M.D. UNIVERSITY, ROHTAK

(NAAC Accredited 'A+' Grade)

SCHEME OF STUDIES AND EXAMINATION

B.TECH (Electronics & Computer Engineering)

SEMESTER 5th AND 6th

Scheme effective from 2020-21

COURSE CODE AND DEFINITIONS:

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional Core Courses
LC	Laboratory Courses
MC	Mandatory Courses
PT	Practical Training
S	Seminar
TH	Theory
Pr	Practical

General Notes:

1. Mandatory courses are non credit courses in which students will be required passing marks in internal assessments.
2. Students will be allowed to use non programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
3. Students will be permitted to opt for any elective course run by the department. However, the department shall offer those electives for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. To run the elective course a minimum of 1/3rd students of the class should opt for it.

Scheme of Studies and Examination
B.TECH (Electronics & Computer 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			Internal Assessment	External Examination	Practical	Total	
1	Engineering Science Course	ESC-CSE301G	Microprocessor (Common with CSE)	3	0	0	3	3	25	75		100	3
2	Professional Core Course	PCC-CSE303G	Computer Networks (Common with CSE)	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-ECE307G	Digital Signal Processing (Common with ECE)	3	0	0	3	3	25	75		100	3
4	Professional Core Course	PCC-CSE307G	Design & Analysis of Algorithms (Common with CSE)	3	0	0	3	3	25	75		100	3
5	Professional Elective Course	Refer to Annexure- I	Elective –I	3	0	0	3	3	25	75		100	3
6	Professional Core Course	PCC-ECSE301G	Soft Computing	3	0	0	3	3	25	75		100	3
7	Engineering Science Course	LC-ESC-317G	Microprocessor Lab (Common with CSE)	0	0	2	2	1	25	-	25	50	3
8	Professional Core Course	LC-CSE323G	Computer Networks Lab (Common with CSE)	0	0	3	3	1.5	25		25	50	3
9	Professional Core Course	LC-ECE325G	Digital Signal Processing Lab (Common with ECE)	0	0	2	2	1	25		25	50	3
10	Mandatory Courses	MC-317G	Constitution of India	2	0	0							
11	Training	PT-ECSE327G	Practical Training	-	-	-	-	-	-	-	* Refer Note 1		
TOTAL CREDIT								**22**				**750**	

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.

Scheme of Studies and Examination
B.TECH (Electronics & Computer 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			Internal Assessment	External Examination	Practical	Total	
1	Humanities/ Basic Science	HUM-ECE306G	Engineering Ethics (Common with ECE)	3	0	0	3	3	25	75		100	3
2	Professional Elective Course	Refer to Annexure II	Elective –II Common with CSE	3	0	0	3	3	25	75		100	3
3	Professional Core Course	PCC-ECE309G	Nano Electronics	3	0	0	3	3	25	75		100	3
4	Professional Elective Course	Refer to Annexure III	Elective-III Common with CSE	3	0	0	3	3	25	75		100	3
5	Engineering Science Course	ESC-CSE308G	Mobile and Wireless Communication (Common with CSE)	3	0	0	3	3	25	75		100	3
6	Professional Core Course	PCC-ECE302G	Control Systems (Common with ECE)	3	0	0	3	3	25	75		100	3
7	Project	PROJ-CSE322G	Project-I	0	0	4	4	2	25		25	50	3
8	Professional Core Course	LC-ECE324G	Control System Lab (Common with ECE)	0	0	3	3	1.5	25		25	50	3
		TOTAL CREDIT						**21.5**				**700**	

Note:

Each student has to undergo practical training of 6 weeks during summer vacation after 6th semester and its evaluation shall be carried out in 7th Semester.

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

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

Course code	ESC-CSE-301G				
Category	Engineering Science Course				
Course title	Microprocessor				
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				

Course Objective:

1. To make understand architecture and working of Intel 8085 microprocessor in depth.
2. To make understand architecture and working of Intel 8086 microprocessor in depth.
3. Familiarization with the assembly language programming.
4. Familiarization with various peripheral operations

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

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

Unit: 2

THE 8086 MICROPROCESSOR ARCHITECTURE: 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 8237 DMA controller.

TEXT BOOKS:

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

REFERENCES:

1. Microprocessors and interfacing: D V Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing, Hardware&Applications: Triebel& Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming &Design: Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing: Badri Ram; TMH

COURSE OUTCOMES: After the completion of the course the student will be able to:

1. Understand the operation and architecture of Intel 8085 microprocessor including Instruction Set Architecture, assembly language programming, timing and speed of operation.
2. Learn the operation of circuits for user interaction through switches, keyboard and display devices.
3. Understand the operation and architecture of Intel 8086 microprocessor including Instruction Set Architecture, assembly language programming, timing and speed of operation.
4. Understand the motivation and need for peripheral operations circuits for digital data exchange, timer, serial communication, merits of direct memory access, interrupt controller and other circuits.

Course code	PCC-CSE-303G				
Category	Professional Core Course				
Course title	Computer Networks				
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				

Objectives of the course

a. To develop an understanding of modern network architectures from a design and Performance perspective.
b. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
c. To provide an opportunity to do Network programming
d. To provide a WLAN measurement ideas.

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: Data communication,Components, Data Representation, Simplex, Half Duplex and Full Duplex Transmission, Modulation and Multiplexing, Computer networks, distributed processing, Internet, Topologies, Packet and circuit switching, connectionless and connection oriented services.

Network Models: OSI model and TCP/IP Model

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

Unit: 2

Data Link Layer and Medium Access Sub Layer: MAC Addressing, Framing, Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window Protocol.

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

Network Layer: Logical addressing, classful and classless addressing, subnetting, IPv4, ICMPv4, ARP, RARP and BOOTP, IPv6, IPv6 addressing, DHCP.

Unit: 3

Network Devices: Repeater, hub, switch, router and gateway.
Routing Algorithms: introduction to routing, Shortest Path Algorithm, Flooding, Hierarchical Routing, Link State and Distance Vector Routing

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

Unit: 4

Congestion Control, Quality of Service, QoS Improving techniques.
Application Layer: Domain Name Space (DNS), EMAIL, File Transfer Protocol (FTP), HTTP, SNMP

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

Suggested books:

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

References:

1. Computer Networks, latest Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, latest Edition Douglas Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

Course Outcomes

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) and describe the function of each.
3. Identify and connect various connecting components of a computer network.
4. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

PCC-ECE307G DIGITAL SIGNAL PROCESSING

L T P
3 1 -

Theory: 75 Marks
Class work : 25 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Course Objective:

1. To get an introduction of basics like Sampling, Interpolation, Aliasing and operations Convolution and correlation.
2. To Study the basics, mathematical analysis and applications of DFT, FFT, etc
3. To study the design and implementation of Digital Filters.
4. To study the analysis of multirate systems.
5. To impart practical knowledge of signal processing

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 I

Discrete-Time Signals and Systems: Sequences; representation of signals on orthogonal basis; representation of discrete systems using difference equations, Sampling and reconstruction of signals - aliasing; Sampling theorem and Nyquist rate.

Z-Transform: Z-Transform, Region of Convergence, Analysis of Linear Shift Invariant systems using z- transforms, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms.

Unit II

Frequency Representation of Signal and Systems: Frequency Domain analysis concept, Discrete Fourier Transform (DFT), Properties of DFT, Convolution of signals, Circular convolution, Linear Filtering using DFT, Fast Fourier Transform Algorithm, Decimation in time and Decimation in frequency algorithms, Computations Complexity Calculations, Parsevals Identity.

Unit III

Design of Digital Filter : Ideal Filter vs Practical Filters, General Specifications and Design Steps, Comparison of FIR & IIR Filters, Design of FIR Filters using Window technique, Frequency sampling Method, Park-McClellan's method, Design of IIR Filters using Impulse Invariance technique, Bilinear Transformation, Design of IIR Filters using Butterworth, Chebyshev and Elliptic filter, Digital frequency transformation.

Unit IV

Implementation of Discrete Time Systems: Block diagrams and signal flow graphs for FIR and IIR systems, Direct form, Cascade form, Frequency Sampling Structures, and Lattice structures for FIR systems, Direct form, Cascade form, Parallel form, and Lattice and Lattice-Ladder Structures for IIR systems, Representation of fixed point and floating point numbers, Finite word length effects, Parametric and non-parametric spectral estimation. Applications of Digital Signal Processing

Multirate Digital Signal Processing: Introduction to multirate digital signal processing, Multi rate structures for sampling rate conversion, Multistage decimator and interpolators, Polyphase decomposition, Digital Filter Banks

References :

1 John G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms And Applications, Prentice Hall, latest edition

1. A.V. Oppenheim and Schafer, Discrete Time Signal Processing, Prentice Hall, latest edition
3. S.K.Mitra, Digital Signal Processing: A computer based approach.TMH
4. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya;TMH
5. L.R. Rabiner and B. Gold, Theory and Application of Digital Signal Processing, Prentice Hall, latest edition
6. J.R. Johnson, Introduction to Digital Signal Processing, Prentice Hall, latest edition
7. D.J.DeFatta, J. G. Lucas andW.S.Hodgkiss, Digital Signal Processing, John Wiley& Sons, latest edition

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. To get an introduction of basics like Sampling, Interpolation, Aliasing and operations, Convolution and Correlation.
2. To Study the basics, mathematical analysis and applications of DFT and FFT
3. To study the design and implementation of Digital Filters.
4. To impart practical knowledge of signal processing operations in MATLAB.

Course code	PCC-CSE-307G				
Category	Professional Core Course				
Course title	Design and Analysis of Algorithms				
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				

Objectives of the course:

1. Analyze the asymptotic performance of algorithms.
2. Write rigorous correctness proofs for algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Apply important algorithmic design paradigms and methods of analysis.
5. Synthesize efficient algorithms in common engineering design situations.

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-I

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.

Unit-II

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 Salesperson problem.

Unit-III

Unit-5: Back Tracking: General method, The 8-Queen's problem, Sum of subsets, Graph Colouring, Hamiltonian Cycles.

Unit-6: Branch and Bound: The method, 0/1 knapsack problem, Traveling Salesperson problem, Efficiency considerations.

Unit-IV

Unit-7: 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 Sartaj Sahni, 1978, Galgotia Publ.,
2. Introduction to Algorithms, Thomas H Cormen, Charles E Leiserson and Ronald L Rivest: 1990, TMH

References:

1. The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., Addison Wesley.
2. Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., Johan Wiley & Sons,
3. Writing Efficient Programs, Bentley, J.L., PHI
4. Introduction to Design and Analysis of Algorithm, Goodman, S.E. & Hedetnieni, latest edition MGH.
5. Introduction to Computers Science- An algorithms approach, Jean Paul Trembley, Richard B.Bunt, latest edition, T.M.H.
6. Fundamentals of Algorithms: The Art of Computer Programming Voll, Knuth, D.E.: latest edition, Naresh Publ.

Course Outcomes:

1. To identify and justify correctness of algorithms and to analyse running time of algorithms based on asymptotic analysis.
2. To understand when an algorithmic design situation calls for the divide-and-conquer paradigm. Synthesize divide-and-conquer algorithms.
3. Describe the greedy paradigm and dynamic-programming paradigm. Explain when an algorithmic design situation calls for it.
4. Developing greedy algorithms/dynamic programming algorithms, and analyze it to determine its computational complexity.
5. To write the algorithm using Backtracking and Branch and Bound strategy to solve the problems for any given model engineering problem.

PCC-ECSE301G **SOFT COMPUTING**

B.TECH SEMESTER VI	SESSIONAL:	25
L T P	THEORY EXAM:	75
3 0 0	TOTAL :	100

Course Objectives

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

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.

Detailed contents:

UNIT-I

INTRODUCTION TO SOFT COMPUTING:
Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

UNIT-II

FUZZY LOGIC:
Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-III

NEURAL NETWORKS:
Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks

UNIT-IV

GENETIC ALGORITHMS:
Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

Matlab:
Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

Course Outcomes

After completion of course, students would be able to:

a. Identify and describe soft computing techniques and their roles in building intelligent Machines.

b. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.

c. Apply genetic algorithms to combinatorial optimization problems.

d. Evaluate and compare solutions by various soft computing approaches for a given problem.

REFERENCES:

1. George J. Klir and Bo Yuan, "*Fuzzy Sets and Fuzzy Logic: Theory and Applications*", PHI

2. Satish Kumar, "*Neural Networks: A classroom approach*" Tata McGraw Hill.

3. Haykin S., "*Neural Networks-A Comprehensive Foundations*", PHI

4. Anderson J.A., "*An Introduction to Neural Networks*", PHI

5. M.Ganesh, "*Introduction to Fuzzy sets and Fuzzy Logic*" PHI.

6. N P Padhy and S P Simon, " *Soft Computing with MATLAB Programming*", Oxford University Press

Course code	LC-ESC-317G				
Category	Engineering Science Course				
Course title	Microprocessor Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	2	0	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Hands-on experiments related to the course contents of ESC-CSE-501G.

Course code	LC-CSE-323G				
Category	Engineering Science Course				
Course title	Computer Networks Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	2	0	
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

LC-ECE325G DIGITAL SIGNAL PROCESSING LAB

L T P	Practical Exam: 25 Marks
- - 2	Lab work : 25 Marks
	Total: 50 Marks
	Duration of Exam: 1 Hour

List of Experiments

Experiments to be performed on MATLAB

1. Introduction to MATLAB.
2. Represent basic signals (unit step, unit impulse, ramp, exponential, sine and cosine)
3. To develop program for Z-Transform in MATLAB
4. To develop program for Convolution of sequences in MATLAB
5. To develop program for Correlation of sequences in MATLAB
6. To develop program for DFT & IDFT of two sequences
7. To develop program for FFT of two Sequences
8. To develop program for Circular Convolution
9. To design analog filter (low-pass, high pass, band-pass, band-stop).
10. To design digital IIR filters (low-pass, high pass, band-pass, band-stop).
11. To develop program for Interpolation and Decimation of sequences
12. To design FIR filters using windows technique.
13. Detection of Signals buried in Noise
14. Effect of noise on signals in MATLAB

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

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

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 (Bare Act), 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 Outcomes:

Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

The examination of the regular students will be conducted by the concerned college/Institute internally. Each student will be required to score minimum 40% marks to qualify in the paper. The marks will not be included in determining the percentage of marks obtained for the award of degree. However, these marks will be shown in the detailed marks certificate of the students.

HUM-ECE306G ENGINEERING ETHICS

L T P
3 - -

Theory: 75 Marks
Class work : 25 Marks
Total: 100 Marks
Duration of Exam: 3 Hours

Course Objective:

To enable the students to create an awareness on

1. Engineering Ethics and Human Values,
2 to instill Moral and Social Values and
3 Loyalty and to appreciate the rights of others.

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 I

Ethics and Professionalism: Ethics and Excellence in Engineering, Micro and Macro Issues, Dimensions of Engineering, Potential Moral Problems, What Is Engineering Ethics, Why Study Engineering Ethics? Responsible Professionals, Professions, and Corporations: Saving Citicorp Tower, Meanings of Responsibility, Engineering as a Profession, Ethical Corporations and Senses of Corporate Responsibility. Moral Reasoning and Codes of Ethics, Moral Choices and Ethical Dilemmas, Rights Ethics, Duty Ethics, Utilitarianism, Virtue Ethics, Self-Realization Ethics, Ethical Egoism, Which Ethical Theory Is Best?

UNIT II

Engineering as Social Experimentation: Engineering as Experimentation, Engineers as Responsible Experimenter, Commitment to Safety: The Concept of Safety, Risks, Acceptability of Risk, Assessing and Reducing Risk: Uncertainties in Design, Risk-Benefit Analyses, Personal Risk versus Public Risk, Examples of Improved Safety, Three Mile Island, Safe Exits.

UNIT III

Truth and Truthfulness: Whistle-Blowing, Moral Guidelines, Protecting Whistle-Blowers, Common Sense Procedures, Beyond Whistle-Blowing, Honesty and Research Integrity: Truthfulness, Trustworthiness, Academic Integrity: Students, Research Integrity, Bias and Self-Deception, Protecting Research Subjects, Giving and Claiming Credit.
Computer Ethics: The Internet and Free Speech, Power Relationships, Property, Privacy,Additional Issues.

UNIT IV

Environmental Ethics: Engineering, Ecology, and Economics, Environmental Moral Frameworks, Human-Centered Ethics, Sentient-Centered Ethics, Biocentric Ethics, Ecocentric Ethics, Religious Perspectives.
Global Justice: Multinational Corporations, Technology Transfer and Appropriate Technology, Bhopal, "When in Rome", International Rights, Promoting Morally Just Measures, Weapons Development and Peace, Involvement in Weapons Work, Defense Industry Problems, Peace Engineering.

References:

1. Mike W. Martin and Roland Schinzinger, “Introduction to Engineering Ethics”, Second Edition, McGraw Hill, New Delhi, latest edition
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, latest edition
3. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, latest edition
4. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, latest edition
5. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, latest edition
6. Edmund G Seebauer and Robert L Barry, “Fundametals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, latest edition
7. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi latest edition
8. World Community Service Centre, " Value Education", Vethathiri publications, Erode, latest edition
9 Web sources:
   i. www.onlineethics.org
   ii. www.nspe.org
   iii. www.globalethics.org
   iv. www.ethics.org

Outcomes:

Upon completion of the course, the student should be able to

1. apply ethics in society
2. discuss the ethical issues related to engineering
3. realize the responsibilities and rights in the society
4. realize the importance of sustainable development

PEC-ECE309G **NANO ELECTRONICS**

L T P — Theory: 75 Marks

3 1 - — Class work : 25 Marks

Total: 100 Marks

Duration of Exam: 3 Hours

Course Objective:

1. To provide the basic concept about nanoscience and technology
2. To introduce the concept of quantum mechanics
3. To provide the knowledge of miniaturizations and their effect on electronics devices
4. To understand the nanomaterials and their characterization techniques
5. To study the various nanoelectronics devices

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 -I

Introduction to nanotechnology, Basics of Quantum Mechanics: Wave nature of particles and wave-particle duality, Pauli Exclusion Principle, wave functions and Schrodinger's equations, Density of States, Band Theory of Solids, Particle in a box Concepts

Unit -II

Shrink-down approaches: CMOS scaling: advantages and limitations. Nanoscale MOSFETs, FINFETs, Vertical MOSFETs, system integration limits (interconnect issues etc.)

Unit -III

Nanostructure materials, classifications of nanostructure materials, zero dimensional, one dimensional, two dimensional and three dimensional, properties and applications Characterization techniques for nanostructured materials: SEM, TEM and AFM

Unit -1V

Nano electronis devices : Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors, Carbon nanotube electronics, Band structure and transport, devices, applications, 2D semiconductors and electronic devices, Graphene, atomistic simulation

References:

1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson, latest edition
2. W. Ranier, Nanoelectronics and Information Technology (Advanced Electronic Materialand Novel Devices), Wiley-VCH, latest edition
3. K.E. Drexler, Nanosystems, Wiley, latest edition
4. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press, latest edition
5. C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley, latest edition

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand various aspects of nano-technology and the processes involved in making nano components and material.
2. Leverage advantages of the nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of nano-technology and the processes involved in making nano components and material.

Course code	ESC -CSE -308G				
Category	Professional Elective Course				
Course title	Mobile and wireless communication				
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				

Course Outcomes

1. Understand the wireless/cellular radio concepts such as frequency reuse, handoff and interference between mobiles and base stations.
2. Identify the techno-political aspects of wireless and mobile communications such as the allocation of the limited wireless spectrum by regulatory agencies.
3. Understand the information theoretical aspects such as channel capacity, propagation effects, modeling the impact of signal bandwidth and motion in mobile systems.
4. Describe the current and future Mobile Communication Systems, GSM, Satellite, Broadcasting, Bluetooth, Wireless LANs, Mobile Adhoc Networks.
5. Describe the mobility support mechanism, WWW and WAPs.

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: 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.

UNIT 2

GSM: Mobile Services, Architecture Radio, Interface, Protocol, Localization, Calling Handover, Security, New data services.

Wireless LAN: IEEE 802 11- System and Protocol Architecture, Physical Layer, MAC Layered Management.

Bluetooth: User scenarios, Physical layer, MAC Layer, Networking, Security and Link Management.

UNIT 3

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.

UNIT 4

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

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

WAP: Architecture, Wireless Datagram, Protocol, Wireless Transport Layer Security, Wireless Transaction Protocol, Application Environment, Telephony Applications.

References:

1. Jochen Schiller, "MobileCommunication", Pearson Education, latest edition
2. LEE, "Mobile Cellular Telecommunications", McGRAW-Hill, latest edition
3. Theodore S Rappaport, "Wireless Communications", Pearson Education.

Course Outcomes

- Explain the principles and theories of mobile computing technologies.
- Describe infrastructures and technologies of mobile computing technologies.
- List applications in different domains that mobile computing offers to the public, employees, and businesses.
- Describe the possible future of mobile computing technologies and applications.
- Effectively communicate course work through written and oral presentations

PCC-ECE302G CONTROL SYSTEMS

L T P
3 1 -

Theory : 75 Marks
Class work : 25 Marks
Total : 100 Marks
Duration of Exam : 3 Hours

Course Objective:

1. To introduce the components and their representation of control systems.
2. To learn various methods for analyzing the time response, frequency response and stability of the systems.
3. To learn the various approach for the state variable analysis.

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 I

Systems Components and Their Representation

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory-Electrical and Mechanical Transfer Function Models-Block diagram Models-Signal flow graphs models-DC and AC servo Systems-Synchronous -Multivariable control system

Unit II

Time Response Analysis And Stability Concept

Transient response-steady state response-Measures of performance of the standard first order and second order system-effect on an additional zero and an additional pole-steady error constant and system- type number-PID control.

Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relative stability-Root locus concept-Guidelines for sketching root locus.

Unit III

Frequency Domain Analysis

Bode Plot - Polar Plot- Nyquist plots-Design of compensators using Bode plots-Cascade lead compensation-Cascade lag compensation-Cascade lag-lead compensation

Unit IV

Control System Analysis Using State Variable Methods

State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems-Equivalence between transfer function and state variable representations.

References:

1. Gopal. M., " Control Systems: Principles and Design" , Tata McGraw-Hill, latest edition
2. Kuo, B.C., "Automatic Control System", Prentice Hall, sixth edition, latest edition
3. Ogata, K., "Modern Control Engineering", Prentice Hall, second edition, latest edition
4. Nagrath & Gopal, "Modern Control Engineering", New Age International, New Delhi

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Characterize a system and find its steady state behaviour
2. Analyse the time domain specification and calculate steady state errors..
3. Investigate stability of a system using different tests
4. Illustrate the state space model of a physical system.

Course code	PROG-CSE-322G				
Category	Professional Elective Course				
Course title	PROJECT				
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				

LC-ECE324G **CONTROL SYSTEM LAB**

L T P
- - 2

Practical Exam: 25 Marks
Lab work : 25 Marks
Total: 50 Marks
Duration of Exam: 1 Hour

Hands-on experiments related to the course contents PCC-ECE307G

SOFTWARE ENGINEERING

Coursecode	PEC CSE-311G				
Category	Professional Elective Course				
Coursetitle	Software Engineering				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

- Be successful professionals in the field with solid fundamental knowledge of software engineering
- Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

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: 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: , Prototyping methods and tools; Specification principles, Representation, the software requirements specification and reviews Analysis Modeling: Data Modeling, Functional modeling and information flow: Data flow diagrams, BehavioralModeling; The mechanics of structured analysis: Creating entity/ relationship diagram, data flow model, control flow model, the control and process specification; The data dictionary; Other classical analysis methods.

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 data warehouse, 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 process debugging 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 record keeping, 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, 5 edition, 1999, AW,
- Software Engineering – David Gustafson, 2002, T.M.H
- Software Engineering Fundamentals Oxford University, Ali Behforooz and Frederick J. Hudson 1995 JW&S,
- An Integrated Approach to software engineering by Pankaj jalote , 1991 Narosa,

Course Outcomes

1. How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
2. An ability to work in one or more significant application domains
3. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
4. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
5. Demonstrate an ability to use the techniques and tools necessary for engineering practice

SYSTEM PROGAMMING AND SYSTEM ADMINISTRATION

Coursecode	PEC CSE-313G				
Category	Professional Elective Course				
Coursetitle	System Programming and System Administration				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0		3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. Evolution of the components of system programming.
2. To learn working and different stages of compilation process.
3. To learn basic of assembler and loading schemes.
4. To learn basics of file structure.
5. To know about filters and pipeline.
6. To learn shell programming

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

Evolution of Components Systems Programming, Assemblers, Loaders, Linkers, Macros, Compilers. software tools, Text editors, Interpreters and program generators, Debug Monitors, Programming environment.

Compiler: Brief overview of compilation process, Incremental compiler, Assembler: Problem statement, symbol table; Loader schemes, compile and go Loader, general loader schemes, absolute loader, Reallocating loader, Direct linkage Loader, Binders, overlays.

Unit: 2

Theoretical Concept of Unix Operating System: Basic features of operating system; File structure: CPU scheduling; Memory management: swapping, demand paging; file system: block and fragments, inodes, directory structure; User to user communication

Unit: 3

Getting Started with Unix: User names and groups, logging in; Format of Unix commands; Changing your password; Characters with special meaning; Unix documentation; Files and directories; Current directory, looking at the directory contents, absolute and relative pathnames, some Unix directories and files; Looking at the file contents; File permissions; basic operation on files; changing permission modes; Standard files, standard output; Standard input, standard error; filters and pipelines; Processes; finding out about processes; Stopping background process; Unix editor vi.

Unit-4

Shell Programming: Programming in the Borne and C-Shell; Wild cards; Simple shell programs; Shell variables; interactive shell scripts; Advanced features.

System Administration: Definition of system administration; Booting the system; Maintaining user accounts; File systems and special files; Backups and restoration; Role and functions of a system manager. Overview of the Linux operating system

Suggested books:

1. Systems Programming by Donovan, TMH.
2. The unix programming environment by Brain Kernighen& Rob Pike, 1984, PHI & Rob Pike.
3. Design of the Unix operating system by Maurich Bach, 1986, PHI.
4. Introduction to UNIX and LINUX by John Muster, 2003, TMH.

Suggested reference books

1. Advanced Unix programmer's Guide by Stephen Prato, BPB
2. Unix- Concept and applications by Sumitabha Das, 2002, T.M..H

Course Outcomes

1. To understand various file statistics.
2. To work on wildcards.

3.To know about shell programming and AWK utility.

Digital Image Processing

Course Code	PEC-CSE-315G				
Category	Professional Elective Course				
Coursetitle	Digital Image Processing				
Scheme and Credits	L	T	P	Credits	Semester 5
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition method

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 to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation.

Unit: 2

Image Transformation & Filtering: Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms.

Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering

Unit: 3

Image Compression: Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression.

Unit-4

Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors.

Suggested books:

1. Rafael C. Gonzalez, Richard E. Woods,Digital Image Processing Pearson, Third Edition,2010.
2. Anil K. Jain,Fundamentals of Digital Image Processing Pearson, 2002.

Suggested reference books

1. Kenneth R. Castleman,Digital Image Processing Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,Digital Image Processing using MATLAB Pearson Education, Inc., 2011.
3. D,E. Dudgeon and RM. Mersereau,Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt,Digital Image Processing John Wiley, New York, 2002
5. Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

Course Outcomes

1. Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
2. Operate on images using the techniques of smoothing, sharpening and enhancement.
3. Understand the restoration concepts and filtering techniques.
4. Learn the basics of segmentation, features extraction, compression and recognition methods for colour models

ADVANCED DATABASE MANAGEMENT SYSTEM

Course code	PEC-CSE-310G				
Category	Professional Elective Course				
Course title	Advanced Database Management System				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objective of the course:

- To understand DBMS Components, Advantages and Disadvantages.
- Understanding Data modeling: ER, EER, Network, Hierarchical and Relational data models.
- Understanding normalization, general strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization.
- To understand transaction concept, schedules, serializability, locking and concurrency control protocols.

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: 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.

UNIT 2

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

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

UNIT 3

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.

UNIT 4

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", 4th Edition, Pearson Education,2007
2. Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
3. R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

Suggested References Books:

1. Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
4. W. Kim, "Modern Database Systems", 1995, ACM Press, Addision Wesley,

Course Outcomes:

- Students will get understanding of DBMS Components, Its advantages and disadvantages.
- Understanding about various types of Data modeling: ER, EER, Network, Hierarchical and Relational data models.
- Understanding normalization, general strategies for query processing, query processor, syntax analyzer, Query decomposition, Heuristic Query optimization.
- Understanding transaction concept, schedules, serializability, locking and concurrency control protocols.

MOBILE APPLICATIONS DEVELOPMENT

Course code	PEC-CSE-312G				
Category	Professional Elective Course				
Course title	Mobile applications development				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- Introduce the students with the various "Next Generation Technologies" in the area of mobile computing
- Assist students understand the various Mobile operating Systems
- Explore the findings using Android Technologies

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: Mobile operating system, Operating system structure, Constraints and Restrictions, Hardware configuration with mobile operating system, Features: Multitasking Scheduling, Memory Allocation, File System Interface, Keypad Interface, I/O Interface, Protection and Security, Multimedia features

UNIT 2

Introduction to Mobile development IDE's, Introduction to Worklight basics, Optimization, pages and fragments , Writing a basic program- in Worklight Studio, Client technologies, Client side debugging, Creating adapters, Invoking adapters from Worklight Client application, Common Controls, Using Java in adapters, Programming exercise with Skins, Understanding Apache Cordova.

UNIT 3

Understanding Apple iOS development, Android development, Shell Development, Creating Java ME application, Exploring the Worklight Server, Working with UI frameworks, Authentication, Push notification, SMS Notifications, Globalization.

UNIT 4

Android: Introduction to Android, Architecture, memory management, communication protocols, application development methods, deployment.

iOS: Introduction to iOS, Architecture, memory management, communication protocols, application development methods, deployment

Suggested text books:

1. Anubhav Pradhan, Anil V Deshpande, " Mobile Apps Development" Edition:
2. Jeff McWherter, Scott Gowell "Professional Mobile Application Development", John Wiley & Sons, 2012.
3. Barry Burd, "Android Application Development All in one for Dummies", Edition: I
4. Teach Yourself Android Application Development In 24 Hours, Edition: I, Publication: SAMS

Suggested reference books:

1. Neal Goldstein, Tony Bove, "iPhone Application Development All-In-One For Dummies", John Wiley & Sons
2. Henry Lee, Eugene Chuvyrov, "Beginning Windows Phone App Development", Apress, 2012.
3. Jochen Schiller,"Mobile Communications", Addison-Wesley, 2nd edition, 2004.
4. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.

Course Outcomes:

- Explain the principles and theories of mobile computing technologies.
- Describe infrastructures and technologies of mobile computing technologies.
- List applications in different domains that mobile computing offers to the public, employees, and businesses.
- Describe the possible future of mobile computing technologies and applications.
- Effectively communicate course work through written and oral presentations

COMPUTER GRAPHICS

Course code	PEC-CSE-314G				
Category	Professional Elective Course				
Course title	Computer Graphics				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- To have basic understanding of the core concepts of Computer Graphics.
- Understand scan conversion, 2D, 3D – transformation and viewing.
- To be able to create interactive computer Graphics with understanding of shading, image processing and illumination model.

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 to Computer Graphics: What is Computer Graphics, Computer Graphics Applications, Computer Graphics Hardware and software; Two dimensional Graphics Primitives: Points and Lines, Scan Conversion: Point, Line, Circle; Region Filling: Scanline algorithm, Polygon filling algorithm, boundary filled algorithm.

UNIT 2

Two dimensional transformations: Geometric, Coordinate and, composite transformation.
Two Dimensional Viewing: window to view port mapping; Clipping: point, line, polygon, curve and text clipping

UNIT 3

Three-dimensional transformations: Three dimensional graphics concept, Geometric and Coordinate transformations, **Viewing in 3D:** Projection, Taxonomy of projection,
Hidden surface removal: Introduction to hidden surface removal, The Z- buffer algorithm, The painter's algorithm, Scanline algorithm, Sub-division algorithm.

UNIT 4

Representing Curves and Surfaces: Parametric representation of curves: Bezier curves, B-Spline curves. Parametric representation of surfaces; Interpolation method.
Illumination, shading, image manipulation: Illumination models, shading models for polygons, shadows, transparency, image processing.

Suggested Text Books:

1. Computer Graphics Principles and Practices second edition by James D. Foley, Andeies van Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
2. Computer Graphics by Donald Hearn and M.Pauline Baker, 2 Edition, 1999, PHI
3. Computer Graphics by Z. Xiang, R. Plastock, 2nd Edition, TMH Education.

Suggested Reference Books:

1. Procedural Elements for Computer Graphics – David F. Rogers, 2001, T.M.H Second Edition
2. Fundamentals of 3-Dimensional Computer Graphics by Alan Watt, 1999, Addision Wesley.
3. Computer Graphics: Secrets and Solutions by Corrign John, BPB
4. Graphics, GUI, Games & Multimedia Projects in C by Pilania&Mahendra, Standard Publ.
5. Computer Graphics Secrets and solutions by Corrign John, 1994, BPV
6 Introduction to Computer Graphics by N. Krishanmurthy T.M.H 2002

Course Outcomes:

- Understanding of the software, hardware and applications of Computer Graphics.
- Understanding of Scan conversion, 2D, 3D – transformation and viewing.
- To be able to implement picture on screen using projection, shading, image processing and illumination model.

DISTRIBUTED SYSTEM

Course code	PEC-CSE-316G				
Category	Professional Elective Course				
Course title	Distributed System				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- To examine the fundamental principles of distributed systems, and provide students hands-on experience in developing distributed protocols.
- Analyze the issues in distributed operating systems and to address these distributed systems issues in a broader sense. Emphasis will be placed on communication, process, naming, synchronization and fault tolerance.

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: 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: SUN RPC, DEC RPC

UNIT 2

Synchronization in Distributed System: Clock synchronization and related algorithms, mutual exclusion, Deadlock 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

UNIT 3

Distributed File systems: 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 file system, 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

UNIT 4

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: JAVA RMI, Sun Network File System, Google Case Study

Suggested Reference books:

1. Distributed Operating Systems by Andrew S Tannebaum, Pearson
2. Distributed Operating Systems Concepts and Design, Pradeep K. 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 S Tanebaum, Maarten Van Steen, PHI
6. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, HagitAttiya and Jennifer Welch, Wiley India

Course Outcomes:

- List the principles of distributed systems and describe the problems and challenges associated with these principles.
- Understand Distributed Computing techniques, Synchronous and Processes.
- Apply Shared Data access and Files concepts.
- Design distributed system that fulfills requirements with regards to key distributed systems properties.
- Understand Distributed File Systems and Distributed Shared Memory.
- Apply Distributed web-based system and understand the importance of security in distributed system

INFORMATION TECHNOLOGY & INDUSTRY BUSINESS SKILLS

Course code	PEC-CSE-318G				
Category	Professional Core Course				
Course title	Information Technology & Industry Business Skills				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

6. To understand the novel information technology techniques and industry business skills.
7. To study about the concept of amazon web services.
8. To understand the use of cloud in web services and their different application.
9. To study business models used in industry and their implementation.

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

Web Services: History and Introduction to cloud computing, Introduction to AWS, Instances creation methods in AWS, Scalable Computing in AWS, Storage in AWS, Persistence in AWS, Routing from AWS, Delivering strategies with AWS, Messaging management inside AWS, Communicating technique with AWS, AWS Free Tier, Identity Access Management, Security Assertion Markup language, Simple Storage Service, introduction to Google APP Engine, Azure computing method, service models, deployments models of cloud computing, difference between AWS, AZURE, Google Cloud;

Unit: 2

Cloud: Amazon Elastic Compute Cloud, Elastic Block Store, Security Group management, Amazon Machine Images, Storing data in the cloud, storing your objects: S3 and Glacier, ELB and SQS, auto-scaling and Cloud Watch, Cloud Formation, Elastic Beanstalk, and Ops Works, RDS, fault-tolerance, scaling, AZURE architecture and services, Google cloud applications;

Unit: 3

Business: Business models, Building blocks of Sales force, Understand the Security model, Understand the Data model, Configure and manage Sales and Service Cloud, Learn about Sales force Objects, create, rename or modify objects, validation rules, Create different field types and validation rules, Sales Cloud and Service Cloud modules, reports and dashboard, Sales force A Chatter, and Social features, chatter, application lifecycle, visual workflow;

Unit: 4

Security & Applications: security group, NACL, difference between security group and NACL, AWS-Data pipeline, Simple queue services, Simple workflow services, Simple notification Services, Elastic Transcoder.

Suggested reference books:

1. Amazon Web Services in Action by Michael Wittig and Andreas Wittig, Manning Publications;
2. AWS Certified Solutions Architect by Joe Baron, Hisham Baz, Tim Bixler, Biff Gaut, Kevin E. Kelly, Wiley publication;

Course Outcomes:

- Student will understand the concept of web services of amazon, virtual machines and their working.
- For a given region the availability of resources and cost management.
- For a given application scalable model and selection of services.

DATA SCIENCE

Course code	PCC-CSE-320G				
Category	Professional Core Course				
Course title	Data Science				
Scheme and Credits	L	T	P	Credits	Semester 6
	3	0	0	3	
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- The objective of this course is to impart necessary knowledge of the basic foundations needed for understanding data science domain and develop programming skills required to build data science applications.
- To introduce the conceptual knowledge of the area of data science domian, feature and scope of applications.
- To impart programming knowledge needed for data sciences.
- To understand the different issues involved in the design and implementation of a data science applications.
- To understand case studies of essential Data sciences applications.

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 to Data Science: Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting, Collection, storing, processing, describing and modelling, statistical modelling and algorithm modelling, AI and data science, Myths of Data science

UNIT 2

Introduction to Programming Tools for Data Science: Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK, Visualizing Data: Bar Charts, Line Charts, Scatterplots, Working with data: Reading Files, Scraping the Web,

UNIT 3

Data Science Methodology: Business Understanding, Analytic Approach, Data Requirements, Data Collection, Data Understanding, data Preparation, Modeling, Evaluation, Deployment, feedback

UNIT 4

Data Science Application : Prediction and elections, Recommendations and buisness analytics, clustering and text analytics

Suggested Text books:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. AurélienGéron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3. Jain V.K., “Data Sciences”, Khanna Publishing House, Delhi.
4. Jain V.K., “Big Data and Hadoop”, Khanna Publishing House, Delhi.

Suggested Reference books:

1. Data Science Workflow: Overview and Challenges by Philip Guo
2. Python for Data Analysis, O’Reilly Media Rajiv, “Machine Learning”, Khanna Publishing House, Delhi.
3. Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", MIT Press
4. http://www.deeplearningbook.org
5. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan
6. Kaufmann Publishers

Course Outcomes:

- Understand the value of data science and the process behind using it.
- Use Python to gather, store, clean, analyse, and visualise data-sets.
- Apply toolkits to formulate and test data hypotheses and uncover relationships within data-sets
- Understand the data science methodology in the data science pipeline
- Understand real-world challenges with several case studies

VHDL AND DIGITAL DESIGN

Course code	PEC-CSE-332G (common with ECE)				
Category	Program Elective Course				
Course title	VHDL and Digital Design				
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				

Course Objective:

- To understand the modelling & simulation & its role in digital evaluation.
- To learn basic concepts of VHDL language, its different architecture, designing of various Combinational & sequential circuits.
- To study various PLDs & detail study of FPGAs and implementation of various combinational & sequential logic circuits on FPGAs.

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: Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL data objects, classes and data types, Operators, Overloading, logical operators. Types of delays, Entity and Architecture declaration. Introduction to behavioural dataflow and structural models.

UNIT- 2

VHDL STATEMENTS: Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements. Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

UNIT -3

COMBINATIONAL & SEQUENTIAL CIRCUIT DESIGN:VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders , code converters, comparators, implementation of Boolean functions etc. VHDL Models and Simulation of Sequential Circuits Shift Registers, Counters etc.

UNIT-4

DESIGN OF MICROCOMPUTER & PROGRAMMABLE DEVICE: Basic components of a computer, specifications, architecture of a simple microcomputer system, and implementation of a simple microcomputer system using VHDL Programmable logic devices: ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs

REFERENCE BOOKS:

1. Ashenden - Digital design,Elsevier
2. IEEE Standard VHDL Language Reference Manual (1993).
3. Digital Design and Modelling with VHDL and Synthesis: KC Chang; IEEE Computer Society Press.
4. "A VHDL Primmer" : Bhasker; Prentice Hall 1995.
5. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
6. "VHDL-Analysis & Modelling of Digital Systems" :Navabi Z; McGraw Hill.
7. VHDL-IV Edition: Perry; TMH (2002)
8. "Introduction to Digital Systems" :Ercegovac. Lang & Moreno; John Wiley (1999).
9. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
10. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).
11. Grout - Digital system Design using FPGA & CPLD 'S,Elsevier

Course Outcome: After the completion of the course the student will be able to:

- Understand the need & application of hardware description language.
- Modelling & simulations of various basic & advanced digital systems using VHDL.
- Implementation of various basic & advanced digital systems using FPGAs.
- Apply knowledge to design & implement combinational circuits & sequential circuits related to research & industry applications.