, user interface components, graphics context, AWT Components, Component Class, Container Class, Layout Manager Interface Default Layouts, Insets and Dimensions, Border Layout, Flow Layout, Grid Layout, Card Layout Grid Bag Layout AWT Events, Event Models, Listeners, Class Listener, Adapters, Action Event Methods Focus Event Key Event, Mouse Events, Window Event.

Package & Scopes: Need of Packages, associating classes to Packages, Class path environment variable, Import Keyword and Feature of static import, Public, protected, private & defaults cope, Private Inheritance;

Exception Handling: exception and error, Exception Handling & Robustness, Common Exceptions and Errors, Try and catch block, Exception handlers, throw keyword, Checked and Unchecked Exceptions, Role of finally, User defined Exceptions;

Unit4:

Collection Framework: Role and Importance of Collection Framework, List & Set based collection, Iterator & List Iterator, Maps, Searching elements in List, Hash and Tree based collections,Role of equals and hash Code()methods, Comparable and Comparator Interfaces, Thread Safety and Vector, Difference b/w Enumeration and Iterator, Type safety and Generics, Common algorithms and Collections class, Using Properties class for managing properties files;

Database Connectivity Using JDBC: Overview of native and ODBC Drives, Introduction to JDBC, Type of JDBC drivers, Usage of drivers, Defining properties-based Connection Factory; Basic database operations: Insert, Delete, Update, and Select; Prepared Statement: Statement, Prepared Statement, Setting Query parameters, Executing Queries;
Callable Statement: Creating PL/SQL Stored procedures and functions, Creating Callable statements, Executing procedures & functions, Batch Updation, Transacting Queries, Programmatic initialization of database, Result Set Meta Data, Database Meta Data ; Input/Output Stream, Stream Filters, Buffered Streams, Data input and Output Stream, Print Stream Random Access File,
Reflection: reflection API, new Instance()method, java p tool, creating java p tool, creating applet viewer, call private method, java9features;

Text Books:

1. Patrick Naughton and HerbertzSchidt,"Java-2thecompleteReference",TMH
2. Sierra &bates,"HeadFirstJava",O'Reilly.

Reference Books:

1. E.Balaguruswamy,"Programming with Java",TMH
2. Horstmann,"Computing Concepts with Java2Essentials",JohnWiley.
3. Decker&Hirshfield,"Programming.Java",Vikas Publication.

Course: Programming in Java
Course Code: PCC-CSE-309G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the basics of object-oriented programming using JAVA.	L2(Understand)
CO2	To **Apply** the concept of classes, Java, JDK Components and develop Simple Java Programs.	L3(Apply)
CO3	To **Analyze** Multi-threading Programming and Interfaces.	L4(Analyze)
CO4	To **Develop** Simple Java Programs using Inheritance and Exception.	L6 (Create)
CO5	To **Develop** GUI applications using Applet classes, Swing components and Event handling programs.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	3
CO2	2	3	2									1	3	2
CO3	2	2	3									1	3	2
CO4	2	2	3									1	3	2
CO5	2	2	2	3								1	3	2

MICROPROCESSOR LAB

Course code	LC-ESC-321G				
Category	Engineering Science Course				
Course title	Microprocessor Lab				
Scheme and Credits	L	T	P	Credits	Semester5
	0	0	2	1	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

Hands-on experiments related to the course contents of ESC-CSE-301G.

Course: Microprocessor Lab
Course Code: LC-ESC-321G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Understand** and **apply** the fundamentals of assembly level programming of microprocessors and microcontroller.	L3(Apply)
CO2	To **Solve** basic binary math operations using the instructions of microprocessor 8085.	L3(Apply)
CO3	To **Design**, code and debugs Assembly Language programs to implement simple programs.	L6 (Create)
CO4	To **Apply** programming knowledge using the capabilities of the stack, the program counter.	L3(Apply)
CO5	To **Troubleshoot** interactions between software and hardware.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	2
CO2	2	3			2							1	1	2
CO3	2	2	3		2							1	1	2
CO4	2	2	3		2							1	1	2
CO5	2	2	3		2							1	1	1

COMPUTER NETWORKS LAB

Course code	LC-CSE-323G				
Category	Professional Core Course				
Course title	Computer Networks Lab				
Scheme and Credits	L	T	P	Credits	Semester5
	0	0	2	1.5	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

Hands-on experiments related to the course contents of PCC-CSE-303Gusing hardware resources and using simulation tool.

1. To study about various troubleshooting command.
2. To study about OSI Model & its function of each layer.
3. To study about FTP Protocol.
4. To study about various network Topology used in computer network.
5. To study about TCP/IP reference model.
6. To study about various type of IP address classes.
7. To study about ARP& RARP Protocol.
8. To study Telent.
9. To study about various LAN Networking devices.
10. To study about different LAN Ethernet standard cable.

Course: Computer Networks Lab
Course Code: LC-CSE-323G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Demonstrate** the function(s) of each layers of the OSI model and TCP/IP.	L3 (Apply)
CO2	To **Describe** the different types of network topologies and protocols.	L2 (Understand)
CO3	To **Analyze** the various routing algorithms.	L4 (Analyze)
CO4	To **Construct** simple network by using any modern Open Source Network Simulation Tool.	L6 (Create)
CO5	To **Design** and implement a peer to peer file sharing application utilizing application layer protocols such as HTTP, DNS, and SMTP and transportation layer protocol.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											1	2	3
CO2	2	3	2		2							1	1	2
CO3	3	2	2		2							1	2	2
CO4	2	2		3	2							1	3	3
CO5	2	3	2		2							1	3	1

DESIGN & ANALYSIS OF ALGORITHMS USING C++

Course code	LC-CSE-325G				
Category	Professional Core Course				
Course title	Design & Analysis of Algorithms Using C++				
Scheme and Credits	L	T	P	Credits	Semester5
	0	0	3	1.5	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

List of programs:

1. Write a Program for iterative and recursive Binary Search.
2. Write a Program to sort a given set of elements using the QuickSort/MergeSort/Selection Sort method and determine the time required to sort the elements.
3. Write a Program for implementation of Fractional Knapsack problem using Greedy Method and 0/1Knapsack problem using Dynamic Programming.
4. Write a Program to find the shortest path from a given vertex to other vertices in a weighted connected graph using Dijkstra's algorithm.
5. Write a Program to find the minimum cost spanning tree (MST) of a given undirected graph using Kruskal's algorithm/Prim's Algorithms.
6. Write a Program to implement N-Queens problem using backtracking.
7. Write a Program to check whether a given graphic connected or not using DFS method.
8. Write a program to implement the Travelling Salesman Problem(TSP).

Note: At least 5 to 10 more exercises to be given by the teacher concerned.

Course: Design & Analysis of Algorithms Using C++
Course Code: LC-CSE-325G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Apply** the Divide and Conquer method to solve various problems.	L3 (Apply)
CO2	To **Apply** the Backtracking method to solve problems various problems.	L3 (Apply)
CO3	To **Compare** different Sorting and Searching algorithms which provide the same solution.	L4 (Analyze)
CO4	To **Create** the programs to solve problems using algorithm design techniques	L6 (Create)
CO5	To **Create** programs to solve problems using Greedy and Dynamic programming techniques.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2									1	3	3
CO2	2	3	2	2	2							1	2	2
CO3	2	2	3	2	2							1	2	2
CO4	2	2	3	2	2							1	2	2
CO5	2	2		3	2							1	3	2

PROGRAMMING IN JAVA LAB

Course code	LC-CSE-327G				
Category	Professional Core Course				
Course title	Java Programming Lab				
Scheme and Credits	L	T	P	Credits	Semester5
	0	0	3	1.5	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

List of Experiments:

1. Create a java program to implement stack and queue concept.
2. Write a java package to show dynamic polymorphism and interfaces.
3. Write a java program to show multithreaded producer and consumer application.
4. Create a customized exception and also make use of all the 5 exception key words.
5. Convert the content of a given file into the upper case content of the same file.
6. Develop an analog clock using applet.
7. Develop a scientific calculator using swings.
8. Create an editor like MS-word usings wings.
9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.
10. Create a simple java bean having bound and constrained properties.

Course: Programming in Java Lab
Course Code: LC-CSE-327G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Identify** of the structure and model of the Java programming language.	L2 (Understand)
CO2	To **Identify** classes, objects, members of a class and relationships among them needed for a specific problem.	L2 (Understand)
CO3	To **Demonstrate** the concepts of polymorphism and inheritance.	L3 (Apply)
CO4	To **Design** Java programs to implement error handling techniques using exception handling.	L6 (Create)
CO5	To **Design** Java application programs using OOP principles and proper program structuring.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	3
CO2	2	3	2		2							1	2	2
CO3	2	2	3		2							1	3	2
CO4	2	2	3		2							1	3	2
CO5	2	2	2	3	2							1	3	2

SOFTWARE ENGINEERING

Course code	PECCSE-311G				
Category	Professional Elective Course				
Course title	Software Engineering				
Scheme and Credits	L	T	P	Credits	Semester5
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

Unit: 1

Introduction: The process, software products, emergence of software engineering, evolving role of software, software life cycle models, Software Characteristics, Applications, Software crisis.

Software project management: Project management concepts, software process and project metrics Project planning, project size estimation metrics, project estimation Techniques, empirical estimation techniques, COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking

Unit: 2

Requirements Analysis and specification requirements engineering, system modeling and simulation Analysis principles modeling, partitioning Software, prototyping: , Prototypingmethodsandtools;Specificationprinciples,Representation,the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, Behavioral Modeling; The mechanics of structured analysis: Creating entity/ relationship diagram, data flow model, control flow model,
thecontrolandprocessspecification;Thedatadictionary;Otherclassicalanalysismethods.

System Design: Design concepts and principles: the design process: Design and software quality, design principles; Design concepts: Abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, data structure, software procedure, information hiding; Effective modular design: Functional independence, Cohesion, Coupling.

Unit: 3

Architectural Design: Software architecture, Data Design: Data modeling, data structures, databases and the datawarehouse, Analyzing alternative Architectural Designs, architectural complexity; Mapping requirements into a software architecture; Transform flow, Transaction flow; Transform mapping: Refining the architectural design.

Testing and maintenance: Software Testing Techniques, software testing fundamentals: objectives, principles, testability; Test case design, white box testing, basis path testing: Control structure testing: Black box testing, testing for specialized environments, architectures and applications. Software Testing Strategies: Verification and validation, Unit testing, Integration testing, Validation testing, alpha and beta testing; System testing: Recovery testing, security testing, stress testing, performance testing; The art of debugging, the debugging processed bugging approaches. Software re-engineering, reverse engineering, restructuring, forward engineering.

Unit: 4

Software Reliability and Quality Assurance :Quality concepts, Software quality assurance , SQA activities; Software reviews: cost impact of software defects, defect amplification and removal; formal technical reviews: The review meeting, review reporting and recordkeeping, review guidelines; Formal approaches to SQA; Statistical software quality assurance; software reliability: Measures of reliability and availability ,The ISO 9000 Quality standards: The ISO approach to quality assurance systems, The ISO 9001 standard, Software Configuration Management. Computer Aided software Engineering: CASE, building blocks,integrated case environments and architecture,repository.

Suggested books:

- Software Engineering –A Practitioner's Approach, Roger S.Pressman,1996,MGH.

Suggested reference books

- Fundamentals of software Engineering, Rajib Mall, PHI Software Engineering by Nasib Singh Gill, Khanna Book Publishing Co(p) Ltd
- Software Engineering by Ian Somerville,Pearson Edu,5edition,1999,AW,
- Software Engineering –DavidGustafson,2002,T.M.H
- SoftwareEngineeringFundamentalsOxfordUniversity,AliBehforoozandFrederick J.Hudson1995JW&S,
- AnIntegratedApproachtosoftwareengineeringbyPankajjalote,1991Narosa,

Course: Software Engineering (Elective-I)
Course Code: PEC-CSE-311G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Understand** the Basics Terms of Software Engineering.	L2 (Understand)
CO2	To **Discuss** Various Software Testing Techniques, Software Quality Assurance activities, ISO standards and Software configuration management.	L2 (Understand)
CO3	To **Apply** the software engineering lifecycle by demonstrating competence in requirement analysis, planning, analysis, design, construction, testing and deployment.	L3 (Apply)
CO4	To **Analyze** and lay down software requirements through a productive association with various stakeholders of the software project.	L4 (Analyze)
CO5	To **Analyze** and plan software solutions to problems using an object-oriented strategy.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	2
CO2	2	3	2									1	2	3
CO3	2	2	3	2								1	3	2
CO4	2	2	3	2								1	2	2
CO5	2	2	2									1	2	3

PRACTICALTRAINING1

Course code	PT-CSE-329G				
Category	Professional Core Course				
Course title	PRACTICALTRAINING1				
Scheme and Credits	L	T	P	Credits	Semester5
	0	0	0		
Classwork	-				
Exam	-				
Total	-				
Duration of Exam	-				

The evaluation of Practical Training-I will be based on seminar, viva-voce, report submitted by the students. According to performance, the students are awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical Training.

Excellent:A; Good:B; Satisfactory:C; Not Satisfactory:F.

Scheme of Studies and Examination
B.TECH. (Computer Science & Engineering)–6th Semester
w.e.f. 2020-21

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Mark of Classwork	Theory	Practical	Total	
1	Professional Core Course	PCC-CSE-302G	Compiler Design	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE-304G	Artificial Intelligence	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-CSE-306G	Advanced Java	3	0	0	3	3	25	75		100	3
4	Engineering Science Course	ESC-CSE-308G	Mobile and Wireless Communication	3	0	0	3	3	25	75		100	3
5	Professional Elective Course	Refer to Annexure II	Elective-II	3	0	0	3	3	25	75		100	3
6	Professional Elective Course	Refer to Annexure III	Elective-III	3	0	0	3	3	25	75		100	3
7	Project	PROJ-CSE-322G	Project-I	0	0	4	4	2	25		25	50	3
8	Professional Core Course	LC-CSE-324G	Compiler Design Lab	0	0	3	3	1.5	25		25	50	3
9	Professional Core Course	LC-CSE-326G	Artificial Intelligence Lab Using python	0	0	3	3	1.5	25		25	50	3
10	Professional Core Course	LC-CSE-328G	Advanced Java Lab	0	0	2	2	1	25		25	50	3
11.	Mandatory Courses	MC-317G	Constitution of India	2	0	0							
		TOTAL						**24**				**800**	

*__MC-317G__ is a mandatory non –credit course in which the students will be required passing marks in theory.

NOTE: At the end of 6th semester each student has to undergo Practical Training of 4/6weeks in an Industry/ Institute/ Professional Organization/ Research Laboratory/ training centre etc. and submit typed report along with a certificate from the organization & its evaluations hall be carried out in the 7th Semester.

Annexure II

Elective–II(Professional Elective Course)

1. PEC-CSE-310G: Advanced Database Management System
2. PEC-CSE-312G:Mobile Application Development
3. PEC-CSE-314G: Computer Graphics
4. PEC-CSE-330G:Communication Engineering

Annexure III

Elective–III(Professional Elective Course)

1. PEC-CSE-316G: Distributed System
2. PEC-CSE-318G:Information Technology & Industry Business Skills
3. PEC-CSE-320G:Data Science
4. PEC-CSE-332G:VHDL and Digital Design

COMPILER DESIGN

Course code	PCC-CSE-302G				
Category	Professional Core Course				
Course title	Compiler Design				
Scheme and Credits	L	T	P	Credits	Semester6
	3	0	0	3	
Classwork	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT1

Introduction to Compilers: Language Processors, The Structure of compiler: its different phases, Compiler Construction Tools, Applications of Compiler Technology.

Lexical Analysis: Role of lexical analyzer, Input Buffering, Specification and recognition of tokens, design of lexical analyzer, regular expressions, A language specifying lexical analyzer, Finite automata, conversion from regular expression to finite automata, and vice versa, minimizing number of states of DFA, Implementation of lexical analyzer.

UNIT2

Syntax Analysis: Role of parsers, context free grammars.

Parsing Technique: Shift-reduce parsing, Operator precedence parsing, Top down parsing, Predictive parsing.

UNIT3

LR parsers, SLR, LALR and Canonical LR parser.

Syntax Directed Translations: Syntax directed definitions, construction of syntax trees, syntax directed translation scheme, Implementation of syntax directed translation, Intermediate-Code Generation: three address code, quadruples and triples.

UNIT4

Symbol Table & Error Detection and Recovery: Symbol tables: its contents and data structure for symbol tables; trees, arrays, linked lists, hash tables. Errors, lexical phase error, syntactic phase error, Semantic error.

Code Optimization & Code Generation: Code generation, forms of objects code, machine dependent code, optimization, register allocation for temporary and user defined variables.

Suggested Text Books:

1.Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi& J.D. Ullman;1998Addison Wesley.

Suggested Reference Books:

1. Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc.GrawHill.
2. System software by Dhamdere, 1986, MGH.
3. Principles of compiler Design, Narosa Publication
4. Elements compiler Design, Dr.M.Joseph, University Science Press

Course: Compiler Design
Course Code: PCC-CSE-302G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the concepts, design and implementation of language processors i.e. Compilers.	L1(Remember)
CO2	To **Illustrate** the various aspects like grammars, languages and phases of compilers etc.	L2 (Understand)
CO3	To **Applying** concept of First and follow of non-terminals and the ambiguity of Grammar.	L3 (Apply)
CO4	To **Analyze** the syntax directed translations with syntax trees.	L4 (Analyze)
CO5	To **Evaluate** the Code Optimization and Code Generation.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	3
CO2	2	3	2									1	2	2
CO3	2	2	3	2								1	1	2
CO4	2	2	3	2								1	2	3
CO5	2	2	2	3								1	3	2

ARTIFICIAL INTELLIGENCE

Course code	PCC-CSE-304G				
Category	Professional Core Course				
Course title	Artificial Intelligence				
Scheme and Credits	L	T	P	Credits	Semester6
	3	0	0	3	
Classwork	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03Hours				

UNIT 1

Introduction: Definition of AI, History of AI, nature of AI problems, examples of AI problems. **Problem solving by search**: *Uninformed Search*: Depth First Search(DFS), Breadth FirstSearch (BFS). *Informed Search*: Best First Search, A*. *Local Search*: Hill Climbing. *ProblemReductionSearch*:AO*.*PopulationBasedSearch*:AntColonyOptimization,GeneticAlgorithm.*Game Playing:* Min Max Algorithm, Alpha-Beta Pruning.

UNIT 2

Knowledge Representation: Types of Knowledge, Knowledge Representation Techniques/schemes: Propositional Logic, Predicate Logic, Semanticnets, Frames. Knowledge representation issues. Rule based systems.

UNIT 3

Reasoning under Uncertainty: Basics of Probability Theory, Probabilistic Reasoning, Bayesian Reasoning, Dempster-Shafer Theory.
Planning: Introduction to Planning, Representation of Planning, Partial-order Planning.
UNIT 4

Learning: Introduction to Learning, Types of Learning: Learning by Induction, Rote Learning, Symbol Based Learning, Identification Trees, Explanation Based Learning, Transformational Analogy, Introduction to Neural Networks, Expert Systems, Current trends in Artificial Intelligence

Suggested Test books:

1.Artificial Intelligence: A Modern Approach Third Edition Stuart Russell and PeterNorvig,2010,Pearson- Education.

Suggested reference books:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill,3rded.,2009.
2. Introduction to Artificial Intelligence & Expert Systems, Dan WPatterson,PHI.,2010.
3. Artificial intelligence, Patrick Henry Winston, 1992, Addition Wesley3Ed.

Course: Artificial Intelligence
Course Code: PCC-CSE-304G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the concept of Artificial Intelligence.	L2 (Understand)
CO2	To **Solve** the basic AI based problem solving, inference perception, knowledge representation and learning.	L3 (Apply)
CO3	To **Break down** real-world problems as state space problems, optimization problems or constraint satisfaction problems.	L4 (Analyze)
CO4	To **Analyze** AI techniques to real-world problems to develop intelligent systems.	L4 (Analyze)
CO5	To **Design** an expert system by using appropriate tools and techniques for implementing the intelligent system.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	2
CO2	2	2	3									1	2	2
CO3	2	3	2									1	2	2
CO4	2	2	2	3								1	1	2
CO5	2	2	2	3								1	2	1

ADVANCEDJAVA

Course code	PCC-CSE-306G				
Category	Professional Course Code				
Course title	Advanced Java				
Scheme and Credits	L	T	P	Credits	Semester6
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

UNIT1

Servlet: Servlet introduction, web terminology, servlet API, servlet Interface, generic servlet, Http servlet, servlet lifecycle, servlet with IDE (eclipse, My eclipse, Net beans), servlet request, servlet collaboration, servlet configuration, context, attribute in servlet, session technique in servlet, event and listener, servlet filter, CRUD, pagination, input output stream, annotation, single thread model, SSI;

JSP: Life cycle of JSP, JSP API,scripting elements,9ImplicitObjects,directiveelements,

Exceptions, action elements, expression language, MVC in JSP, JSTL, custom tags, pagination, CRUD, JSTL function, formatting, XML, SQL tags,

UNIT2

Struts: Introduction, features, models, components, struts2 architecture, action, configuration,interceptors, validation method, aware Interfaces,stuts2withI18N,zero configuration,struts2withtiles,hibernatewithstruts2,spring withstruts2,UItags;

MailAPI:java mail introduction, methods of sending email, sending mail by Gmail, receiving email, sending attachment, receiving attachment, sending html, forwarding, deleting email.

UNIT3

Hibernate(HB): Introduction, architecture, HB with IDE, HB Log4j, inheritance mapping, HB mapping, transaction management, HB query language, HB criteria query language, named query, HB caching, integration, HB lifecycle;

Spring: Introduction, modules, spring with IDE, dependency injection methods, spring AOP, spring Jdbc template, spring ORM, SPEL, MVC tag library, applications, spring remoting, springOXM, spring web, security models, springboot, spring with angular;

UNIT4

Android: Introduction, history & versions, architecture, building blocks, emulator, android widgets, activity and intents, android fragments, android menu, android service, SQLite, XML & JSON, androids peech,multimedia,telephony,maps;

Design Pattern: java design pattern, creational, structural, behavioral, J2EE patterns, presentation layers,

SuggestedText Books:

1. Patrick Naughton and HerbertzSchidt,"Java-2 the complete Reference", TMH
2. Sierra & bates, "Head First Java", O'Reilly.

SuggestedReferenceBooks:

1. E.Balaguruswamy, "Programming with Java", TMH
2. Horstmann, "Computing Concepts with Java2 Essentials", John Wiley.
3. Decker & Hirsh field, "Programming. Java", Vikas Publication.

Course: Advanced Java
Course Code: PCC-CSE-306G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the role of Servlet & JSP for Web designing.	L2 (Understand)
CO2	To **Demonstrate** the role of Spring & Struts.	L3 (Apply)
CO3	To **Differentiate** between Hibernate & Spring.	L4 (Analyze)
CO4	To **Analyze** Design Pattern of J2EE & Android.	L4 (Analyze)
CO5	To **Create** Mail API for understanding of mail system.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	3
CO2	2	3	2									1	3	2
CO3	2	2	3	2								1	3	2
CO4	2	2	3	2								1	3	2
CO5	2	2	2	2								1	3	2

MOBILE AND WIRELESS COMMUNICATION

Course code	ESC-CSE-308G				
Category	Engineering Science Course				
Course title	Mobile and wireless communication				
Scheme and Credits	L	T	P	Credits	Semester6
	3	0	0	3	
Classwork	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT1

Introduction: Application, History, Market Scenario, Reference Model and Overview, Wireless Local Loop and Cellular system.

Wireless Transmission: Frequencies, Signals, Antennae, Signal Propagation, Multiplexing, Modulation, Spread Spectrum.

MAC Layer: Specialized MAC, SDMA, FDMA, TDMA – Fixed TDM, Classical ALOHA, Slotted,ALOHA, CSMA, DAMA, PKMA, Reservation TDMA. Collision Avoidance, Polling, Inhibit Sense Multiple Access, CDMA.

Broadcasting: Unidirectional Distribution Systems, Digital Audio Broadcasting, Digital Video Broadcasting, Convergence of Mobile and Broadcasting Techniques.

UNIT2

GSM: Mobile Services,ArchitectureRadio,Interface,Protocol,Localization,CallingHandover,Security, New data services.

Wireless LAN: IEEE80211-System and Protocol Architecture, Physical Layer, MAC Layered Management
Bluetooth: User scenarios, Physical layer, MAC Layer, Networking, Security and Link Management Wimax

UNIT3

Mobile Network Layer: Mobile IP-Goals, Assumptions, Requirement, Entities, Terminology, IP Packet delivery, Agent Advertisement and Discovery, Registration, Tunneling, Encapsulation, Optimization, Reserve Tunneling, Security, IPv6 ,DHCP.

Mobile Adhoc Networks: Routing, Destination Sequence Distance Vector, Dynamic Source Routing, Hierarchical algorithms, Performance Metrics.

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping, TCP, Mobile TCP, Fast-retransmission TCP,Transaction oriented TCP.

UNIT4 Satellite Systems: **History, Applications, GEO, LEO, MEO, Routing, Localization, Handover in Satellite System.**

Support form Mobility: File System, WWW, HTML, System Architecture.

WAP:Architecture,WirelessDatagram,Protocol,WirelessTransportLayerSecurity,WirelessTransactionProtocol, Application Environment, Telephony Applications.

Suggested Reference Books:

1. JochenSchiller,"MobileCommunication",PearsonEducation,2002
2. LEE,"MobileCellularTelecommunications",McGRAW-Hill,2nd Edition.
3. The odoreSRappaport, "Wireless Communications", Pearson Education.

Course: Mobile and Wireless Communication
Course Code: ESC-CSE-308G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the key concepts of cellular communication and Satellite Systems.	L2 (Understand)
CO2	To **Demonstrate** the standards like GSM, Bluetooth, 802.11, WAP etc.	L3 (Apply)
CO3	To **Differentiate** various multiple-access techniques for mobile communications like FDMA, TDMA, and CDMA.	L4 (Analyze)
CO4	To **Analyze** various routing algorithms and applications of Mobile Ad-Hoc Networks.	L4 (Analyze)
CO5	To **Assess** Mobile IP Standard with packet delivery concept.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	3
CO2	2	3	2									1	1	2
CO3	2	2	3									1	2	2
CO4	2	2	2	2								1	3	3
CO5	3	2	2	3								1	3	1

PROJECT-I

Course code	PROJ-CSE-322G				
Category	Professional Core Course				
Course title	PROJECT- I				
Scheme and Credits	L	T	P	Credits	Semester6
	0	0	4	2	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.
The project will have 4 stages:
(*Marks for internal evaluation are given in brackets)

- Synopsis submission(5marks),
- 1st mid term progress evaluation (5marks)
- 2nd mid term progress evaluation (5marks)
- Final submission evaluation (10marks).

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and viva.

Course: PROJECT-I
Course Code: PROJ-CSE-322G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Define** the problem identification, requirements and analyze the feasibility.	L2 (Understand)
CO2	To **Demonstrate** knowledge, skills of professional engineer and applying hypothesis on Problem.	L3 (Apply)
CO3	To **Design** and develop the solution for real-life engineering problems.	L6 (Create)
CO4	To **Evaluate** the developed system to solve real world problems.	L5 (Evaluate)
CO5	Ability to **use** formal & informal communication with team members and guide.	L3 (Apply)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1						2	2	3	1	3	3
CO2	2	3	2	2					2	2		1	2	3
CO3	2	2	3	2					2	2	2	1	3	2
CO4	2	2	2	3					2	2	2	1	2	3
CO5	2	2	2						3	3		1	2	3

COMPILER DESIGN LAB

Course code	LC-CSE-324G				
Category	Professional Core Course				
Course title	Compiler Design Lab				
Scheme and Credits	L	T	P	Credits	Semester6
	0	0	3	1.5	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

List of programs:

1. Write a Program for Token separation with a given expression.
2. Write a Program for Token separation with a given file.
3. Write a Program for Lexical analysis using LEX tools.
4. Write a Program to identify whether a given line is a comment or not.
5. Write a Program to check whether a given identifier is valid or not.
6. Write a Program to recognize string sunder'a', 'a*b+', 'abb'.
7. Write a Program to simulate lexical analyser for validating operators.
8. Write a Program for implementation of Operator Precedence Parser.
9. Study of LEX and YACC tools:
   i) Write a Program for implementation of calculator using YACC tool.
   ii) Write a Program for implementation of Recursive Descent Parser using LEXtool.
10. Write a Program for implementation of LL(1)Parser.
11. Write a Program for implementation of LALR Parser

Note: At least 5 to 10 more exercises to be given by the teacher concerned.

Course: Compiler Design Lab
Course Code: LC-CSE-324-G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the concept of Lex/ Yacc Compilers.	L2 (Understand)
CO2	To **Use** various aspects like grammar, languages, operators, left recursion using practical experiments.	L3 (Apply)
CO3	To **Analyze** whether Regular Expressions belong to Grammar or not.	L4 (Analyze)
CO4	To **Analyze** Lexical Analyzer for validating operators.	L4 (Analyze)
CO5	To **Evaluate** the implementation of Operator Precedence Parser.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	2	3
CO2	2	3	2		2							1	2	2
CO3	2	2	3	2	2							1	1	2
CO4	2	2	3	2	2							1	2	3
CO5	2	2	2	3	2							1	3	2

ARTIFICIAL INTELLIGENCE LAB USING PYTHON

Course code	LC-CSE-326G				
Category	Professional Core Course				
Course title	Artificial Intelligence Lab Using Python				
Scheme and Credits	L	T	P	Credits	Semester6
	0	0	3	1.5	
Classwork	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

List of Program:

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to Implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman Problem using Python.
7. Write a Program to Implement Tower of Hanoi using Python.
8. Write a Program to Implement Monkey Banana Problem using Python.
9. Write a Program to Implement Missionaries-Cannibals Problems using Python.
10. Write a Program to Implement 8-QueensProblemusingPython.

Note: At least 5 to 10 more exercises to be given by the teacher concerned.

Course: Artificial Intelligence Lab using Python
Course Code: LC-CSE-326G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Use** Control Structures and Operators to write basic Python programming.	L3 (Apply)
CO2	To **Analyze** object-oriented concepts in Python.	L4 (Analyze)
CO3	To **Evaluate** the AI models pre-processed through various feature engineering algorithms by Python Programming.	L5 (Evaluate)
CO4	To **Develop** the code for the recommender system using Natural Language processing.	L6 (Create)
CO5	To **Design** various reinforcement algorithms to solve real-time complex problems.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	2
CO2	2	2	3		2							1	2	2
CO3	2	3	2		2							1	2	2
CO4	2	2	2	3	2							1	1	2
CO5	2	2	2	3	2							1	2	1

ADVANCED JAVA LAB

Course code	LC-CSE-328G				
Category	Professional Core Course				
Course title	Advanced Java Lab				
Scheme and Credits	L	T	P	Credits	Semester6
	0	0	2	1	
Classwork	25Marks				
Exam	25Marks				
Total	50Marks				
Duration of Exam	03Hours				

Students have to write at list 15 programs based on the course PCC-CSE-306G

Course: Advanced Java Lab
Course Code: LC-CSE-328-G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Explain** the basics of the Java.Net package	L2 (Understand)
CO2	To **Demonstrate** client-server interaction using Servlets.	L3 (Apply)
CO3	To **Analyze** applications to implement database interaction using JDBC.	L4 (Analyze)
CO4	To **Develop** Java Beans applications.	L6 (Create)
CO5	To **Create** server communication using TCP-IP and UDP.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	3
CO2	2	3	2		2							1	3	2
CO3	2	2	3	2	2							1	3	2
CO4	2	2	3	2	2							1	3	2
CO5	2	2	2	2	2							1	3	2

Constitution of India

Course code	MC-317G			
Category	Mandatory Course			
Coursetitle	**Constitution of India**			
Scheme and credits	L	T	P	Credits
	2	0	0	0

Unit– I

Philosophy of Indian Constitution: Salient features of Indian Constitution, Preamble, and Nature of Indian Constitution, Procedure for amendment of the Constitution.

Unit– II

Federal structure and distribution of legislative and financial powers between the Union and the States

Unit– III

Organs of Governance: President – Qualification and Powers of the President, Governor- Qualification and Powers of Governor, Parliament: Composition, Qualifications and Disqualifications, Judiciary: Appointment, Tenure and Removal of Judges.

Unit– IV

Fundamental Rights: Origin and development of Fundamental rights, Need for fundamental rights. Introduction to Right to equality, Right to freedom, Right against exploitation, Right to freedom of religion, Cultural and Education rights and Fundamental duties.

References:

1. The Constitution of India,1950 (BareAct), Government Publication.
2. Dr.S.N.Busi, Dr. B.R. Ambedkar framing of Indian Constitution, latest Edition
3. M.P.Jain, Indian Constitution Law, Lexis Nexis, latest edition
4. D.D.Basu, Introduction to Constitution of India, Lexis Nexis, latest edition.

Course: Constitution of India
Course Code: MC-317-G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Understand** the basic features of Constitution of India	L2 (Understand)
CO2	To **Understand** about salient features of the Constitution of India.	L2 (Understand)
CO3	To **Understand** fundamental duties and federal structure of Constitution of India.	L2 (Understand)
CO4	To **Understand** about emergency provisions in Constitution of India.	L2 (Understand)
CO5	To **Understand** about fundamental rights under Constitution of India.	L2 (Understand)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO8**	**PO9**	**PO1 0**	**PO1 1**	**PO12**	**PSO1**	**PSO2**
CO1						3		2				1	0	1
CO2						3		2				1	0	1
CO3						2		3				1	0	1
CO4						3		2				1	1	1
CO5						3		2				1	1	1

ADVANCED DATA BASE MANAGEMENT SYSTEM

Course code	PEC-CSE-310G				
Category	Professional Elective Course				
Course title	Advanced Database Management System				
Scheme and Credits	L	T	P	Credits	Semester6
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

UNIT1

Introduction: Architecture, Advantages, Disadvantages, Data models, relational algebra, SQL , Normal forms. **Query Processing:** General strategies for query processing, transformations, expected size, statistics in estimation, query improvement. Query evaluation, view processing, query processor.

UNIT2

Recovery: Reliability, Transactions, recovery in centralized DBMS, reflecting updates, Buffer management logging schemes, disaster recovery.

Concurrency: Introduction, Serializability, Concurrency control, Locking schemes, Time stamp based ordering, Optimistic, Scheduling, Multiversion techniques, Deadlocks.

UNIT3

Parallel and Distributed Databases: Distributed Data Storage – Fragmentation & Replication, Location and Fragment. Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

UNIT4

Objected Oriented and Object Relational Databases: Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Suggested Text Book:

1. Elmarsi, Navathe, Somayajulu, Gupta, “Fundamentals of Database Systems”, 4thEdition,PearsonEducation,2007
2. Garcia, Ullman, Widom, “Database Systems, The complete book”, PearsonEducation,2007
3. R. Ramakrishnan, “Database Management Systems”, McGraw Hill InternationalEditions,1998

Suggested References Books:

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th EditionPearsonEducation,2007
2. SinghS.K.,"Database System Concepts,design and application",PearsonEducation,2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition,2006
4. W.Kim,"Modern Database Systems",1995,ACMPress,Addision Wesley,

Course: Advanced Database Management System (Elective-II)
Course Code: PEC-CSE-310G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** Basic Components, Terms, Advantages and Disadvantages of DBMS.	L2 (Understand)
CO2	To **Illustrate** the Transactions issues and concurrency control.	L2 (Understand)
CO3	To **Demonstrate the** ER, EER, Network, Hierarchical and Relational data models.	L3 (Apply)
CO4	To **Analyze** Parallel and Distributed Databases and Query Processing and Optimization.	L4 (Analyze)
CO5	To **Compare** Object Oriented and Object Relational Databases.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	3
CO2	2	3	2									1	2	2
CO3	2	2	3	2								1	2	2
CO4	2	2	3	2								1	3	2
CO5	2	2	3	2								1	2	2

DISTRIBUTED SYSTEM

Course code	PEC-CSE-316G				
Category	Professional Elective Course				
Course title	Distributed System				
Scheme and Credits	L	T	P	Credits	Semester6
	3	0	0	3	
Classwork	25Marks				
Exam	75Marks				
Total	100Marks				
Duration of Exam	03Hours				

UNIT1

Introduction: Distributed Operating Systems Definition and goals, Hardware and Software concepts, Design issues.

Communication in Distributed System: Computer Network and Layered protocols, Message passing and related issues, synchronization, Client Server model & its implementation, remote procedure call and implementation issues, Case Studies: SUNRPC,DECRPC

UNIT2

Synchronization in Distributed System: Clock synchronization and related algorithms, mutual exclusion, Dead lock in distributed systems

Processes and processors in Distributed systems: Threads, system model, processor allocation, scheduling in distributed systems: Load balancing and sharing approach, fault tolerance, real time distributed systems, Process migration and related issues

UNIT3

Distributed Filesystems: Introduction,features & goal of distributed File system,file models, file accessing models, file sharing semantics, file caching scheme, file replication, fault tolerance, trends in distributed filesystem, case study.

Distributed Shared Memory: Introduction, general architecture of DSM systems, design and implementation issues of DSM, granularity, structure of shared memory space, consistency models, replacement strategy, thrashing

UNIT4

Security Issues: Introduction of Security in Distributed OS, Overview of security techniques, features, Need, Access Control, Security Management

Distributed Web-based Systems: Architecture, Processes, Communication, Naming, Synchronization

Case Studies: JAVARMI, Sun Network File System, Google Case Study

Suggested Reference books:

1. Distributed Operating Systems by Andrew STannebaum, Pearson
2. Distributed Operating Systems Concepts and Design, PradeepK.Sinha,PHI
3. Distributed Systems: Concepts and Design by George Coulouris, Jean Dollimore, TimKindberg, Pearson
4. Distributed Computing by Sunita Mahajan & Seema Shah OXFORD
5. Distributed Systems: Principles and Paradigms by Andrew STanebaum, Maarten VanSteen, PHI
6. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, HagitAttiya and JenniferWelch, Wiley India

Course: Distributed System (Elective-III)
Course Code: PCC-CSE-316G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the Goals, Issues, hardware & software concepts of the Distributed system.	L1 (Remember)
CO2	To **Discuss** the Communication & Synchronization Algorithms in Distributed System.	L2 (Understand)
CO3	To **Apply** Scheduling & Processor Allocation Techniques for Load balancing.	L3 (Apply)
CO4	To **Analyze** the Design & functioning of Distributed file System & Shared Memory.	L4 (Analyze)
CO5	To **Examine** the security issues of Distributed System & Distributed Web-based System**.**	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	3	3
CO2	3	2										1	3	2
CO3	2	3	2									1	3	2
CO4	2	3	3									1	3	2
CO5	2	3	2									1	3	2

B.Tech. (COMPUTER SCIENCE & ENGINEERING)
Scheme of Studies/Examination
Semester 7th
w.e.f. 2021-2022

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assesment	Theory	Practical	Total	
1	Professional Core Course	PCC-CSE-401G	Neural Networks	3	0	0	3	3	25	75		100	3
2	Professional Elective Course	Refer to Annexure IV	Professional Elective –IV	3	0	0	3	3	25	75		100	3
3	Professional Elective Course	Refer to Annexure V	Professional Elective –V	3	0	0	3	3	25	75		100	3
4	Open Elective Course	Refer to Annexure OEC-I	Open Elective –I	3	0	0	3	3	25	75		100	3
5	Professional Core Course	LC-CSE-421G	Neural Networks Lab	0	0	2	2	1	25	-	25	50	3
6	Project	PROJ-CSE-423G	Project-II	0	0	6	6	3	50	-	50	100	3
7	Professional Core Course	PT-CSE-425G	Practical Training-II	0	0	0	1	-	-	-	-	-	-
		TOTAL CREDIT						**16**	**175**	**300**	**75**	**550**	

NOTE:

1. Practical Training II: The evaluation of Practical Training-II will be based on seminar, viva-voce, report submitted by the students. According to performance, the students will be awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical

Training.

2. Choose one subject from each Professional Elective –IV, Professional Elective –V and Open Elective – I. List of elective subjects is attached as annexures.

Annexure IV: Professional Elective -IV

1. PEC-CSE-403G: Software Project Management
2. PEC-CSE-405G: Web Mining
3. PEC-CSE-407G: Predictive Analysis
4. PEC-CSE-409G: Information Hiding Techniques

Annexure V: Professional Elective -V

1. PEC-CSE-411G: Network Security and cryptography
2. PEC-CSE-413G: Software Testing
3. PEC-CSE-415G: Cyber Security Threats
4. PEC-CSE-417G: Advanced Computer Architecture

Annexure OEC-I: Open Elective-I

1. OEC-PHY-101G: Material Science
2. OEC-ECE-451-G: Electronic Principles
3. HSMC-08G: Fundamentals of Management
4. OEC-CE-451-G: Disaster Management
5. HSMC-10G: English for Professionals

NEURAL NETWORK

Course code	PCC-CSE-401G				
Category	Professional Core Course				
Course title	Neural Networks				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT 1

Overview of biological neurons: Structure of biological neuron, neurobiological analogy, Biological neuron equivalencies to artificial neuron model, Evolution of neural network.

Activation Functions: Threshold functions, Signum function, Sigmoid function, Tan-hyperbolic function, Stochastic function, Ramp function, , Linear function, Identity function.

ANN Architecture: Feed forward network, Feed backward network, single and multilayer network, fully recurrent network,

UNIT 2

McCulloch and Pits Neural Network (MCP Model): Architecture, Solution of AND, OR function using MCP model, Hebb Model: Architecture, training and testing, Hebb network for AND function.

Perceptron Network: Architecture, training, Testing, single and multi-output model, Perceptron for AND function

Linear function, application of linear model, linear seperatablity, solution of OR function using liner seperatablity model.

UNIT 3

Learning: Supervised, Unsupervised, reinforcement learning, Gradient Decent algorithm, generalized delta learning rule, Habbian learning, Competitive learning, Back propogation Network: Architecture, training and testing,

UNIT 4

Associative memory: Auto associative and Hetro associative memory and their architecture, training (insertion) and testing (Retrieval) algorithm using Hebb rule and Outer Product rule. Storage capacity, Testing of associative memory for missing and mistaken data, Bidirectional memory

Text Books:

1. Introduction to artificial Neural systems by Jacek M. Zurada, 1994, Jaico Publ. House.
2. Principles of Soft Computing by S.N. Deepa, S.N. Sivanandam., Weley publication

Reference Books:

1. "Neural Networks :A Comprehensive formulation", Simon Haykin, 1998, AW
2. "Neural Networks", Kosko, 1992, PHI.
3. "Neural Network Fundamentals" – N.K. Bose , P. Liang, 2002, T.M.H
4. Neural Network , T.N.Shankar, University Science Press
5. Neuro Fuzzy Systems, Lamba, V.K., University Science Press

Course: Neural Networks
Course Code: PCC-CSE-401G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Understand** the concept of Biological neurons and Activation function.	L2 (Understand)
CO2	To **Describe** the concepts ANN architecture in single and multi-layer Network.	L2 (Understand)
CO3	To **Analyze** various types of Models: MCP Model and Perceptron Network .	L4 (Analyze)
CO4	To **Identify** the types of Learning and their Learning concepts.	L4 (Analyze)
CO5	To **Conceptualize** about different types of Associative Memory.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	2
CO2	3	2	1									1	2	2
CO3	2	3	1									1	2	2
CO4	2	3	1									1	2	3
CO5	2	3	1									1	2	1

NEURAL NETWORKS LAB

Course code	LC-CSE-421G				
Category	Professional Core Course				
Course title	Neural Networks Lab				
Scheme and Credits	L	T	P	Credits	Semester 7
	0	0	2	1	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam					

Practical problems:

1. Introduction to Matlab in context with NN.
2. Plotting of Activation Functions: Threshold functions, Signum function, Sigmoid function, Tan-hyperbolic function, Ramp function, Identity function using matlab
3. Implementation of some basic model like MCP with suitable example.
4. Implementation of Hebb model with suitable example.
5. How the weights and bias values affect the output of a neuron.
6. How the choice of activation function (or transfer function) affects the output of a neuron. Experiment with
7. Implementation of linearly separable concept for a problem.
8. To study some basic neuron models and learning algorithms by using Matlab's neural network toolbox.

Course: NEURAL NETWORKS USING MATLAB
Course Code: LC-CSE-421G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Understand** basic neuron models and learning algorithms by using Matlab's neural network toolbox	L2 (Understand)
CO2	To **Describe** about different activation function (transfer function).	L2 (Understand)
CO3	To **Analyze** how weights & bias values affect the output of neuron.	L4 (Analyze)
CO4	To **Identify** how weights & bias values are able to represent a decision boundary in the feature space.	L4 (Analyze)
CO5	To **Conceptualize** about perceptron learning rule works for linearly separable problems.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	2										1	1	2
CO2	3	2	1		2							1	2	2
CO3	2	3	1		2							1	2	2
CO4	2	3	1		2							1	2	3
CO5	2	3	1		2							1	2	1

PROJECT-II

Course code	PROJ-CSE-423G				
Category	Professional Core Course				
Course title	Project-II				
Scheme and Credits	L	T	P	Credits	Semester 7
	0	0	6	3	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hrs				

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.

The project will have 4 stages: (*Marks for internal evaluation are given in brackets)

1. Synopsis submission (10 marks),
2. 1st mid-term progress evaluation (10 marks)
3. 2nd mid-term progress evaluation (10 marks)
4. Final submission evaluation (20 marks).

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and viva.

Course: PROJECT-II
Course Code: PROJ-CSE-423G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Define** the problem identification, requirements and analyze the feasibility.	L2 (Understand)
CO2	To **Demonstrate** knowledge, skills of professional engineer and applying hypothesis on Problem.	L3 (Apply)
CO3	To **Design** and develop the solution for real-life engineering problems.	L6 (Create)
CO4	To **Evaluate** the developed system to solve real world problems.	L5 (Evaluate)
CO5	Ability to **use** formal & informal communication with team members and guide.	L3 (Apply)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	1						2	2	3	1	3	3
CO2	2	3	2	2					2	2		1	2	3
CO3	2	2	3	2					2	2	2	1	3	2
CO4	2	2	2	3					2	2	2	1	2	3
CO5	2	2	2						3	3		1	2	3

PRACTICAL TRAINING-II

<table>
<tr><td>Course code</td><td colspan="5">PT-CSE-425G</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Practical Training-II</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester 7</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td></tr>
<tr><td>Class work</td><td colspan="5"></td></tr>
<tr><td>Exam</td><td colspan="5"></td></tr>
<tr><td>Total</td><td colspan="5"></td></tr>
<tr><td>Duration of Exam</td><td colspan="5"></td></tr>
</table>

Practical Training II: The evaluation of Practical Training-II will be based on seminar, viva-voce, report submitted by the students. According to performance, the students are awarded grades A, B, C, F. A student who is awarded 'F' grade is required to repeat Practical Training.

SOFTWARE PROJECT MANAGEMENT

Course code	PEC-CSE-403G				
Category	Professional Elective Course				
Course title	Software Project Management				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT 1

Introduction to Software Project Management (SPM): Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

UNIT 2

Project Evaluation & Estimation: Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, waterfall, V-process model, spiral models, Prototyping, delivery. Albrecht function point analysis.

Activity planning & Risk Management: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project, precedence networks.

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values.

UNIT 3

Resource allocation & monitoring the control: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

Monitoring the control: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

Managing contracts and people: Introduction, types of contracts, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behaviour, organizational behaviour: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures.

UNIT 4

Software quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, Practical software quality measures, product versus process quality management, external standards, techniques to help enhance software quality.

Text Book:

1. Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH

Reference Books:

1. Software Engineering – A Practitioner's approach, Roger S. Pressman (5th edi), 2001, MGH
2. Software Project Management, Walker Royce, 1998, Addison Wesley.
3. Project Management 2/c. Maylor
4. Managing Global software Projects, Ramesh, 2001, TMH.

Course: Software Project Management (Professional Elective –IV)
Course Code: PEC-CSE-403G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Recall** the fundamental principles of software project management.	L1 (Remember)
CO2	To **Understand** Estimation, Planning, And Tracking.	L2 (Understand)
CO3	To **Recognize** good knowledge of responsibilities of a project manager.	L2 (Understand)
CO4	To **Interpret** the importance of software quality and techniques to enhance software quality	L3 (Apply)
CO5	To **Compare** and differentiate organization structures and project structures.	L4(Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											2	2	3
CO2	2	3										2	1	2
CO3	2	2							2			2	2	3
CO4	2	2									3	2	3	1
CO5	2	3									2	2	2	1

Web Mining

Course code	PEC-CSE-405G				
Category	Professional Elective Course				
Course title	Web Mining				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit: 1

Data Mining Foundations: Basic concepts in data Mining, Web mining versus Data mining, Discovering knowledge from Hypertext data; An overview of web mining : What is Web mining, Web mining taxonomy, Web mining subtasks, issues, challenges

Unit: 2

Web Search and Information Retrieval : Information Retrieval Models, Web Search and IR, Text Mining, , Latent Semantic Indexing, Web Spamming, Clustering and Classification of Web Pages, Information Extraction , Web Content Mining;

Unit: 3

Optimization : Introduction to Models and Concept of Computational Intelligence, Social Behavior as Optimization: Discrete and Continuous Optimization Problems, Classification of Optimization Algorithms, Evolutionary Computation Theory and Paradigm, Swarm and Collective intelligence

Unit: 4

Swarm Intelligence Techniques: Particle Swarm Optimization, Ant Colony Optimization, Artificial Bees and Firefly Algorithm etc., Hybridization and Comparisons of Swarm Techniques, Application of Swarm Techniques in Different Domains and Real World Problems

Suggested books:

1. Witton Frank, Data Mining , Morgan Kauffan Publishers.
2. Kennedy, J. and Eberhart, R.C., Swarm Intelligence, Morgan Kaufmann Publishers, 2001
3. Bonabeau, E., Dorigo, M. and Theraulaz, G., Swarm Intelligence: From Natural to Artifical Systems, Oxford University Press, 1999
4. Dorigo, M., Stutzle, T., Ant Colony Optimization, MIT Press, 2004
5. Parsopoulos, K.E., Vrahatis, M.N., Particle Swarm Optimization and Intelligence: Advances and Applications, Information Science Reference, IGI Global, 2010
6. Clerc, M., ParticleSwarm Optimization, ISTE, 2006
7. Nature Inspired Metaheuristic Algorithms, Xin-She Yang, Luniver Press, 2010

Course: Web Mining (Professional Elective –IV)
Course Code: PEC-CSE-405G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Recall** the basic concepts and techniques of Web Mining, Data Mining, and Web Mining Challenges.	L1 (Remember)
CO2	To **Discuss** the application of Swarn Intelligence Techniques in real-world problems.	L2 (Understand)
CO3	To **Illustrate** Information retrieval models and Web Content Mining.	L3 (Apply)
CO4	To **Classify** the concept of Computational Intelligence and Optimization algorithms.	L4 (Analyze)
CO5	To **Assess** the performance of different Swarn Intelligence Techniques.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											1	2	2
CO2	2	2										1	2	2
CO3	2	2	2	1								1	2	2
CO4	2	2	1	3								1	2	2
CO5	2	1	2	2								1	1	1

NETWORK SECURITY AND CRYPTOGRAPHY

Course code	PEC-CSE-411G				
Category	Professional Elective Course				
Course title	Network Security and Cryptography				
Scheme and Credits	L	T	P	Credits	Semester 7
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT- I

Introduction: Plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography.

UNIT- II

Symmetric Key Algorithms:- Introduction, algorithms types and modes, DES, AES.

Asymmetric Key Algorithms: Introduction, history of asymmetric key cryptography, RSA symmetric and asymmetric key cryptography together, Digital signature.

UNIT- III

Internet Security Protocols: Basic concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), S SL versus SET, Electronic Money, Email Security.

UNIT- IV

User Authentication And Kerberos:- Introduction, Authentication basics, Passwords, authentication tokens, certificate based authentication, biometric based authentication, Kerberos, key distribution center(KDC), Security handshake pitfalls, single Sign on(SSO) approach.

TEXT/ REFERENCE BOOKS:

1. Cryptography and Network Security, 2nd Edition by Atul Kahate, TMH
2. Network Management Principles & Practices by Subramanian, Mani (AWL)
3. SNMP, Stalling, Willian (AWL)
4. SNMP: A Guide to Network Management (MGH)
5. Telecom Network Management by H.H. Wang (MGH)
6. Network Management by U. Dlack (MGH)

Course: Network Security and Cryptography (Professional Elective –V)
Course Code: PEC-CSE-411G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy's
CO1	To **Understand** various attacks and need of Cryptography.	L2 (Understand)
CO2	To **Apply** various substitution and transposition ciphers for securing a message.	L3 (Apply)
CO3	To **Analyze** the need and functioning of various block ciphers.	L4 (Analyze)
CO4	To **Evaluate** how to maintain the Confidentiality, Integrity and Availability.	L5 (Evaluate)
CO5	To **Create** various public key algorithm for securing the message.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	2
CO2	2	2	1									1	1	1
CO3	3	2	2									1	1	2
CO4	2	2	2									1	1	1
CO5	2	2	2	2								1	1	1

ADVANCED COMPUTER ARCHITECTURE

Course code	PCC-CSE-417G				
Category	Professional Elective Course				
Course title	Advanced Computer Architecture				
Scheme and Credits	L	T	P	Credits	
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit 1

Architecture And Machines: Some definition and terms, interpretation and microprogramming. The instruction set, Basic data types, Instructions, Addressing and Memory. Virtual to real mapping. Basic Instruction Timing.

Unit 2

Cache Memory Notion: Basic Notion, Cache Organization, Cache Data, adjusting the data for cache organization, write policies, strategies for line replacement at miss time, Cache Environment, other types of Cache. Split I and D-Caches, on chip caches, Two level Caches, write assembly Cache, Cache references per instruction, technology dependent Cache considerations, virtual to real translation, overlapping the Tcycle in V-R Translation, studies. Design summary.

Unit 3

Memory System Design: The physical memory, models of simple processor memory interaction, processor memory modeling using queuing theory, open, closed and mixed-queue models, waiting time, performance, and buffer size, review and selection of queuing models, processors with cache.

Unit 4

Concurrent Processors: Vector Processors, Vector Memory, Multiple Issue Machines, Comparing vector and Multiple Issue processors.

Shared Memory Multiprocessors: Basic issues, partitioning, synchronization and coherency, Type of shared Memory multiprocessors, Memory Coherence in shared Memory Multiprocessors.

Text Book:

Advance computer architecture by Hwang & Briggs, 1993, TMH.

Reference Books:

Pipelined and Parallel processor design by Michael J. Fiynn – 1995, Narosa

Course: Advanced Computer Architecture (Professional Elective –V)
Course Code: PEC-CSE-417G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Discuss** the computational model and micro architectural design of Advance Computer Architecture.	L2 (Understand)
CO2	To **Describe** various parallel processing techniques, performance measures and code scheduling.	L2 (Understand)
CO3	To **Interpret** the role of VLIW Superscalar processor and branch handling techniques for performance improvement.	L3 (Apply)
CO4	To **Analyze** various MIMD architecture, various static and dynamic networks for realizing the efficient network.	L4 (Analyze)
CO5	To **Distinguish** advance processor technology, memory hierarchy and cache tolerance using directory based and snoopy class of protocols.	L4 (Analyze)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										1	1	2
CO2	3	2	2									1	1	3
CO3	3	2	2									1	1	2
CO4	2	3	2									1	1	3
CO5	3	2	2	2								1	1	1

FUNDAMENTALS OF MANAGEMENT

Course code	HSMC-08G				
Category	Open Elective Course				
Course title	Fundamentals of Management				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT 1

Meaning of management, Definitions of Management, Characteristics of management, Management vs. Administration. Management-Art, Science and Profession. Importance of Management.

Development of Management thoughts. Principles of Management. The Management Functions, Inter-relationship of Managerial functions. Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

UNIT 2

Production Management: Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.

UNIT 3

Marketing Management - Definition of marketing, marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

UNIT 4

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

Suggested Books:

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S.Bhalla.(Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

Suggested Reference Books:

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2. Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).
4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner & R.Edward Freeman, PHI.

Course: Fundamentals of Management (Open Elective –I)
Course Code: HSMC-08G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the Basics of Management and the role of Management in an organization.	L2 (Understand)
CO2	To **Explain** the Importance of Staffing and Training.	L2 (Understand)
CO3	To **Discuss** the concept of Material management and Inventory Control.	L2 (Understand)
CO4	To **Analyze** the components of Marketing and Advertising.	L4 (Analyze)
CO5	To **Assess** the Various sources of Finance and Capital Structure.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1											3	2	1	2
CO2									3	2	2	2	1	2
CO3											3	2	1	2
CO4											3	2	1	2
CO5											3	2	1	2

B.Tech. (COMPUTER SCIENCE & ENGINEERING)
Scheme of Studies/Examination
Semester 8th
w.e.f. 2021-2022

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit	Examination Schedule (Marks)				Duration of Exam (Hours)
				L	T	P			Internal Assesment	Theory	Practical	Total	
1	Professional Core Course	PCC-CSE-402G	Machine Learning	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE-404G	Big Data Analytics	3	0	0	3	3	25	75		100	3
3	Open Elective Course	Refer to Annexure OEC-III	Open Elective-II	3	0	0	3	3	25	75		100	3
4	Professional Core Course	LC-CSE-410G	Big Data Analytics Lab	0	0	0	2	1	25		25	50	3
5	Professional Core Course	LC-CSE-412G	Machine Learning with Python Lab	0	0	2	2	1	25		25	50	3
6	Project	PROJ-CSE-422G	Project-III	0	0	8	4	4	50		50	100	3
		TOTAL CREDIT						**15**	**175**	**225**	**100**	**500**	

NOTE:
Choose one subject from open Elective – II. List of elective subjects is attached as annexure.

Annexure OEC-II: Open Elective-II

1. PEC-ME-410G: Quality Engineering
2. OEC-ECE-430G: Wireless Adhoc and Sensor Networks
3. OEC-ECE-452-G: Intelligent Instrumentation for Engineers
4. OEC-CE- 448G: Traffic Engineering and Road Safety
5. OEC-EE-08G: Conventional and Renewable Energy Resources

BASICS OF MACHINE LEARNING

Course code	PCC-CSE-402G				
Category	Professional Core Course				
Course title	Basics of Machine Learning				
Scheme and Credits	L	T	P	Credits	Semester-8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit-1

Introduction

Machine Learning: Definition, History, Need, Features, Block diagrammatic representation of learning machines, Classification of Machine Learning: Supervised learning, Unsupervised learning, Reinforcement Learning, Machine Learning life cycle, Applications of Machine Learning.

Unit-2

Dimensionality Reduction

Dimensionality reduction: Definition, Row vector and Column vector, how to represent a dataset, how to represent a dataset as a Matrix, Data preprocessing in Machine Learning: Feature Normalization, Mean of a data matrix, Column Standardization**,** Co-variance of a Data Matrix, Principal Component Analysis for Dimensionality reduction.

Unit-3

Supervised Learning

Supervised Learning: Definition, how it works. Types of Supervised learning algorithms k - Nearest Neighbours, Naïve Bayes, Decision Trees, Naive Bayes, Linear Regression, Logistic Regression, Support Vector Machines.

Unit-4

Unsupervised Learning

Unsupervised Learning: Clustering: K-means. Ensemble Methods: Boosting, Bagging, Random Forests.

Evaluation: Performance measurement of models in terms of accuracy, confusion matrix, precision & recall, F1-score, receiver Operating Characteristic Curve (ROC) curve and AUC, Median absolute deviation (MAD), Distribution of errors

Suggested books

1. E. Alpaydin, Introduction to
2. Machine Learning, Prentice Hall of India, 2006.
2. T Hastie, R Tibshirani and J Friedman, The Elements of Statistical Learning Data Mining, Inference, and Prediction, 2nd Edition, Springer, 2009.
3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2010.

Suggested reference books

1. R. O. Duda, P. E. Hart, and D.G. Stork, Pattern Classification, John Wiley and Sons, 2012.
2. Simon O. Haykin, Neural Networks and Learning Machines, Pearson Education, 2016

Course: Machine Learning
Course Code: PCC-CSE-402G

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CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the basic concept and the importance of Machine Learning.	L2 (Understand)
CO2	To **Explain** the Machine Learning Models and features of machine learning to apply to real world problems.	L2 (Understand)
CO3	To **Apply** the concept of Machine Learning algorithms as supervised learning and unsupervised learning	L3 (Apply)
CO4	To **Analyze** the Regression, Classification and Clustering Techniques of Machine learning.	L4 (Analyze)
CO5	To **Evaluate** various machine learning algorithms through statistical learning techniques.	L5 (Evaluate)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2										2	3	2
CO2	3	2										2	2	1
CO3	2	2	3									2	3	2
CO4	2	2	3									2	3	3
CO5	2	2	3	1								2	2	1

BIG DATA ANALYTICS

Course code	PCC-CSE-404G				
Category	Professional Core Course				
Course title	Big Data Analytics				
Scheme and Credits	L	T	P	Credits	Semester 8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit: 1

Introduction to Big Data: Big Data: Why and Where, Application and Challenges, Characteristics of Big Data and Dimensions of Scalability, The Six V, Data Science: Getting Value out of Big Data, Steps in the Data science process, Foundations for Big Data Systems and Programming, Distributed file systems

Unit: 2

Data Repositories and Big Data Platforms: RDBMS, NoSQL, Data Marts, Data Lakes, ETL, and Data Pipelines, Foundations of Big Data, Big Data Processing Tools, Modern Data Ecosystem, Key Players, Types of Data, Understanding Different Types of File Formats, Sources of Data Using Service Bindings

Unit: 3

Introduction to Big Data Modeling and Management: Data Storage, Data Quality, Data Operations, Data Ingestion, Scalability and Security Traditional DBMS and Big Data Management Systems, Real Life Applications, Data Model: Structure, Operations, Constraints, Types of Big Data Model

Unit: 4

Big Data Integration and processing: Big Data Processing, Retrieving: Data Query and retrieval, Information Integration, Big Data Processing pipelines, Analytical operations, Aggregation operation, High level Operation, Tools and Systems: Big Data workflow Management

Suggested books:

Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

Suggested reference books

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.

4. Anand Rajaraman and Jef rey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
6. Glen J. Myat, “Making Sense of Data”, John Wiley & Sons, 2007
7. Pete Warden, “Big Data Glossary”, O’Reily, 2011.
8. Michael Mineli, Michele Chambers, Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.
9. ArvindSathi, “BigDataAnalytics: Disruptive Technologies for Changing the Game”, MC Press, 2012
10. Paul Zikopoulos ,Dirk DeRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , "Harness the Power of Big Data The IBM Big Data Platform ", Tata McGraw Hill Publications, 2012.

Course: Big Data Analytics
Course Code: PCC-CSE-404G

CO (Course Outcomes)		RBT*- Revised Bloom’s Taxonomy
CO1	To **Describe** the need for Big Data challenges, applications and their Business Implications.	L2 (Understand)
CO2	To **Demonstrate** the conceptual, logical, and physical Big Data Model.	L3 (Apply)
CO3	To **Analyze** the Big Data framework like Hadoop, and NOSQL to efficiently store and process Big Data to generate analytics.	L4 (Analyze)
CO4	To **Classify** the Workflow system for Big Data like Swift, Taverna, Kepler.	L4 (Analyze)
CO5	To **Develop** all-purpose big data pipeline architecture.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											1	2	2
CO2	2	3										1	2	3
CO3	2	2	3	1								1	3	2
CO4	2	2	1	3								1	2	2
CO5	2	1	2	3								1	1	1

BIG DATA ANALYTICS LAB

Course code	LC-CSE-421G				
Category	Big Data Analytics				
Course title	Neural Networks Lab				
Scheme and Credits	L	T	P	Credits	Semester 8
	3	0		3	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

A student has to attempt 12-15 practicals based on theory on an open-source tool.

Course: Big Data Analytics Lab
Course Code: LC-CSE-410G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the key issues in Big Data Management and experiment with the Hadoop framework.	L2 (Understand)
CO2	To **Explain** the structure and unstructured data by using No SQL commands.	L2 (Understand)
CO3	To **Apply** scientific computing algorithms for finding similar items and clustering.	L3 (Apply)
CO4	To **Test** fundamental enabling techniques and scalable algorithms for data stream mining.	L5 (Evaluate)
CO5	To **Develop** problem solving and critical thinking skills in fundamental enable techniques like Hadoop & Map Reduce.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3											1	2	2
CO2	2	3			2							1	2	3
CO3	2	2	3	1	2							1	3	2
CO4	2	2	1	3	2							1	2	2
CO5	2	1	2	3	2							1	1	1

MACHINE LEARNING WITH PYTHON

Course code	LC-CSE-421G				
Category	MACHINE LEARNING WITH PYTHON				
Course title	MACHINE LEARNING WITH PYTHON LAB				
Scheme and Credits	L	T	P	Credits	Semester 8
	3	0		3	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

A student has to attempt 12-15 practicals based on theory on an open-source tool.

Course: Machine Learning with Python Lab
Course Code: LC-CSE-412G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the implementation procedures for the Machine Learning algorithms.	L2 (Understand)
CO2	To **Apply** appropriate data sets to the Machine Learning algorithms.	L3 (Apply)
CO3	To **Use** Machine Learning algorithms to solve real-world problems.	L3 (Apply)
CO4	To **Outline** predictions using machine learning algorithms.	L4 (Analyze)
CO5	To **Design** Java/Python programs for various Machine Learning algorithms.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2		2								1	3	3
CO2	3	3	2									1	3	2
CO3	3	2	3	2								1	3	2
CO4	3		3	2								1	3	2
CO5	3	2		3								1	3	2

Project-III

Course code	PROJ-CSE-422G				
Category	Professional Core Course				
Course title	Project-III				
Scheme and Credits	L	T	P	Credits	Semester 8
	0	0	8	4	
Class work	50 Marks				
Exam	50 Marks				
Total	50 Marks				
Duration of Exam	03 Hrs				

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.

The project will have 4 stages: (*Marks for internal evaluation are given in brackets)

1. Synopsis submission (10 marks),
2. 1st mid-term progress evaluation (10 marks)
3. 2nd mid-term progress evaluation (10 marks)
4. Final submission evaluation (20 marks).

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and viva.

Course: PROJECT-III
Course Code: PROJ-CSE-422G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Define** the problem identification, requirements and analyze the feasibility.	L2 (Understand)
CO2	To **Demonstrate** knowledge, skills of professional engineer and applying hypothesis on Problem.	L3 (Apply)
CO3	To **Design** and develop the solution for real-life engineering problems.	L6 (Create)
CO4	To **Evaluate** the developed system to solve real world problems.	L6 (Evaluate)
CO5	Ability to **use** formal & informal communication with team members and guide.	L3 (Apply)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	1						2	2	3	1	3	3
CO2	2	3	2	2					2	2		1	2	3
CO3	2	2	3	2					2	2	2	1	3	2
CO4	2	2	2	3					2	2	2	1	2	3
CO5	2	2	2						3	3		1	2	3

WIRELESS ADHOC AND SENSOR NETWORKS

Course code	OEC-ECE-430G				
Category	Open Elective Course				
Course title	Wireless Adhoc and Sensor Networks				
Scheme and Credits	L	T	P	Credits	SEMESTER 8
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

UNIT- I

Introduction to Ad Hoc Networks: Characteristics of MANETs, Applications of MANETs and challenges of MANETs - Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

UNIT- II

Data Transmission: Broadcast storm problem, Broadcasting, Multicasting and Geocasting TCP over Ad Hoc: TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT- III

Basics of Wireless, Sensors and Applications: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT- IV

Data Retrieval in Sensor Networks: Routing layer, Transport layer, High-level application layer support; Adapting to the inherent; dynamic nature of WSNs; Sensor Networks and mobile robots. Security: Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms - Operating System: TinyOS– Imperative Language: nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns2 and its sensor network extension, TOSSIM.

Suggested Books:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P.Aggarwal, World Scientific Publications, March 2006, ISBN – 981-256-681-3

2.Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

Course: Wireless Adhoc and Sensor Network (Open Elective-II)
Course Code: OEC-ECE-430G

CO (Course Outcomes)		RBT*- Revised Bloom's Taxonomy
CO1	To **Describe** the concepts, architectures, and applications of Wireless Ad Hoc and Sensor Networks.	L2 (Understand)
CO2	To **Describe** the MANETs and WSNs for industry and research point of views.	L2 (Understand)
CO3	To **Classify** the various Sensor Network Platforms, tools and applications.	L4 (Analyze)
CO4	To **Evaluate** the QoS related performance measurements of Wireless Ad Hoc and Sensor networks.	L5 (Evaluate)
CO5	To **Design** routing protocols for ad hoc systems.	L6 (Create)

CO PO-PSO Articulation Matrices

Course Outcomes (COs)	(POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	1	1	1							1	3	3
CO2	3	2	2	1	3							1	3	3
CO3	3	1	3	2	2							1	3	3
CO4	3	1	3	1	2							1	2	2
CO5	3	1	2	1	3							1	2	2