ANNEXURE-31

SCHEME & SYLLABUS

For

BACHELOR OF TECHNOLOGY PROGRAMME

In

COMPUTER SCIENCE & ENGINEERING

(w.e.f Session 2024-2025)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING AND INFORMATION TECHNOLOGY

BPS MAHILA VISHWAVIDYALAYA, KHANPUR KALAN

STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM

S.No	Category	Breakup of Credits (Total 160)
1	Humanities and Social Sciences including Management courses	12
2	Basic Science courses	24
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	20
4	Professional core courses	60
5	Professional Elective courses relevant to chosen specialization/branch	17
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	15
8	Mandatory Courses [Induction Program, Environmental Sciences, Constitution of India/ Essence of Indian Traditional Knowledge, Universal Human Values] , General Proficiency	Non-credit
9	Total *Minor variation is allowed as per need of the respective disciplines.	160

SEMESTER WISE SUMMARY OF THE PROGRAMME

S.No.	Semester	No. of Contact Hours	Marks	Credits
1.	I	21	500	17
2.	II	26	600	20
3.	III	32	750	24
4.	IV	32	750	24
5.	V	28	650	21
6.	VI	29	700	22
7.	VII	23	800	20
8.	VIII	20	450	12
	Total	211	5200	160

CREDIT DISTRIBUTION IN THE FIRST YEAR OF UNDERGRADUATE ENGINEERING PROGRAM

	Lecture (L)	Tutorial (T)	Laboratory/ Practical(P)	Total credits(C)
Chemistry -I	3	1	1	5
Physics	3	1	1	5
Maths-I	3	1	0	4
Maths -2	3	1	0	4
Programming for Problem solving	3	0	2	5
English	2	0	1	3
Engineering Graphics & Design	1	0	2	3
Workshop/Practicals	1	0	2	3
Basic Electrical Engg.	3	1	1	5
Bioinformatics	2	0	0	2
Maths-3	3	1	0	4

COURSE CODE AND DEFINITION

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
OEC	Open Elective courses
LC	Laboratory course
MC	Mandatory courses
PROJ	Project

MANDATORY INDUCTION PROGRAM (3-WEEKS DURATION)

- **Physical activity**
- **Creative Arts ,Literary**
- **Universal Human Values**
- **Proficiency Modules**
- **Lectures by Eminent People**
- **Visits to local Areas**
- **Familiarization to Dept./Branch & Innovations**

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HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT

S.No	Code No.	Course Title	Hours Per week			Total Credits	Semester
			L	T	P		
1	HSMC-101	English	2	0	2	3	2
2	HSMC-201	Humanities –I (Effective Technical Communication)	3	0	0	3	3
3	HSMC-202	Management-I (Organizational Behaviour)	3	0	0	3	4
4	HSMC-301	Humanities –II (Economics for Engineers)	3	0	0	3	5
					Total Credits	12	

BASIC SCIENCE COURSES [BSC]

S.No	Code No.	Course	Hours Per Week			Total Credits	Semester
			L	T	P		
1	BSC-101	Physics(Semi Conductor Physics)	3	1	2	5	1
2	BSC-103	Mathematics –I (Calculus & Linear Algebra)	3	1	0	4	1
3	BSC-104	Mathematics –II (Probability & Statistics)	3	1	0	4	2
4	BSC-102	Chemistry-I	3	1	2	5	2
5	BSC-201	Mathematics- III (Calculus and Ordinary Differential Equations)	3	1	0	4	3
6	BSC-401	Bioinformatics	2	0	0	2	7
					Total Credits	24	

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w.e.f (2024-25)

ENGINEERING SCIENCE COURSE [ESC]

S.No.	Code No.	Course Title	Hours Per Week			Total Credits	Semester
			L	T	P		
1	ESC- 101	Basic Electrical Engineering	3	1	2	5	1
2	ESC-102-P	Engineering Graphics & Design	1	0	4	3	1
3	ESC-103	Programming for Problem Solving	3	0	4	5	2
4	ESC-104-P	Workshop/Manufacturing Practices	1	0	4	3	2
5	ESC-203	Digital Electronics	3	0	2	4	3
					Total Credits	20	

PROFESSIONAL CORE COURSES [PCC]

S.No.	Code No.	Course Title	Hours Per Week			Total Credits	Semester
			L	T	P		
1	PCC-CS 201	Data Structure & Algorithms	3	0	4	5	3
2	PCC-CS 203	Computer Organization & Architecture	3	0	0	3	3
3	PCC-CS 205	Object Oriented Programming with C++	3	0	4	5	3
4	PCC-CS 202	Discrete Mathematics	3	1	0	4	4
5	PCC-CS 204	Software Engineering	3	0	0	3	4
6	PCC-CS 206	Operating System	3	0	4	5	4
7	PCC-CS 208	Design and Analysis of Algorithms	3	0	0	3	4
8	PCC-CS 208P	Hardware Lab/MATLAB	0	0	2	1	4
9	PCC-CS 210	Python	3	0	4	5	4
10	PCC-CS-301	Database Management System	3	0	4	5	5
11	PCC-CS -303	Formal Language and Automata theory	3	0	0	3	5
12	PCC-CS-305	Java Programming	3	0	4	5	5
13	PCC-CS-307	Machine Learning	3	0	0	3	5
14	PCC-CS-302	Compiler Design	3	0	4	5	6
15	PCC-CS 304	Computer Networks	3	0	4	5	6
					Total Credits	60	

PROFESSIONAL ELECTIVE COURSES [PEC]

S.No.	Code No.	Course Title	Hours Per Week			Total Credits	Semester
			L	T	P		
1	PEC	Elective-I	3	0	2	4	6
2	PEC	Elective-II	3	0	0	3	6
3	PEC	Elective-III	3	0	2	4	7
4	PEC	Elective-IV	3	0	0	3	7
5	PEC	Elective-V	3	0	0	3	8
					Total Credits	17	

OPEN ELECTIVE COURSES [OEC]

S.No	Code No.	Course Title	Hours Per Week			Total Credits	Semester
			L	T	P		
1	OEC	Open Elective-I	3	0	0	3	6
2	OEC	Open Elective-II	3	0	0	3	7
3	OEC	Open Elective-III	3	0	0	3	7
4	OEC	Open Elective-IV	3	0	0	3	8
					Total Credits	12	

PROJECT/ SEMINAR/ INDUSTRIAL TRAINING

S.NO	CODE NO.	COURSE TITLE	HOURS PER WEEK			TOTAL CREDITS	SEMESTER
			L	T	P		
1	PROJ-CS-300-P	PROJECT I	0	0	4	2	6
2	PROJ-CS-401-P	PROJECT II	0	0	4	2	7
3	PROJ-CS-402-P	PROJECT III	0	0	12	5	8
4	PROJ-CS-403-P	SEMINAR	0	0	2	1	7
5	PROJ-CS-404-P	SEMINAR	0	0	2	1	8
6	ITP-CS-301-P	INDUSTRIAL PRACTICAL TRAINING-I	0	0	0	2	5
7	ITP-CS-405-P	INDUSTRIAL TRAINING – II	0	0	0	2	7
					TOTAL CREDITS	15	

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Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech. Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester -1

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	BSC	BSC - 101	Semi Conductor Physics	3	1	0	4	20	80	100
2.	BSC	BSC - 103	Mathematics –I : Calculus and Linear Algebra	3	1	0	4	20	80	100
3.	ESC	ESC - 101	Basic Electrical Engineering	3	1	0	4	20	80	100
Lab										
4.	BSC	BSC - 101-P	Physics Lab	0	0	2	1	10	40	50
5.	ESC	ESC - 102-P	Engineering Graphics & Design	1	0	4	3	20	80	100
6.	ESC	ESC - 101-P	Basic Electrical Engineering Lab	0	0	2	1	10	40	50
7.			Induction Program (Mandatory)				Non Credit			
		Total		**10**	**3**	**8**	**17**	**100**	**400**	**500**

Total Contact Hours =21 **Total Credit= 17**

Note: 1. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

2. Every student has to participate in the MANDATORY INDUCTION PROGRAM OF ONE/THREE WEEK DURATION at the start of regular teaching of first semester. It comprises physical activity, creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Deptt. Branch & Innovations.

Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester -2

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	BSC	BSC - 102	Chemistry	3	1	0	4	20	80	100
2.	BSC	BSC - 104	Mathematics -II : Probability and Statistics	3	1	0	4	20	80	100
3.	ESC	ESC - 103	Programming for problem solving	3	0	0	3	20	80	100
4.	HSMC	HSMC - 101	English	2	0	0	2	10	40	50
Lab										
5.	HSMC	HSMC -101-P	English Language Lab	0	0	2	1	10	40	50
6.	ESC	ESC - 104-P	Workshop /Manufacturing Practices	1	0	4	3	20	80	100
7.	ESC	ESC - 103-P	Programming for problem solving Lab	0	0	4	2	10	40	50
8.	BSC	BSC - 102-P	Chemistry Lab	0	0	2	1	10	40	50
	Total			**12**	**2**	**12**	**20**	**120**	**480**	**600**

Total Contact Hours =26 **Total Credit= 20**

Note: Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

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(w.e.f Academic Session 2024- 2025)

Semester - 3

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-201	Data Structure & Algorithms	3	0	0	3	20	80	100
2.	PCC	PCC-CS-203	Computer Organization & Architecture	3	0	0	3	20	80	100
3.	PCC	PCC-CS-205	Object Oriented Prog. with C++	3	0	0	3	20	80	100
4.	ESC	ESC-203	Digital Electronics	3	0	0	3	20	80	100
5.	BSC	BSC-201	Mathematics- III (Calculus and Ordinary Differential Equations)	3	1	0	4	20	80	100
6.	HS MC	HSMC-201	Humanities –I (Effective Technical Communication)	3	0	0	3	20	80	100
7.	MC	EVS-201 (Non Credit)	Environmental Studies	3	0	0	0	20	80	100
Lab										
8.	ESC	ESC-203-P	Digital Electronics Lab	0	0	2	1	10	40	50
9.	PCC	PCC-CS-201 --P	Data Structure & Algorithms Lab	0	0	4	2	10	40	50
10	PCC	PCC-CS-205 –P	Object Oriented Programming with C++ Lab	0	0	4	2	10	40	50
		Total		**21**	**1**	**10**	**24**	**150**	**600**	**750**

Total Contact Hours =32 **Total Credit= 24**

Note: Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

w.e.f (2024-25)

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Semester - 4

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-202	Discrete Mathematics	3	1	0	4	20	80	100
2.	PCC	PCC-CS-204	Software Engineering	3	0	0	3	20	80	100
3.	PCC	PCC-CS-206	Operating System	3	0	0	3	20	80	100
4.	PCC	PCC-CS-208	Design & Analysis of Algorithms	3	0	0	3	20	80	100
5.	PCC	PCC-CS-210	Python	3	0	0	3	20	80	100
6.	HSMC	HSMC-202	Management – I (Organizational Behavior)	3	0	0	3	20	80	100
7.	MC	MC-303 (Non Credit)	Universal Human Values	3	0	0	0	10	40	50
Lab										
8.	PCC	PCC-CS-206-P	Operating System LAB	0	0	4	2	10	40	50
9.	PCC	PCC-CS-208-P	Hardware Lab/ MATLAB	0	0	2	1	10	40	50
10.	PCC	PCC-CS-210-P	Python Lab	0	0	4	2	10	40	50
		Total		21	1	10	24	150	600	750

Total Contact Hours =32 **Total Credit= 24**

Note: 1). 4-6 weeks training will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester.

2). Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

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Semester - 5

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-301	Database Management Systems	3	0	0	3	20	80	100
2.	PCC	PCC-CS-303	Formal Language & Automata Theory	3	0	0	3	20	80	100
3.	PCC	PCC-CS-305	Java Programming	3	0	0	3	20	80	100
4.	PCC	PCC-CS-307	Machine Learning	3	0	0	3	20	80	100
5.	HSMC	HSMC-301	Humanities- II (Economics for Engineers)	3	0	0	3	20	80	100
6.	MC	MC -301 (Non Credit)	Constitution of India/Essence of Indian Traditional Knowledge	2	0	0	0	10	40	50
7.	As per UGC	CSD-001 (Non Credit)	Current Issues and Societal Development	3	0	0	0	20	80	100
Lab										
7.	PCC	PCC-CS-301-P	Database Management Systems LAB	0	0	4	2	10	40	50
8.	PCC	PCC-CS-305- P	Java Programming LAB	0	0	4	2	10	40	50
9.	Project	ITP-CS-301-P	Industrial Practical Training-I	0	0	0	2	-	50	50
		Total		**20**	**0**	**8**	**21**	**120**	**530**	**650**

Total Contact Hours =28 **Total Credit= 21**

Note: 1. Industrial Practical Training-I was conducted after fourth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.

2. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

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Semester - 6

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-302	Compiler Design	3	0	0	3	20	80	100
2.	PCC	PCC-CS-304	Computer Networks	3	0	0	3	20	80	100
3.	PEC	PEC	Elective-I	3	0	0	3	20	80	100
4.	PEC	PEC	Elective-II	3	0	0	3	20	80	100
5.	OEC	OEC	Open Elective-I	3	0	0	3	20	80	100
Lab										
6.	Project	PROJ-CS-300-P	Project-I	0	0	4	2	10	40	50
7.	PCC	PCC-CS-302-P	Compiler Design lab	0	0	4	2	10	40	50
8.	PCC	PCC-CS-304-P	Computer Networking Lab	0	0	4	2	10	40	50
9	PEC	PEC	Electives-I Course Lab	0	0	2	1	10	40	50
		Total		**15**	**0**	**14**	**22**	**140**	**560**	**700**

Total Contact Hours =29 **Total Credit= 22**

Note: 1. 4-6 weeks industrial practical training. II training will be held after sixth semester. However, Viva- Voce will be conducted in the seventh semester.

2. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

3. Project coordinator and other assisting co-coordinators will be assigned the load maximum of 02 Hours per week including their own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

S.No	Elective – I	Elective – I Lab	Elective –II	Open Elective- I
1.	PEC-CS-306 Digital Image Processing	PEC-CS-306-P Digital Image Processing Lab	PCC-IT-303 Multimedia and Technologies	OE-CS-322 Soft Skills & Interpersonal Communication
2.	PEC-CS-308 Artificial Intelligence	PEC-CS-308-P Artificial Intelligence Lab	PEC-CS-316 High Speed Network	OE-CS-324 Cyber Law and Ethics
3.	PEC-CS-310 Computer Graphics	PEC-CS-310-P Computer Graphics Lab	PEC-CS-318 Soft Computing	OE-CS-326 Data Analytics using R
4.	PEC-CS-312 Cloud Computing	PEC-CS-312-P Cloud Computing Lab	PEC-CS-320 Data Mining	OE-CS-328 Microprocessor and Interfacing

Department of Computer Science & Engineering & Information Technology

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Semester -7

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PEC	PEC	Elective-III	3	0	0	3	20	80	100
2.	PEC	PEC	Elective-IV	3	0	0	3	20	80	100
3.	OEC	OEC	Open Elective-II	3	0	0	3	20	80	100
4.	OEC	OEC	Open Elective-III	3	0	0	3	20	80	100
5.	BSC	BSC-401	Bioinformatics	2	0	0	2	20	80	100
Lab										
6.	Project	PROJ-CS-401-P	Project-II	0	0	4	2	20	80	100
7.	Project	PROJ-CS-403-P	Seminar	0	0	2	1	50	-	50
8.	Project	ITP-CS-405-P	Industrial Practical Training- II	0	0	0	2	-	100	100
9	PEC	PEC	Electives-III Course Lab	0	0	2	1	10	40	50
		Total		**14**	**1**	**08**	**20**	**180**	**620**	**800**

Total Contact Hours =23 **Total Credit= 20**

Note: 1. Practical training was conducted after sixth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.

2. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

3. Project coordinator and other assisting co-coordinators will be assigned the load maximum of 02 Hours per week including their own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her

S.No	Elective –III	Elective –III Labs	Elective – IV	Open Elective- II	Open Elective – III
1.	PEC- CS-401 Information Security	PEC- CS-401 -P Information Security Lab	PEC- CS-409 Queuing Theory and Modeling	OE-CS-417 Human Resource Management	OE-CS-425 Financial Management
2.	PEC-CS-403 Wireless and Mobile Communication	PEC-CS-403-P Wireless and Mobile Communication Lab	PEC-CS-411 Internet of Things	OE-CS-419 ICT for Development	OE-CS-427 E-Commerce & Entrepreneurship
3.	PEC-CS-405 Advanced Operating Systems	PEC-CS-405 -P Advanced Operating Systems Lab	PEC-CS-413 Speech and Natural Language Processing	OE-CS-421 Intellectual Property Rights	OE-CS-429 Basics of Operation Research
4.	PCC-IT-302 Web and Internet Technology	PCC-IT-302-P Web and Internet Technology Lab	PEC-CS-415 Optimization Techniques	OE-CS-423 International Business Environment	OE-CS-431 Renewable Energy System

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Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester - 8

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PEC	PEC	Elective-V	3	0	0	3	20	80	100
2.	OEC	OEC	Open Elective-IV	3	0	0	3	20	80	100
Lab										
3.	Project	PROJ-CS-402 P	Project-III	0	0	12	5	40	160	200
4.	Project	PROJ-CS-404-P	Seminar	0	0	2	1	50	0	50
5.	MC (Non Credit)	GPP-CS-406-P	General Proficiency	0	0	0	0	0	100	100
		Total		**6**	**0**	**14**	**12**	**130**	**320**	**450**

Total Contact Hours =20 **Total Credit= 12**

Note: Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

2. General Fitness for Profession: A comprehensive viva-voce of the students will be taken by external examiner and Chairperson of the department (internal examiner) and Class Coordinator at the end of the semester. The evaluation of the student for General Fitness for the Profession will be carried out through viva-voce taken by the committee of examiners.

3. Project coordinator and other assisting co-coordinators will be assigned the load maximum of 02 Hours per week including their own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

S.No	Elective – V	Open Elective- IV
1.	PEC- CS-402 Block Chain	OE-CS-410 Economic policies in India
2.	PEC-CS-404 Deep Learning	OE-CS-412 Quality Engineering
3.	PEC-CS-406 Neural Networks	OE-CS-414 Optical Network Design
4.	PEC-CS-408 Software Testing and Quality Assurance	OE-CS-416 Embedded System

Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech. Computer Science & Engineering

(w.e.f Academic Session 2024-2025)

Semester -1

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	BSC	BSC-101	Semi Conductor Physics	3	1	0	4	20	80	100
2.	BSC	BSC-103	Mathematics –I : Calculus and Linear Algebra	3	1	0	4	20	80	100
3.	ESC	ESC-101	Basic Electrical Engineering	3	1	0	4	20	80	100
Lab										
4.	BSC	BSC-101-P	Physics Lab	0	0	2	1	10	40	50
5.	ESC	ESC-102-P	Engineering Graphics & Design	1	0	4	3	20	80	100
6.	ESC	ESC-101-P	Basic Electrical Engineering Lab	0	0	2	1	10	40	50
7.			Induction Program (Mandatory)				Non Credit			
Total				10	3	8	17	100	400	500

Total Contact Hours =21 **Total Credit= 17**

Note: 1. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

2. Every student has to participate in the MANDATORY INDUCTION PROGRAM OF ONE/THREE WEEK DURATION at the start of regular teaching of first semester. It comprises physical activity, creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Deptt. Branch & Innovations. Classes for Ist semester will commence after completion of Induction Program.

-238- Chairperson

B. Tech. Semester – I (Computer Science and Engineering)

SEMI CONDUCTOR PHYSICS

CODE: BSC - 101

NO. OF CREDITS: 4	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 1 0	TOTAL: 100

Prerequisite: "Introduction to Quantum Mechanics" Desirable.

Course objectives:-

1. To give knowledge about semiconductor physics and discus working and applications of basic devices, including p-n junctions, BJTs and FETs.

UNIT- 1

Electronic materials (8): Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT- 2

Semiconductors (10): Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

UNIT-3

Light-semiconductor interaction (10): Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

Measurements (4): Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics,

UNIT- 4

Engineered semiconductor materials (8): Density of states in 2D, 1d and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band-diagrams DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.

Suggested Text books/References:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).

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4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL

Course outcomes:-

1. Students will be able to understand free electron gas models in solids.
2. Students became familiar with Mechanism of semi conductors and their combination with metals.
3. Students became familiar with the mechanism of light and semiconductor interaction.
4. Students are able to appreciate various experiments to measure charge density, Resistivity hall., mobility and I-V characteristics of semiconductors.
5. Students would be able to understand the Basics of Nonmaterial's.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – I (Computer Science and Engineering)

MATHEMATICS- I: CALCULUS AND LINEAR ALGEBRA

CODE: BSC -103

NO OF CREDITS: 4	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 1 0	TOTAL: 100

Course Objectives:

1. To understand the basic mathematical ideas and tools which are at the core of any engineering course.
2. To understand the basic techniques in matrix theory which are essential for analysing linear systems

UNIT- 1

Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Calculus: Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

UNIT- 2

Matrices (in case vector spaces is to be taught)

Matrices, vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

UNIT- 3

Vector spaces (Prerequisite Module 3-Matrices)

Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

UNIT- 4

Vector spaces (Prerequisite Module 3 –Matrices & Module-4 Vector spaces

Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices; eigenbases.Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Suggested Text/Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,

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Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

Course Outcomes

1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
2. The essential tools of matrices and linear algebra including linear transformations, eigenvalues, diagonalization and orthogonalization.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – I (Computer Science and Engineering)

BASIC ELECTRICAL ENGINEERING

CODE: ESC- 101

NO. OF CREDITS: 4		INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
3 1 0		TOTAL:	100

Pre-requisite: Basic understanding of Physics.

Course Objective: The aim of this course is to:

- To analyze DC and AC circuits.
- To analyze AC series and parallel circuits.
- To understand fundamental knowledge of electric machines.
- To assimilate elementary knowledge of electric installations.

UNIT- 1

DC Circuits (10 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Mesh and nodal analysis of simple circuits with dc excitation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Star to Delta conversion and vice versa, Time-domain analysis of first-order RL and RC circuits.

UNIT- 2

AC Circuits (10 hours)

Representation of sinusoidal waveforms, Peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Resonance (series and parallel circuits). Three-phase balanced circuits, voltage and current relations in star and delta connections, Measurement of Power and Power Factor using two wattmeter method.

UNIT- 3

Electrical Machines (12 hours)

Construction and working principle of Transformer, Ideal and practical transformer, phasor diagram and equivalent circuit of transformer, losses in transformers, voltage regulation and efficiency, Autotransformer Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Applications of three phase induction motor, Construction and working of DC machine, Speed control of dc machine.

UNIT- 4

Electrical Instruments and LT Installations (10 hours)

Electrical Instruments: Permanent Magnet Moving Coil, Electrodynamometer & Moving Iron type instruments, Induction type Energy meter.

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Elementary calculations for energy consumption, power factor improvement.

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Suggested Text / Reference Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. Del Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
3. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
4. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
5. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
6. B. L. Theraja & A. K. Theraja, "Basic Electrical Engineering", Volume 1, S. Chand, 2015
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

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

1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits.
2. Identify the applications of network theorems and resonance phenomenon in relevant area.
3. Analyze the steady state behaviour of single phase and three phase AC electrical circuits.
4. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also, identify the connections of a three phase transformer.
5. Understand the fundamentals of Electrical circuits, Electrical machines, measuring instruments and LT installation.
6. Assess the type of electrical machines, instruments and LT switchgear to be used for a particular application.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – I (Computer Science and Engineering)

PHYSICS LAB

CODE: BSC- 101- P

NO OF CREDITS: 1

L T P

0 0 2

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL:	50

Laboratory Objectives:-

1. To Impart technology aspects of applied physics
2. To lay foundation of practical application of physics in engineering.
3. To apply Basics Physics concepts in a broader sense.
4. Students will be able to understand the new development, research and breakthrough efficiency in engineering physics.
5. Understand and explain the various physics related problems in engineering field.

Pre-requisites (if any) - Basics of Statistics.

List of Experiments

1. To find the capacitance of unknown capacitor using flashing and quenching of Argon bulb.
2. To study the photo conducting cell and hence to verity the inverse square law.
3. To study the characteristics of a solar cell and to find the fill factor.
4. To find the value of Planck's constant by using a photo electric cell.
5. To find the value of Hall Co-efficient of semi-conductor.
6. To study the V-I characteristics of a p-n diode.
7. To find the band gap of intrinsic semi-conductor using four probe method.
8. To convert given galvanometer into an ammeter and voltmeter of given range.
9. To determine the wavelength of sodium light by Newton's rings experiment.
10. To find the Specific rotation of sugar solution by using Polarimeter.
11. To find the refractive of a material of a given prism using spectrometer.
12. To study rectification properties of a semiconductor.
13. Study of Characteristics of p-i-n and avalanche photo diode detectors.
14. To determine the resistivity of a semiconductor by four probe method.
15. To find the wavelength of various colours of white light with the help of a plane transmission diffracting grating

Laboratory Outcomes:-

1. Students would be able to determine the wavelength of white light by using diffraction grating.
2. Students will understand to determine the specific rotation of a canesugar solution.
3. Characterise the semiconductor materials by determining band gap & resistivity using four please method.
4. Students will be able to determine capacitance using flashing & Quenching of argon bulb.
5. Student learn about V-I characteristics of P-N Diode.

Note: At least ten experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

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B. Tech. Semester – I (Computer Science and Engineering)

BASIC ELECTRICAL ENGINEERING LAB

CODE: ESC -101- P

NO OF CREDITS: 1

L	T	P
0	0	2

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL:	50

Laboratory Objective:

1. To get an exposure to common electrical components and their ratings.
2. To understand the DC and AC electrical circuits.
3. To analyze various laws and theorems in DC circuits.
4. To get the fundamental knowledge of electric machines.

Pre-requisite: 10+2 Physics.

List of experiments:

1. To demonstrate the various basic safety precautions and use of instruments like voltmeter, ammeter, multi-meter, oscilloscope, Real-life resistors, capacitors and inductors in Electrical Engineering Laboratories.
2. To verify the KVL and KCL.
3. To verify the Thevenin's and Norton's Theorems.
4. To verify the Superposition theorem.
5. To study frequency response of a series R-L-C circuit and determine resonant frequency and & Q-factor for various values of R-L-C.
6. To study frequency response of a parallel R-L-C circuit and determine resonant frequency and & Q-factor for various values of R-L-C.
7. To observe steady state and transient time response of R-L, R-C and R-L-C circuits to a step change in voltage.
8. To measure the power and power factor using three voltmeter / three ammeter method in a single phase AC circuit.
9. To measure the power and power factor for a balanced 3 phase load by two wattmeter method.
10. To perform the direct load test of a Transformer and plot load current versus (a) terminal voltage (b) efficiency.
11. To measure iron loss in a single phase transformer and to find the equivalent circuit parameters by performing open circuit and short circuit.
12. To study various types of meters such as: ammeter, voltmeter, Wattmeter, Multimeter, Energy Meter.
13. To demonstrate the cut-set of dc machine (Commutator-brush arrangement), induction machine.
14. To perform the torque-speed characteristics of a separately excited DC Motor.
15. To perform the open circuit and short circuit tests of a three phase Induction motor.

References and Suggested Text Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

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2. Del Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
3. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
4. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
5. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
6. B. L. Theraja & A. K. Theraja, "Basic Electrical Engineering", Volume 1, S. Chand, 2015
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
8. Kirchhoff's laws: Virtual lab link: http://vlab.amrita.edu/?sub=3&brch=75&sim=217&cnt=2.
9. Thevenin Theorem: Virtual lab link: https://vlab.amrita.edu/?sub=1&brch=75&sim=313&cnt=1
10. RLC series resonance: Virtual lab link: https://vlab.amrita.edu/?sub=1&brch=75&sim=330&cnt=1

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

1. Perform experimental work and gain technical knowledge of electrical circuits, Electrical machines and measuring instruments along with safety measures.
2. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits.
3. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
4. Evaluate the performance of transformer and electrical machines under various operating conditions.
5. Organize reports based on experiments performed with effective demonstration and analysis of results.

Note: At least ten experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

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B. Tech. Semester – I (Computer Science and Engineering)
ENGINEERING GRAPHICS & DESIGN (THEORY & LAB)
CODE: ESC- 102- P

NO OF CREDITS: 3
L T P
1 0 4

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL: 100

Course Objectives:

1. To prepare the students to design a system, component, or process to meet desired needs within realistic constraints such as economic,. environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. To prepare students to communicate effectively
3. To prepare students to use the techniques, skills, and modern engineering tools necessary forengineering practice.

Engineering Graphics & Design [A total of 10 lecture hours & 60 hours of lab.]

Traditional Engineering Graphics(5 hrs):

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

Computer Graphics(5 hrs):

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)

(Except the basic essential concepts, most of the teaching part can happen Concurrently in the laboratory)

Unit 1

Introduction to Engineering Drawing (12 hrs):

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales; Orthographic Projections covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes

Unit 2

Projections of Regular Solids (16 hrs):

Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only), Isometric Projections covering, Principles of Isometric projection – Isometric Scale,

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Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit 3

Overview of Computer Graphics (16 Hrs):

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];Customisation& CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.

Unit 4

Annotations, layering & other functions (16 hrs):

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models.Part editing and two-dimensional documentation of models.Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;Demonstration of a simple team design project that illustrates Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Text/Reference Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
5. (Corresponding set of) CAD Software Theory and User Manuals

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Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

The student will learn:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

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B. Tech. Semester – I (Computer Science and Engineering)
MANDATORY INDUCTION PROGRAM (3-WEEKS DURATION)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

A Guide to Induction Program

1 Introduction

(Induction Program was discussed and approved for all colleges by AICTE in March 2017. It was discussed and accepted by the Council of IITs for all IITs in August 2016. It was originally proposed by a Committee of IIT Directors and accepted at the meeting of all IIT Directors in March 2016. This guide has been prepared based on the Report of the Committee of IIT Directors and the experience gained through its pilot implementation in July 2016 as accepted by the Council of IITs. Purpose of this document is to help institutions in understanding the spirit of the accepted Induction Program and implementing it.)

Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his study. However, he must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he would understand and fulfill his responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed. There is a mad rush for engineering today, without the student determining for himself his interests and his goals. This is a major factor in the current state of demotivation towards studies that exists among UG students. The success of gaining admission into a desired institution but failure in getting the desired branch, with peer pressure generating its own problems, leads to a peer environment that is demotivating and corrosive. Start of hostel life without close parental supervision at the same time, further worsens it with also a poor daily routine. To come out of this situation, a multi-pronged approach is needed. One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce unnecessary burden on the students besides making them self-oriented.

2 Induction Program

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days. We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after

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the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature. The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

Induction Program as described here borrows from three programs running earlier at different institutions:
(1) Foundation Program running at IIT Gandhinagarsss since July 2011,
(2) Human Values course running at IIIT Hyderabad since July 2005, and
(3) Counselling Service or mentorship running at several IITs for many decades. Contribution of each one is described next. (1) IIT Gandhinagar was the first IIT to recognize and implement a special 5-week Foundation Program for the incoming 1st year UG students. It took a bold step that the normal classes would start only after the five week period. It involved activities such as games, art, etc., and also science and other creative workshops and lectures by resource persons from outside. (2) IIIT Hyderabad was the first one to implement a compulsary course on Human Values. Under it, classes were held by faculty through discussions in small groups of students, rather than in lecture mode. Moreover, faculty from all departments got involved in conducting the group discussions under the course. The content is non-sectarian, and the mode is dialogical rather than sermonising or lecturing. Faculty were trained beforehand, to conduct these discussions and to guide students on issues of life. (3) Counselling at some of the IITs involves setting up mentor-mentee network under which 1st year students would be divided into small groups, each assigned a senior student as a student guide, and a faculty member as a mentor. Thus, a new student gets connected to a faculty member as well as a senior student, to whom he/she could go to in case of any difficulty whether psychological, financial, academic, or otherwise. The Induction Program defined here amalgamates all the three into an integrated whole, which leads to its high effectiveness in terms of building physical activity, creativity, bonding, and character. It develops sensitivity towards self and one's relationships, builds awareness about others and society beyond the individual, and also in bonding with their own batch-mates and a senior student besides a faculty member. Scaling up the above amalgamation to an intake batch of 1000 plus students was done at IIT (BHU), Varanasi starting from July 2016.

2.1 Physical Activity

This would involve a daily routine of physical activity with games and sports. It would start with all students coming to the field at 6 am for light physical exercise or yoga. There would also be games in the evening or at other suitable times according to the local climate. These would help develop team work. Each student should pick one game and learn it for three weeks. There could also be gardening or other suitably designed activity where labor yields fruits from nature.

2.2 Creative Arts

Every student would chose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the

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duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into engineering design later.

2.3 Universal Human Values

It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting staff in the hostel and department, be sensitive to others, etc. Need for character building has been underlined earlier. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values. The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Experiments in this direction at IIT (BHU) are noteworthy and one can learn from them.3 Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the induction program. Besides drawing the attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 4-year stay and possibly beyond.

The Universal Human Values Course is a result of a long series of experiments at educational institutes starting from IIT-Delhi and IIT Kanpur in the 1980s and 1990s as an elective course, NIT Raipur in late 1990s as a compulsory one-week off campus program. The courses at IIT(BHU) which started from July 2014, are taken and developed from two compulsory courses at IIIT Hyderabad first introduced in July 2005.

2.4 Literary

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

2.5 Proficiency Modules

This period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.

2.6 Lectures by Eminent People

This period can be utilized for lectures by eminent people, say, once a week. It would give the students exposure to people who are socially active or in public life.

2.7 Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the under privileged.

2.8 Familiarization to Dept./Branch & Innovations

The students should be told about different method of study compared to coaching that is needed at IITs. They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

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3 Schedule

The activities during the Induction Program would have an Initial Phase, a Regular Phase and a Closing Phase. The Initial and Closing Phases would be two days each.

3.1 Initial Phase Time Activity

Day 0 Whole day Students arrive - Hostel allotment. (Preferably do pre- allotment)

Day 1 09:00 am - 03:00 pm Academic registration 04:30 pm - 06:00 pm Orientation

Day 2 09:00 am - 10:00 am Diagnostic test (for English etc.) 10:15 am - 12:25 pm Visit to respective depts. 12:30 pm - 01:55 pm Lunch 02:00 pm - 02:55 pm Director's address 03:00 pm - 05:00 pm Interaction with parents 03:30 pm - 05:00 pm Mentor-mentee groups - Introduction within group. (Same as Universal Human Values groups)

3.2 Regular Phase

After two days is the start of the Regular Phase of induction. With this phase there would be regular program to be followed every day.

3.2.1 Daily Schedule

Some of the activities are on a daily basis, while some others are at specified periods within the Induction Program. We first show a typical daily timetable. Sessn. Time Activity Remarks

Day 3 onwards 06:00 am Wake up call

I 06:30 am - 07:10 am Physical activity (mild exercise/yoga) 07:15 am - 08:55 am Bath, Breakfast, etc.

II 09:00 am - 10:55 am Creative Arts / Universal Human Values Half the groups do Creative Arts

III 11:00 am - 12:55 pm Universal Human Values / Creative Arts Complementary alternate 01:00 pm - 02:25 pm Lunch

IV 02:30 pm - 03:55 pm Afternoon Session See below.

V 04:00 pm - 05:00 pm Afternoon Session See below. 05:00 pm - 05:25 pm Break / light tea

VI 05:30 pm - 06:45 pm Games / Special Lectures 06:50 pm - 08:25 pm Rest and Dinner

VII 08:30 pm - 09:25 pm Informal interactions (in hostels) Sundays are off. Saturdays have the same schedule as above or have outings.

3.2.2 Afternoon Activities (Non-Daily)

The following five activities are scheduled at different times of the Induction Program, and are not held daily for everyone:

1. Familiarization to Dept./Branch & Innovations
2. Visits to Local Area
3. Lectures by Eminent People
4. Literary
5. Proficiency Modules

Here is the approximate activity schedule for the afternoons (may be changed to suit local needs):

Activity Session Remarks Familiarization with Dept/Branch & Innovations IV For 3 days (Day 3 to 5) Visits to Local Area IV, V and VI For 3 days - interspersed (e.g., 3 Saturdays) Lectures by Eminent People IV As scheduled - 3-5 lectures Literary (Play / Book Reading / Lecture) IV For 3-5 days Proficiency Modules V Daily, but only for those who need it

3.3 Closing Phase Time Activity Last But One Day

08:30 am - 12 noon Discussions and finalization of presen- tation within each group 02:00 am - 05:00 pm Presentation by each group in front of 4 other groups besides their own (about 100 students) Last Day Whole day Examinations (if any). May be ex- panded to last 2 days, in case needed.

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3.4 Follow Up after Closure

A question comes up as to what would be the follow up program after the formal 3-week Induction Program is over? The groups which are formed should function as mentor- mentee network. A student should feel free to approach his faculty mentor or the student guide, when facing any kind of problem, whether academic or financial or psychological etc. (For every 10 undergraduate first year students, there would be a senior student as a student guide, and for every 20 students, there would be a faculty mentor.) Such a group should remain for the entire 4-5 year duration of the stay of the student. Therefore, it would be good to have groups with the students as well as teachers from the same department/discipline4. Here we list some important suggestions which have come up and which have been experimented with.

3.4.1 Follow Up after Closure – Same Semester

It is suggested that the groups meet with their faculty mentors once a month, within the semester after the 3-week Induction Program is over. This should be a scheduled meeting shown in the timetable. (The groups are of course free to meet together on their own more often, for the student groups to be invited to their faculty mentor's home for dinner or tea, nature walk, etc.)

3.4.2 Follow Up – Subsequent Semesters

It is extremely important that continuity be maintained in subsequent semesters. It is suggested that at the start of the subsequent semesters (upto fourth semester), three days be set aside for three full days of activities related to follow up to Induction Program. The students be shown inspiring films, do collective art work, and group discussions be conducted. Subsequently, the groups should meet at least once a month.

4 Summary

Engineering institutions were set up to generate well trained manpower in engineering with a feeling of responsibility towards oneself, one's family, and society. The incoming undergraduate students are driven by their parents and society to join engineering without understanding their own interests and talents. As a result, most students fail to link up with the goals of their own institution. The graduating student must have values as a human being, and knowledge and meta- skills related to his/her profession as an engineer and as a citizen. Most students who get demotivated to study engineering or their branch, also lose interest in learning. The Induction Program is designed to make the newly joined students feel comfortable, sensitize them towards exploring their academic interests and activities, reducing compe- tition and making them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and building of character. The Universal Human Values component, which acts as an anchor, develops awareness and sensitivity, feeling of equality, compassion and oneness, draw attention to society and

4We are aware that there are advantages in mixing the students from different depts. However, in mixing, it is our experience that the continuity of the group together with the faculty mentor breaks down soon after. Therefore, the groups be from the same dept. but hostel wings have the mixed students from different depts. For example, the hostel room allotment should be in alphabetical order irrespective of dept. nature, and character to follow through. It also makes them reflect on their relationship with their families and extended family in the college (with hostel staff and others). It also connects students with each other and with teachers so that they can share any difficulty they might be facing and seek help.

Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester -2

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	BSC	BSC-102	Chemistry – I	3	1	0	4	20	80	100
2.	BSC	BSC-104	Mathematics – II : Probability and Statistics	3	1	0	4	20	80	100
3.	ESC	ESC - 103	Programming for problem solving	3	0	0	3	20	80	100
4.	HSMC	HSMC-101	English	2	0	0	2	10	40	50
Lab										
5.	HSMC	HSMC -101-P	English Language Lab	0	0	2	1	10	40	50
6.	ESC	ESC - 104-P	Workshop /Manufacturing Practices	1	0	4	3	20	80	100
7.	ESC	ESC - 103-P	Programming for problem solving Lab	0	0	4	2	10	40	50
8.	BSC	BSC - 102-P	Chemistry Lab	0	0	2	1	10	40	50
		Total		**12**	**2**	**12**	**20**	**120**	**480**	**600**

Total Contact Hours =26 **Total Credit= 20**

Note: Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

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B. Tech. Semester – II (Computer Science and Engineering)

CHEMISTRY- I

CODE: BSC-102

NO OF CREDITS: 4		**INTERNAL MARKS:**	**20**
L T P		**EXTERNAL MARKS:**	**80**
3 1 0		**TOTAL:**	**100**

Course objectives:

1. To impart technological aspects of applied chemistry
2. To lay foundation of practical application of chemistry in engineering aspects
3. To apply basic chemistry concepts to chemical process industries
4. Student will able to understand the new developments, research and breakthrough efficiency in engineering chemistry
5. To understand and explain scientifically the various chemistry related problems in industry and engineering field.

Pre-requisites (if any) - Basics of Chemistry.

UNIT- 1

Atomic and molecular structure (12 lectures)

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations.Molecular orbitals of diatomic molecules and plots of the multicenter orbitals.Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity.Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.Band structure of solids and the role of doping on band structures

UNIT- 2

Spectroscopic techniques and applications (4 lectures)

Principles of spectroscopy and selection rules.Electronic spectroscopy.Fluorescence and its applications in medicine.Vibrational and rotational spectroscopy of diatomic molecules.Applications.Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques.Diffraction and scattering.

Intermolecular forces and potential energy surfaces (4 lectures)

Ionic, dipolar and van Der Waals interactions.Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

UNIT- 3

Use of free energy in chemical equilibria (6 lectures)

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cell potentials, the Nernst equation and applications.Acid base, oxidation reduction and solubility equilibria.Water chemistry.Corrosion.Use of free energy considerations in metallurgy through Ellingham diagrams.

Periodic properties (4 lectures)

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

UNIT- 4

Stereochemistry (4 lectures)

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

Organic reactions and synthesis of a drug molecule (4 lectures)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.Synthesis of a commonly used drug molecule

Stereochemistry (4 lectures)

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

Organic reactions and synthesis of a drug molecule (4 lectures)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.Synthesis of a commonly used drug molecule.

Suggested Text Books:

1 University chemistry, by B. H. Mahan
2 Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3 Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4 Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5 Physical Chemistry, by P. W. Atkins (vi) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition
http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes

- Understanding the Schrödinger equation for 1-D box as well as hydrogen atom & its application
- Understanding the bonding in tetrahedral and octahedral complexes and their energy diagram
- Detailed discussion of electrochemistry and cell corrosion
- Understanding the stereochemistry of organic molecules

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

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Suggested Text/Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

Course Outcomes

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

The students will learn:

- The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
- The basic ideas of statistics including measures of central tendency, correlation and regression.
- The statistical methods of studying data samples.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – II (Computer Science and Engineering)

PROGRAMMING FOR PROBLEM SOLVING

CODE: ESC - 103

NO OF CREDITS: 3		INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
3 0 0		TOTAL:	100

Pre-requisites (if any) - Basics of Computers, Algorithms and flowcharts.

Course Objective:-

1. To provide basic understanding of computer including history, various operating systems, number system, various languages developed etc.
2. To impart adequate knowledge on the need and concept of algorithms and programming.
3. Develop, execute and document computerized solution for various problems using the features of C language.
4. To enable effective usage of arrays, structures, functions, pointers and to implement the concepts of file organization.

UNIT- 1

Introduction to Programming (12 lectures)

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

UNIT- 2

Basic of C Programming (10 lectures)

Concept of variables, program statements and function calls from the library (printf for example), C data types: int, char, float etc., C expressions, arithmetic operation, relational and logic operators, C assignment statements, extension of assignment of the operations. C primitive input output using get char and put char, exposure to scanf and printf functions, C Statements, conditional executing using if, else , switch case, goto and break statements.

UNIT- 3

Conditional Branching and Loops (12 lectures)

Concept of loops in C using for, while and do-while, Writing and evaluation of conditionals and consequent branching Iteration and loops Arrays Arrays (1-D, 2-D), Character arrays and Strings, example of iterative programs using arrays and use in matrix computations. Functions, parameters and return values, standard library functions, Basic Algorithms Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection).

UNIT- 4

Pointers, Strings and Structure (12 lectures)

Pointers, relationship between arrays and pointers, Call by reference. Array of pointers, passing arrays as arguments. Character strings: processing strings using loops, and string library functions, Structures, Defining structures and Array of Structures.

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Suggested Text Books / Reference Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3.Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Course Outcomes

1. Explain the basic architecture of computers and various programming language to solve various engineering problem.
2. Apply problem solving skills in programming.
3. Developing logical thinking using C programming.
4. Develop and run computer programs in C language.

The student will learn

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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RPS Mahila Vishwavidyalaya Khanpur Kalan, Sonepat (HR.)

B. Tech. Semester – II (Computer Science and Engineering)

ENGLISH

CODE: HSMC -101

No of CREDITS: 2	INTERNAL MARKS: 10
L T P	EXTERNAL MARKS: 40
2 0 0	TOTAL: 50

Course objectives:

1. Ability to be comfortable with English in use while reading or listening.
1. Ability to use receptive skills through reading and listening to acquire good exposure to language and literature.
2. Ability to write and speak good English in all situations.
3. Students should develop style in speech and writing and manipulate the tools of language for effective communication.
4. The course should provide exposure to the learners in Good Prose texts and Poems and expose the learners to value based ideas.
5. Students should enhance their language skills especially in the areas of grammar and pronunciation.

UNIT- 1

Vocabulary Building

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms and standard abbreviations.

Basic Writing Skills

Sentence Structures, Use of phrases and clauses in sentences Importance of proper punctuation Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

UNIT- 2

Identifying Common Errors in Writing

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles Prepositions 3.6 Redundancies, Clichés

UNIT- 3

Nature and Style of sensible Writing

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

UNIT- 4

Writing Practices

Comprehension ,Précis Writing,Essay Writing

Oral Communication

(This unit involves interactive practice sessions in Language Lab)

Listening Comprehension

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Pronunciation, Intonation, Stress and Rhythm
Common Everyday Situations: Conversations and Dialogues
Communication at Workplace
Interviews
Formal Presentations

Suggested Readings:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – II (Computer Science and Engineering)
ENGLISH LANGUAGE LAB
CODE: HSMC -101-P

NO OF CREDITS: 1	INTERNAL MARKS: 10
L T P	PRACTICAL EXAM: 40
0 0 2	TOTAL: 50

Laboratory objectives:
The course will enable the students,

1. To implement English vocabulary at command and ensure language proficiency.
2. To achieve better Technical writing and Presentation skills.
3. Identify the common errors in speaking and writing English.
4. Acquire Employment and Workplace communication skills.

Oral Communication
Interactive practice sessions in Language Lab
Listening Comprehension
Pronunciation, Intonation, Stress and Rhythm
Common Everyday Situations: Conversations and Dialogues
Communication at Workplace
Interviews
Formal Presentations

Course Outcomes:

On completion of the course, students will be able to,

1. Identify common errors in spoken and written communication.
2. Get familiarized with English vocabulary and language proficiency.
3. Improve nature and style of sensible writing; acquire employment and workplace communication skills.
4. Improve their Technical Communication Skills through Technical Reading and Writing practices.
5. Perform well in campus recruitment, engineering and all other general competitive examinations.

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B. Tech. Semester – II (Computer Science and Engineering)
WORKSHOP / MANUFACTURING PRACTICES
CODE: ESC -104-P

NO OF CREDITS: 3		INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
1 0 4		TOTAL:	100

Course Objectives:

1. To understand various manufacturing processes.
2. To understand the metal cutting phenomena.
3. To select process parameter and tools for obtaining desired machining characteristic
4. To understand principles of manufacturing processes.

Contents:

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing Methods (3 lectures)
2. CNC machining, Additive manufacturing (1 lecture)
3. Fitting operations & power tools (1 lecture)
4. Electrical &Electronics (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding, glass cutting (1 lecture)
7. Metal casting (1 lecture)
8. Welding (arc welding & gas welding), brazing (1 lecture)

Suggested Text/Reference Books:

1. HajraChoudhury S.K., HajraChoudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

Course Outcomes:

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

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Laboratory Objectives:

1. To impart knowledge and skill to use tools, machines, equipment, and measuring instruments.
2. To educate students of Safe handling of machines and tools.

Workshop Practice:

1. Machine shop (10 hours)
2. Fitting shop (8 hours)
3. Carpentry (6 hours)
4. Electrical & Electronics (8 hours)
5. Welding shop (8 hours (Arc welding 4 hrs + gas welding 4 hrs)
6. Casting (8 hours)
7. Smithy (6 hours)
8. Plastic moulding & Glass Cutting (6 hours)

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Laboratory Outcomes:

Upon completion of this laboratory course, students will be able to fabricate components with their own hands. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. By assembling different components, they will be able to produce small devices of their interest.

Note: At least ten experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

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B. Tech. Semester – II (Computer Science and Engineering)

PROGRAMMING FOR PROBLEM SOLVING LAB

CODE: ESC -103-P

NO OF CREDITS: 2		INTERNAL MARKS:	10
L T P		PRACTICAL EXAM:	40
0 0 4		TOTAL:	50

Laboratory Objectives:

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

List of Experiments:

The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers: Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions: Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions: Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops: Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting: Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value: Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration): Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation Lab 11: Pointers and structures

Tutorial 12: File handling: Lab 12: File operations

Laboratory Outcomes:

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at run time
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program.
7. To be able to declare pointers of different types and use them in defining self- referential structures.

Note: At least ten experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

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B. Tech. Semester – II (Computer Science and Engineering)

CHEMISTRY LAB

CODE: BSC -102 –P

NO OF CREDITS: 1		INTERNAL MARKS:	10
L T P		EXTERNAL MARKS	40
0 0 2		TOTAL:	50

Laboratory Objectives:

1. Incorporates the experiments which involve the volumetric estimation of chemicals and determination of various properties of fuel, water sample and lubricants like calorific value, hardness, viscosity and surface tension.
2. To enable the learners to get hands-on experience on the principles discussed in theory sessions and to understand the applications of these concepts in engineering.
3. Practical awareness is inculcated and students are trained both quantitatively and qualitatively during the lab sessions so that their understanding and problem solving abilities can be enhanced.
4. To provide students with a practical approach towards the various techniques used in engineering application.

List of experiments:

Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry– determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg .

Laboratory Outcomes:

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

The students will learn to:

1. Estimate rate constants of reactions from concentration of reactants/products as a function of time

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2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
3. Synthesize a small drug molecule and analyses a salt sample.

Note: At least ten experiments are to be performed by students in the semester. Out of which at least eight experiments should be performed from the above list, remaining two experiments may either be performed from the above list or designed and set by the concerned faculty as per the scope of the syllabus.

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Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester - 3

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-201	Data Structure & Algorithms	3	0	0	3	20	80	100
2.	PCC	PCC-CS-203	Computer Organization & Architecture	3	0	0	3	20	80	100
3.	PCC	PCC-CS-205	Object Oriented Prog. with C++	3	0	0	3	20	80	100
4.	ESC	ESC-203	Digital Electronics	3	0	0	3	20	80	100
5.	BSC	BSC-201	Mathematics- III (Calculus and Ordinary Differential Equations)	3	1	0	4	20	80	100
6.	HSMC	HSMC-201	Humanities - I (Effective Technical Communication)	3	0	0	3	20	80	100
7.	MC	EVS-201 (Non Credit)	Environmental Studies	3	0	0	0	20	80	100
Lab										
8.	ESC	ESC-203-P	Digital Electronics Lab	0	0	2	1	10	40	50
9.	PCC	PCC-CS-201 -P	Data Structure & Algorithms Lab	0	0	4	2	10	40	50
10.	PCC	PCC-CS-205 -P	Object Oriented Programming with C++ Lab	0	0	4	2	10	40	50
		Total		**21**	**1**	**10**	**24**	**150**	**600**	**750**

Total Contact Hours =32 **Total Credit= 24**

Note: Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

B. Tech. Semester – III (Computer Science and Engineering)
DATA STRUCTURES & ALGORITHMS
CODE: PCC-CS-201

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

UNIT-1

Introduction

Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations.

Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Stacks and Queues

ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis

UNIT-2

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.

UNIT-3

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.

UNIT-4

Sorting and Hashing

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

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and

complexity analysis.

TEXT/ REFERENCE BOOKS

1. M. Tenenbaum, Langsam, Moshe J. Augentem , "Data Structures using C," PHI Pub.
2. K. Sharma, "Data Structures using C" Pearson Pub.
3. A.V. Aho, J.E. Hopcroft and T.D. Ullman, "Data Structures and Algorithms" Original edition, Addison-Wesley, 1999, Low Priced Edition.
4. Ellis Horowitz &Sartaj Sahni, "Fundamentals of Data structures" Pub, 1983,AW

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues, linked list and Tree, student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

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B. Tech. Semester – III (Computer Science and Engineering)

COMPUTER ORGANIZATION AND ARCHITECTURE

CODE: PCC-CS-203

NO OF CREDITS: 3		INTERNAL MARKS:	20
L	T P	EXTERNAL MARKS:	80
3	0 0	TOTAL :	100

Course Objectives:

1. How Computer Systems work and the basic principles.
2. Concept of computer architecture and Micro programming.
3. The basic principles for accessing I/O devices and memory unit.
4. Concepts of advanced processors, parallel and pipelining techniques.

UNIT-1

Introduction

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit, control and data path of a typical register based CPU, Bus structures, Register Transfer language, Arithmetic and Logic Unit-Micro operations (Arithmetic, logical and Shift Micro operations), Hardware Implementation. Data Representation: Fixed Point, Floating Point, Stored program control concept

UNIT-2

Control Unit Design

Design of CPU Control Unit- Hardwired :Instruction codes, Computer Registers, Computer instructions, Timing and control, Instruction-reference, Register Reference and Memory reference Instructions; Microprogrammed design: Micro programmed controlled unit, Control memory and address sequencing, Micro instruction Format ,Design of Control Unit.

UNIT-3

Central Processing Unit & Input-Output

General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC vs CISC Architectures, Overlapped register Window , Internal architecture of 8085 microprocessor.

I/O Interface: I/O bus and Interface modules, I/O vs memory mapped, Asynchronous Data Transfer—Strobe Control and Handshaking, Asynchronous Serial Transfer, modes of transfer, DMA;

UNIT-4

Memory Organization: Memory hierarchy, Memory interleaving, Associative Memory, Cache Memory and its organization (Direct, Associative and Set Associative).

Multiprocessor Systems

Characteristics of Multi. Processor Systems, Introduction to parallel processors and pipelined processors, typical example, Amdahl's Law and Flynn's Classification of computers (SISD, MISD, SIMD, and MIMD).

TEXT/ REFERENCE BOOKS:

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1. Mano, M.M. : Computer System Architecture, Prentice- Hall of India.
2. Stallings, William : Computer Organization & Architecture.
3. Gill, Nasib Singh and Dixit J.B.: Digital Design and Computer Organization, University Science Press (Laxmi Publications), New Delhi.
4. Kai Hwang : Advanced Computer Architecture, McGraw Hill International.
5. John P. Hayes , "Computer Architecture and Organization", Mc-Graw Hill .
6. Carl Hamacher, "Computer Organization and Embedded system ", Mc-Graw Hill

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of this course, the students will be able to perform the following:

1. Draw the functional block diagram of single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
2. Write assembly language program for specified microprocessors using different data representations.
3. Design the ALU, Control Unit and CPU of a computer system.
4. Design a memory module and analyze its operation by interfacing with a given CPU organization and instruction
5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology.

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B. Tech. Semester – III (Computer Science and Engineering)

OBJECT ORIENTED PROGRAMMING WITH C++

CODE: PCC-CS-205

NO OF CREDITS: 3			INTERNAL MARKS:	20
L	T	P	EXTERNAL MARKS:	80
3	0	0	TOTAL :	100

Course Objectives:

1. To familiarize students with basic concepts of object oriented programming
2. To familiarize students with operator overloading, inheritance, virtual functions and friend functions.
3. To familiarize students with advanced concepts of object oriented programming like templates and exception handling

UNIT- 1

Basic Concepts Of Object Oriented Programming:- Procedural Vs. Object oriented Programming, C++ Standard Library, Preprocessor Directives, illustrative Simple C++ Programs. Header Files and Namespaces, library files. Object Oriented Concepts: Introduction to Objects and Classes, Data Abstraction, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private), Polymorphism, Inheritance, and Reusability.

Classes: - Introduction, Structure Vs. Class, Class Scope and Accessing Class Members, Initializing Class Objects: Constructors.

UNIT- 2

Destructors, Friend Functions And Operator Overloading:- Destructors, Static Class Members, Const(Constant) Object And Const Member Functions, Object as Member of Classes, Friend Function and Friend Classes, Using This Pointer, Dynamic Memory Allocation with New and Delete, Container Classes and Iterators, Function overloading

Operator Overloading: - Introduction, Fundamentals of Operator Overloading, Restrictions on Operators Overloading, Operator Functions as Class Members vs. as Friend Functions, Overloading Binary Operators (+,-,*, /,=),Overloading Unary Operators(-,++,--,)

UNIT- 3

Inheritance And Virtual Functions:- Introduction, Types of Inheritance, Base Classes And Derived Classes, Virtual Base class, Casting Base Class Pointers to Derived- Class Pointers, Using Member Functions, Overriding Base - Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes, Composition Vs. Inheritance, Overloading Vs. Overriding. Run Time Polymorphism, Introduction to Virtual Functions, Pure Virtual Functions, Abstract Base Classes and Concrete Classes, Dynamic Binding, Virtual Destructors, Dynamic Binding.

UNIT-4

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6 **Files, Templates And Exception Handling:** - Files and I/O Streams and various operation on files. Stream Input/output Classes and Objects, Stream Output, Stream Input, Unformatted I/O (with read and write), Stream Manipulators, Stream Format States, Stream Error States.

Templates & Exception Handling: - Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters, Templates and Inheritance, Templates and Friends.

Basics of C++ Exception Handling: - Try Throwing, Catch, and Throwing an Exception; - Catching an Exception, Re-throwing an Exception, Processing Unexpected Exceptions, Constructors, Destructors and Exception Handling.

TEXT / REFERENCE BOOKS:

1. Object Oriented Programming in Turbo C++ by Robert Lafore ,1994, The WAITE Group Press.
2. Programming with C++ By D Ravichandran, 2003, T.M.H 3. Object oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill.
3. C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall
4. Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,
5. The Complete Reference in C++ By Herbert Schildt, 2002, TMH.
6. C++ Programming Fundamentals by Chuck Easttom, Firewall Media.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After successful completion of the course, students will be able:

1. To understand the difference between object oriented programming and procedural programming.
2. To understand the basic concepts of object oriented programming
3. To understand and implement C++ features such as Operator overloading, inheritance, virtual functions and friend functions.
4. To understand and apply the concepts of templates and exception handling

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B. Tech. Semester – III (Computer Science and Engineering)

DIGITAL ELECTRONICS

CODE: ESC-203

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

UNIT-1

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, characteristics of digital ICs, digital logic families, TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic. Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions

UNIT-2

Combinational Digital Circuits

Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

Sequential Circuits and Systems

A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, applications of counters.

UNIT-3

A/D and D/A Converters

Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, 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, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs

UNIT-4

Semiconductor Memories and Programmable Logic Devices

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Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

TEXT/REFERENCE BOOKS:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes

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

1. Understand working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Be able to use PLDs to implement the given logical problem.

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B. Tech. Semester – III (Computer Science and Engineering)
MATHEMATICS- III (Calculus and Ordinary Differential Equations)
CODE: BSC-201

NO OF CREDITS: 4	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 1 0	TOTAL : 100

UNIT-1

SEQUENCES AND SERIES

Convergence of sequence and series, tests for convergence, power series, Taylor's series. Series or exponential, trigonometric and logarithmic functions.

MULTIVARIABLE CALCULUS (DIFFERENTIATION)

Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

UNIT-2

MULTIVARIABLE CALCULUS (INTEGRATION)

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar). Theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT-3

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-4

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

TEXT/REFERENCES BOOKS

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry" , 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2010.
5. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 35th Edition, 2000.
6. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.

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7. W. E. Boyce and R. C. DiPrima, "Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
8. S. L. Ross, "Differential Equations", 3rd Ed., Wiley India, 1984.
9. E. A. Coddington, "An Introduction to Ordinary Differential Equations", Prentice Hall India, 1995.
10. E. L. Ince, "Ordinary Differential Equations", Dover Publications, 1958.
11. G.F. Simmons and S.G. Krantz, "Differential Equations", Tata McGraw Hill, 2007.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – III (Computer Science and Engineering)
HUMANITIES – I (EFFECTIVE TECHNICAL COMMUNICATION)
CODE: HSMC-201

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

UNIT-1

Information Design and Development

Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Technical writing

Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language.

UNIT-2

Grammar and editing

Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

Self Development and Assessment

Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

UNIT-3

Communication and Technical writing

Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development. Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

UNIT-4

Ethics

Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

TEXT/REFERENCE BOOKS

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004

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2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Bhagat Phool Singh Mahila Vishwavidyalaya Khanpur kalan (Sonipat), Haryana

Minutes of Meeting

Minutes of the meeting of the committee constituted to resolve the issue regarding scheme of examination of common paper of environmental studies (E.V.S-201) and Syllabus of B. Tech CSE & IT implemented w.e.f. from session 2024-2025 held on 03/07/2024 at 11:00 a.m. in the office of Controller of Examinations, BPSMV.

The following were present: -

1. Dr. Sandeep Dahiya, Controller of Examinations	Convener
2. Prof. Vijay Nehra, Dean Faculty of Engineering and Technology	Member
3. Mrs. Sonal, Chairperson, Deptt. of Computer Science and Engineering	Member
4. Dr. Priyanka, Chairperson, Deptt. of Electronics and Communication Engineering	Member
5. Dr. Bhupinder Singh, Chairperson, Deptt. of Chemistry	Member
6. Mr. Ashish Hooda, Incharge, Deptt. of Fashion Technology	Member
7. Ms. Usha Narula, Incharge, Academic	Member Secretary

After detailed deliberations the following decision were taken: -

1. CBCS is yet to be implemented in Faculty of Engineering and Technology. The possibilities may be explored by the Chairpersons of Faculty of Engineering and Technology to implement CBCS uniformly in all Departments of Faculty of Engineering and Technology. Since, the same has already been approved by the Academic Council dated 15/03/2024.
2. Common Structure/Common Syllabus of EVS approved by the Academic Council for all UG programmes at University level will be followed in Faculty of Engineering and Technology. The EVS course will be 80(Theory):20 (Internal) is non credit qualifying with common syllabus will be implemented from academic session 2024-2025.

Dr. Sandeep Dahiya 03/07/24

Prof. Vijay Nehra

Mrs. Sonal 3/7/24

Dr. Priyanka 3/7

Dr. Bhupinder Singh 3/7/2024

Mr. Ashish Hooda 3/7/24

Ms. Usha Narula 3/07/2024

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ENVIRONMENTAL STUDIES

Maximum Marks: 100
Time: 03 Hours
Credits: 04

External Marks: 80
Internal Marks: 20
Code: EVS 201

Course Objectives: To sensitize the students about environmental concerns and issues, to create a clean and green consciousness among students through various activities e.g. tree plantation, water conservation, energy conservation and green & clean campus drive etc. Moreover, constitution of Eco-Club at departmental and university level would be planned i.e. one of the most important objective .Through which different environmental awareness campaigns would be initiated, Every student will become a member of Eco-Club.

Unit I

Introduction to Environmental Studies - Nature of environmental studies: scope and importance: concept of sustainable development.

Natural Resources - Land resources: land degradation: soil erosion and desertification. Forest resources: deforestation: causes and impacts of mining and dam building on forests and tribal people. Water: use and over-exploitation of surface and ground water: conflicts over water. Energy resources: renewable and non renewable, use of alternate energy sources, case studies.

Unit 2

Ecosystems - Definition; structure and function of an ecosystem: energy flow, food chains, food webs and ecological succession; types of ecosystems; case studies.

Biodiversity Conservation - Definition; value; genetic, species and ecosystem diversity; Biogeographic zones of India; hot spots of biodiversity; India as a mega--biodiversity nation; endangered and endemic species of India; threats and conservation of biodiversity.

Unit 3

Environmental Pollution - Type, causes, effects and controls measures of: air, water, soil and noise pollution. Nuclear hazards. Solid waste and its management, global warming, ozone layer depletion, acid rain and their impacts, pollution case studies.

Disaster management: Droughts, floods, earthquake, cyclones, tsunami and landslides.

Unit 4

Environmental Policies and Practices - Environment Protection Act (1986). Air (Prevention & Control of Pollution) Act (1981); Water (Prevention and control of Pollution) Act (1974); Wildlife Protection Act (1972); Forest Conservation Act (1980).

Human Communities and the Environment – Human population growth; impacts and control. Drug abuse: drugs and their effects. Environmental movements: Chipko and Silent valley movements. Environmental ethics: role of Indian and other religions in environmental conservation

Field Work -- (write report on any two activities for internal assessment only)

1. To explain environmental issues of your area and suggest some solution for them
2. Visit to a local polluted site-urban/rural/industrial/agricultural/sewage treatment plant.
3. Visit to an area to document environmental assets: river/ forest/ flora/fauna/herbal park.
4. Segregation of biodegradable and non biodegradable domestic solid waste to prepare its compost

* The rally, quiz, essay and slogan writing and painting competitions etc. would be organized to aware the students about environmental issues. The campaigns like: paper, water and electricity conservation, polyethylene free campus and polyethylene free environment, one student one plant campaign etc. would be initiated. Moreover, students would also be provoked to contribute in Swachh Bharat Mission.

Instruction for Examiner

The examiner is requested to set nine questions in all taking two questions from each unit and one compulsory question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt five questions in all by selecting at least one question from each unit along with one compulsory question

Department of ...
Engineering and Information Technology
... (HR)

B. Tech. Semester – III (Computer Science and Engineering)
DIGITAL ELECTRONICS LAB
CODE: ESC-203-P

NO. OF CREDITS: 1		INTERNAL MARKS:	10
L	T P	EXTERNAL MARKS:	40
0	0 2	TOTAL :	50

At least 10 to 15 experiments related to the course must be performed.

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DCRUST Murthal, Sonepat (HR.)

B. Tech. Semester – III (Computer Science and Engineering)

DATA STRUCTURES & ALGORITHMS LAB

CODE: PCC-CS-201-P

NO OF CREDITS: 2

L T P

0 0 4

INTERNAL MARKS: 10

EXTERNAL MARKS: 40

TOTAL : 50

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures

S.No.	Experiment
1	Five /six programs on Strings
2	Five/ six programs on Array
3	Programs on Pointer
4	Write a program to search an element from an array using Linear Search
5	Write a program to search an element from an array using Binary Search
6	Write a program to sort elements of an array using selection sort
7	Write a program to sort elements of an array using insertion sort
8	Write a program to sort elements of an array using bubble sort
9	Write a program to sort elements of an array using Quick sort
10	Write a program to sort elements of an array using Merge sort
11	Write a program to push , pop and display the elements in a stack using array
12	Write a program to convert infix into postfix notation using stack using array
13	Write a program to evaluate postfix notation using stack
14	Write a program to insert, delete and display the elements in a queue using array
15	Write a program to insert, delete and display the elements in a circular queue
16	Write a program to insert, delete and display the elements in a one way linked list at beginning, at end and at certain point
17	Write a program to insert, delete and display the elements in a two way linked list at beginning, at end and at certain point
18	Write a program to push , pop and display the elements in a stack using linked list
19	Write a program to convert infix into postfix notation using stack using linked list
20	Write a program to insert, delete and display the elements in a queue using linked list

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21	Write a program to insert, delete and display the elements in a binary tree
22	Write a program to insert, delete and display the elements in a binary search tree
23	Write a program to sort elements using heap sort
24	Write a program to insert, delete and display elements in a graph
25	Write a program to insert, delete and display the elements in a B-tree
26	Other programs based on above concepts that teacher finds appropriate

Course Outcomes:

1. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
2. For a given problem of Stacks, Queues, linked list and Tree: student will able to implement it.
3. Student will able to write programs - Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort.
4. Student will able to implement Graph search and traversal algorithms.

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B. Tech. Semester – III (Computer Science and Engineering)

OBJECT ORIENTED PROGRAMMING WITH C++ LAB

CODE: PCC-CS-205-P

NO OF CREDITS: 2

L	T	P
0	0	4

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL :	50

Course Objectives:

1. To apply the basic knowledge of Object and classes.
2. To implement features of Object oriented programming like inheritance, polymorphism, operator overloading
3. To apply the concepts of exception handling and templates.

1. Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power ( ) that takes a double value for n and an int value for p, and returns the result as double value Use a default argument of 2 for p. so that if this argument is omitted, the number will be squared. Write a main ( ) function that gets values from the user to test this function.
2. Create the equivalent of a four function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding. subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally it should display the result.
3. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be 'Y' or 'N'. Some sample interaction with the program might look like this.
4. Enter first number. Operator, second number: 10/3 Answer = 3.333333
5. Do another (YI N)? Y Enter first number. Operator, second number 12 + 100 Answer = 11 Do another (Y I N)? N
6. Write a program to overload constructors.
7. Create two classes DM and DB which store the value of distances. DM stores distances in metres and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or metres and centimetres depending on object on display.
8. Write a Program to overload +,-,*,/,+= on a class of complex numbers.
9. Write a Program to overload +,== on a class of strings.
10. Create a class rational which represents a numerical value by NUMERATOR & DENOMINATOR . Write a Program to overload +,- for class of rational .
11. Make a class Employee with a name and salary. Make a class Manager inherit from Employee. Add an instance variable, named department, of type string. Supply a method to toString that prints the manager's name, department and salary. Make a class Executive inherit from Manager

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Supply a method to String that prints the string Executive followed by the information stored in the Manager superclass object. Supply a test program that tests these classes and methods.

12. Imagine a tollbooth with a class called toll Booth. The two data items of a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function, called nopayCar ( ). increments the car.
13. Write a program to create a class template to implement stack operations.
14. Write a program to demonstrate exception handling.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Develop program using the concepts of object oriented programming like class, objects, constructors and destructors.
2. Develop programs using C++ features such as Operator overloading and
3. Develop programs to illustrate virtual functions and friend functions.
4. Develop programs to apply the concepts of templates and exception handling

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Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester - 4

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-202	Discrete Mathematics	3	1	0	4	20	80	100
2	PCC	PCC-CS-204	Software Engineering	3	0	0	3	20	80	100
3.	PCC	PCC-CS-206	Operating System	3	0	0	3	20	80	100
4.	PCC	PCC-CS-208	Design & Analysis of Algorithms	3	0	0	3	20	80	100
5.	PCC	PCC-CS-210	Python	3	0	0	3	20	80	100
6.	HSMC	HSMC-202	Management – I (Organizational Behavior)	3	0	0	3	20	80	100
7.	MC	MC-303 (Non Credit)	Universal Human Values	3	0	0	0	10	40	50
Lab										
8	PCC	PCC-CS-206-P	Operating System LAB	0	0	4	2	10	40	50
9.	PCC	PCC-CS-208-P	Hardware Lab MATLAB	0	0	2	1	10	40	50
10.	PCC	PCC-CS-210-P	Python Lab	0	0	4	2	10	40	50
		Total		**21**	**1**	**10**	**24**	**150**	**600**	**750**

Total Contact Hours =32 **Total Credit= 24**

Note: 1). 4-6 weeks training will be held after fourth semester. However, Viva-Voce will be conducted in the fifth semester.

2). Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

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B. Tech. Semester – IV (Computer Science and Engineering)

DISCRETE MATHEMATICS

CODE: PCC-CS-202

NO OF CREDITS: 4	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 1 0	TOTAL : 100

Course Objectives:

1. Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:
2. Use mathematically correct terminology and notation.
3. Construct correct direct and indirect proofs.
4. Use division into cases in a proof.
5. Use counterexamples.
6. Apply logical reasoning to solve a variety of problems.

UNIT-1

Sets, Relation and function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT-2

Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT-3

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

UNIT-4

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Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

TEXT/REFERNCE BOOKS

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.
4. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, TataMcgraw-Hill
5. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson, Discrete Mathematics, Tata McGraw – Hill

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

1. For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives
2. For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference
3. For a given a mathematical problem, classify its algebraic structure
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
5. Develop the given problem as graph networks and solve with techniques of graph theory.

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B. Tech. Semester – IV (Computer Science and Engineering)

SOFTWARE ENGINEERING

CODE: PCC-CS-204

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. To enable the students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.
2. To make the students understand project management concepts & their metrics.
3. To make the students understand requirement engineering and its models (Information, functional, behavioural).

UNIT-1

INTRODUCTION

Evolving role of software, Software Characteristics, Software crisis, Silver bullet, Software myths, Software process, Personal Software Process (PSP), Team Software Process (TSP), emergence of software engineering, Software process, project and product, Software Process Models: Waterfall Model, Prototype Model, Spiral, Model, RAD Model, Iterative Model, Incremental Model, Aspect-oriented Model, Agile Model.

UNIT-2

SOFTWARE PROJECT MANAGEMENT

Project management concepts, Planning the software project, Estimation—LOC based, FP based, Use-case based, empirical estimation COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management.

UNIT-3

REQUIREMENTS, ANALYSIS AND SPECIFICATION

Software Requirements engineering, Requirement engineering process, Requirement Engineering Tasks, Types of requirements, SRS. System 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 data dictionary.

SYSTEM DESIGN

Design principles, the design process; 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-4

TESTING AND MAINTENANCE

Testing terminology- error, bug/defect/fault, failure, Verification and validation, Test case design, Static testing ,Dynamic testing— Black box testing—Boundary value analysis, White box testing--basis path testing, Unit testing, Integration testing, Acceptance Testing

SOFTWARE QUALITY MODELS AND STANDARDS

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Quality concepts, Software quality assurance, SQA activities, Formal approaches to SQA; Statistical software quality assurance; CMM, The ISO 9126 Standard

TEXT/REFERENCES BOOKS:

1. Software Engineering – A Practitioner's Approach, Roger S. Pressman, 1996, MGH.
2. Fundamentals of software Engineering,Rajib Mall, PHI
3. Software Engineering by Ian sommerville, Pearson Edu, 5th edition, 1999, AW,
4. Software Engineering – David Gustafson, 2002, T.M.H

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – IV (Computer Science and Engineering)
OPERATING SYSTEMS
CODE: PCC-CS-206

NO OF CREDITS: 3		**INTERNAL MARKS:**	**20**
L T P		**EXTERNAL MARKS:**	**80**
3 0 0		**TOTAL :**	**100**

Course Objectives:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes, threads and their communication.
3. To know the components and management aspects of concurrency management viz. Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
4. To learn the mechanisms involved in memory management in contemporary OS.
5. To gain knowledge on Input/Output management aspects of Operating systems

UNIT-1

Introduction
Concept of Operating Systems, Evolution and Generations of Operating systems, Types of Operating Systems, OS Services, Hardware Support for Operating Systems, Types of Resources, System Calls, Structure of an OS -, Monolithic, Layered, Microkernel and Hybrid Operating Systems; Concept of Virtual Machine

Process Management
Definition of process, 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, Concept of multithreads; Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, First come first served, , Priority and Round Robin scheduling.

UNIT-2

Inter-Process Communication and Synchronization
Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer-Consumer Problem, Semaphores, , Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

Deadlocks
Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, 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

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operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging; Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT-4

I/O Management

Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms; Disk scheduling - FCFS, SSTF, SCAN, C-SCAN File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance; Disk Management: Disk structure, , Disk reliability, Disk formatting, Boot-block, Bad blocks

Case Study on Linux/Unix and Windows

TEXT/REFERENCES BOOKS:

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts Essentials", 9th Edition, Wiley Asia Student Edition.
2. William Stallings, "Operating Systems: Internals and Design Principles", 5th Edition, Prentice Hall of India.
3. NareshChauhan, "Principles of operating systems". Oxford university Press.
4. Charles Crowley, "Operating System: A Design-oriented Approach", 1st Edition, Irwin Publishing.
5. Gary J. Nutt, "Operating Systems: A Modern Perspective", 2nd Edition, Addison-Wesley
6. Maurice Bach, "Design of the Unix Operating Systems", 8th Edition, PHI
7. Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly and Associates

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After the completion of the course, the students will be able to:

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, and Response Time.
3. For a given specification of memory organization, develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O device and OS (specify), develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

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B. Tech. Semester – IV (Computer Science and Engineering)
DESIGN AND ANALYSIS OF ALGORITHMS
CODE: PCC-CS-208

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:

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.

UNIT-1

Introduction

Characteristics of algorithm, Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

UNIT-2

Fundamental Algorithmic Strategies

Brute-Force, Greedy, Dynamic Programming, Branch and-Bound and backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knapsack, Job sequencing with deadline, Optimal Binary Search tree, N-Queen problem, Hamiltonian Cycle, TSP, Heuristics – characteristics and their application domains.

UNIT-3

Graph and Tree Traversal Algorithms

Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT-4

Tractable and Intractable Problems

Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard, Cook's theorem, Standard NP-complete problems and Reduction techniques.

Advanced Topics

Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

TEXT/REFERENCE BOOKS

1. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", MIT Press/McGraw-Hill; 3rd edition, [ISBN: 978-0262533058], 2009.

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2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Fundamentals of Algorithms", Universities Press; 2nd edition [ISBN:978-8173716126],2008.
3. Jon Kleinberg and ÉvaTardos, "Algorithm Design", Pearson Publisher; 1st edition [ISBN:978-0321295354],2012.
4. Michael T Goodrich and Roberto Tamassia, "Fundamentals of Algorithms" Wiley Press; 1st edition [ISBN:978-8126509867],2006.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After the completion of course, student should be able to:

1. Analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.
5. Explain the ways to analyze randomized algorithms (expected running time, probability of error).
6. Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

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B. Tech. Semester – IV (Computer Science and Engineering)

PYTHON

CODE: PCC-CS-210

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL : 100

Course objectives:

1. Fundamentals and Data structures of pythons programming language.
2. Object oriented concepts in python programming language.
3. Retrieving, processing, storing and visualization of data using python.

UNIT-1

INTRODUCTION TO PYTHON

Brief history of python, Data types - Built-in, Sequence, Sets, Strings, Literals, constants, keywords, variables, naming convention. Operators – Types, Precedence & Associativity, Input, Output, file handling, Control Statements.

UNIT-2

FUNCTIONS AND DATA STRUCTURES IN PYTHON

Functions – basics of functions, functions as objects, recursive functions, List –methods to process lists, Shallow & Deep copy, Nested lists, lists as matrices, lists as stacks, Queues, - Deques, Tuples – basic operations on tuples, nested tuples, Dictionaries – operations on dictionary, ordered dictionary, iteration on dictionary, conversion of lists & strings into dictionary, Sets & frozen sets, looping techniques on lists & dictionaries, Lamda, filter, reduce, map, list comprehension, iterators and generators.

UNIT-3

OBJECTS IN PYTHON & DATA MANIPULATION AND VISUALIZATION IN PYTHON

Class and instance attributes, inheritance, multiple inheritance, methods resolution order, magic methods and operator overloading, meta classes, abstract and inner classes, exception handling, modular programs and packages.

Data frames in panda, Creating dataframes from .csv and excel files, Lists of tuples, Dataframes aggregation and concatenation, plotting data using matplotlib & panda

UNIT-4

NUMERICAL ANALYSIS IN PYTHON

Introduction to NumPy, NumPy array object, Creating a multidimensional array, NumPy numerical types - Data type objects, Character codes, dtype constructors. dtype attributes. Nedimensional slicing and indexing. Manipulating array shapes -- Stacking arrays, Splitting NumPy arrays, NumPy array attributes, Converting arrays, Creating array views and copies. Indexing with a list of locations. Indexing NumPy arrays with Booleans. Broadcasting NumPy arrays.

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TEXT/REFERENCE BOOKS:

1. Wesley J Chun, Core Python Programming, Prentice Hall, Second Edition, 2006
2. Ivan Idris, Python Data Analysis, Packt Publishing,UK, 2014 (freely available online)
3. Wes McKinney, Python for Data Analysis, O'Reilly - 2013

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of course, students would be able to:

1. Write programs efficiently in python
2. Effectively use numerical analysis libraries of python
3. Carry out basic data science operations like retrieving, processing and visualizing using python.

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B. Tech. Semester – IV (Computer Science and Engineering)
MANAGEMENT –I (ORGANIZATIONAL BEHAVIOUR)
CODE: HSMC-202

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:
The objective of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

UNIT-1

Introduction to management: concept, nature; evolution of management thoughts –traditional, behavioural, system, contingency and quality viewpoints; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, Directing, Controlling, Problem solving and Decision making; Management control; managerial ethics and social responsibility; Management Information System (MIS).

UNIT-2

Fundamentals of Organizational Behavior: Concept, evolution, importance and relationship with other Fields; Contemporary challenges of OB; Individual Processes and Behavior – differences, Personality concept, determinant, theories and applications; Values, Attitudes and Emotions, Perception- concept, process and applications, Learning and Reinforcement; Motivation: concept, theories and applications; Stress management.

UNIT-3

Interpersonal Processes- Work teams and groups- Definition of Group, Stages of group development, Group cohesiveness, Types of groups, Group processes and Decision Making; Team Building; Conflict- concept, sources, types, management of conflict; Power and Political Behavior; Leadership: concept, function and styles.

UNIT-4

Organizational Processes and structure: organizational design: various organizational structures and their effect on human behavior; Organizational climate; Organizational culture; Organizational change: Concept, Nature, Resistance to Change, Change Management, Implementing Change and Organizational Development

TEXT/REFERENCES BOOKS:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education 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, OrganisationalBehaviour: Text and cases. New Delhi: Pearson Education.

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5. Pareek, Udai, Understanding Organisational Behaviour, Oxford University Press, New Delhi
6. Robbins, S.P. & Judge, T.A., Organisational Behaviour, Prentice Hall of India, New Delhi

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

1. The students learn how to influence the human behaviour.
2. Students will be able to understand behavioural dynamics in organizations.
3. Students will be able to apply managerial concepts in practical life.
4. Students will be able to understand organizational culture and change.

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B. Tech. Semester – IV (Computer Science and Engineering)

UNIVERSAL HUMAN VALUES

CODE: MC-303

NO OF CREDITS: 0

L	T	P
3	0	0

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL :	50

Course Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

UNIT-1

Introduction

Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration, 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration, Continuous Happiness and Prosperity, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-2

Understanding Harmony in the Human Being

Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; meaning of Prosperity in detail.

UNIT-3

Understanding Harmony in the Family and Society

Harmony in Human-Human Relationship Understanding harmony in the Family- the basic unit of human interaction , Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and

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differentiation, Understanding the harmony in the society, Visualizing a universal harmonious order in society.

UNIT-4

Understanding Harmony in the Nature and Existence

Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Implications of the above Holistic Understanding of Harmony on Professional Ethics

TEXT/REFERENCE BOOKS

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
6. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
7. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
8. A N Tripathy, 2003, Human Values, New Age International Publishers.
9. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
10. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
12. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
13. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

On completion of this course, the students will be able to

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society

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2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.
3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
4. Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

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B. Tech. Semester – IV (Computer Science and Engineering)

OPERATING SYSTEM LAB

CODE: PCC-CS-206-P

NO OF CREDITS: 2	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 4	TOTAL :	50

At least 10 to 15 experiments related to the course must be performed.

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B. Tech. Semester – IV (Computer Science and Engineering)

HARDWARE LAB/MATLAB

CODE: PCC-CS-208-P

NO OF CREDITS: 1

L T P

0 0 2

INTERNAL MARKS: 10

EXTERNAL MARKS: 40

TOTAL : 50

At least 10 to 15 experiments related to the course must be performed.

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B. Tech. Semester – IV (Computer Science and Engineering)
PYHON LAB
CODE: PCC-CS-210-P

NO OF CREDITS: 2		**INTERNAL MARKS:**	**10**
L	**T** **P**	**EXTERNAL MARKS:**	**40**
0	**0** **4**	**TOTAL :**	**50**

At least 10 to 15 experiments related to the course must be performed.

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Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester - 5

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-301	Database Management Systems	3	0	0	3	20	80	100
2.	PCC	PCC-CS-303	Formal Language & Automata Theory	3	0	0	3	20	80	100
3.	PCC	PCC-CS-305	Java Programming	3	0	0	3	20	80	100
4.	PCC	PCC-CS-307	Machine Learning	3	0	0	3	20	80	100
5.	HSMC	HSMC-301	Humanities- II (Economics for Engineers)	3	0	0	3	20	80	100
6	MC	MC -301 (Non Credit)	Constitution of India/Essence of Indian Traditional Knowledge	2	0	0	0	10	40	50
7	As per UGC	CISD-001 (Non Credit)	Current Issues and Societal Development	3	0	0	0	20	80	100
Lab										
7.	PCC	PCC-CS-301-P	Database Management Systems LAB	0	0	4	2	10	40	50
8.	PCC	PCC-CS-305- P	Java Programming LAB	0	0	4	2	10	40	50
9.	Project	ITP-CS-301-P	Industrial Practical Training-I	0	0	0	2	-	50	50
		Total		**20**	**0**	**8**	**21**	**120**	**530**	**650**

Total Contact Hours =28 **Total Credit= 21**

Note: 1. Industrial Practical Training-I was conducted after fourth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.

2. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

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B. Tech. Semester – V (Computer Science and Engg.)

DATABASE MANAGEMENT SYSTEMS

CODE: PCC-CS-301

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL: 100

Course Objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
3. To understand and use data manipulation language to query, update, and manage a Database
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.

UNIT-1

Database 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 axiom, Normal forms, Dependency preservation, Lossless 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 timestamp 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.

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Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

TEXT/REFERENCES BOOKS:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
3. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
4. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes

After successful completion of the course, students will be able to:

1. Understand basic concepts of database system and data models for relevant problems.
2. Understand the basic elements of a relational database management system.
3. Design entity relationship model and convert entity relationship diagrams into rdbms and formulate SQL queries on the data.
4. Apply normalization for the development of application software.

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B. Tech. Semester – V (Computer Science and Engg.)

FORMAL LANGUAGE AND AUTOMATA THEORY

CODE: PCC-CS-303

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL: 100

Course Objectives:

1. Develop a formal notation for strings, languages and machines.
2. Design finite automata to accept a set of strings of a language.
3. Prove that a given language is regular and apply the closure properties of languages.
4. Design context free grammars to generate strings from a context free language and convert them into normal forms.
5. Prove equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
6. Identify the hierarchy of formal languages, grammars and machines.
7. Distinguish between computability and non-computability and Decidability and undecidability.

UNIT-1

Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages. Regular languages and finite automata: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA

UNIT-2

Regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata. Context-free languages and pushdown automata: Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms,

UNIT-3

Nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs. Context-sensitive languages: Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.

UNIT-4

Turing machines: The basic model for Turing machines (TM), Turing- recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators. Undecidability: Church-Turing

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thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages.

TEXT/REFERENCES BOOKS:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
3. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
4. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
5. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Write a formal notation for strings, languages and machines.
2. Design finite automata to accept a set of strings of a language and determine whether the given language is regular or not.
3. Design context free grammars to generate strings of context free language.
4. Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
5. Write the hierarchy of formal languages, grammars and machines.
6. Distinguish between computability and non-computability and Decidability and decidability.

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B. Tech. Semester – V (Computer Science and Engg.)

JAVA PROGRAMMING

CODE: PCC-CS-305

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

The course will introduce standard tools and techniques for software development, using object oriented approach, use of a version control system, an automated build process, and an appropriate framework for automated unit and integration tests.

UNIT-1

Abstract Data Types: Decomposition & Abstraction, Abstraction Mechanisms – parameterization, specification, Kind of Abstractions – Procedural, Data, Type hierarchies, Iteration. ADT implementation - Concrete state space, concrete invariant, abstraction function, implementing operations, illustrated by the Text example

Features of Object-Oriented Programming, Encapsulation, object identity, polymorphism – Inheritance in OO design. Implementing OO language features, Classes, Objects and variables, Type Checking,

UNIT-2

Procedures - Commands as methods and as objects, Exceptions, Polymorphic procedures, Templates, Memory management

Design Patterns: Introduction and classification. Creational Pattern – Abstract Factory Pattern, Factory Method, Singleton, Structural Pattern – Bridge, Flyweight, Behavioral Pattern - The iterator pattern, Observer pattern, Model-view-controller pattern

UNIT-3

Generic Types and Collections: Simple Generics, Generics and Subtyping, Wildcards, Generic Methods, Set Interface, List Interface, Queue Interface, Deque Interface, Map Interface, Object Ordering, SortedSet Interface, SortedMap Interface

UNIT-4

GUIS. Graphical Programming with Scala And Swing: Swing components, Laying out components in a container, Panels, Look & Feel, Event listener, concurrency in swing.

The Software Development Process: Requirement specification and analysis,Data Model, Design, Implementation, Testing.

Manjit

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TEXT/REFERENCES BOOKS:

1. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After taking the course, students will be able to:

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

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B. Tech. Semester – V (Computer Science and Engg.)

MACHINE LEARNING

CODE: PCC-CS-307

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL: 100

Course objectives:

1. To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes.
2. To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
3. Explore supervised and unsupervised learning paradigms of machine learning.
4. To explore Deep learning technique and various feature extraction strategies.

UNIT-1

Supervised Learning (Regression/Classification): Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods Beyond Binary Classification: Multi-class/Structured Outputs, Ranking

UNIT-2

Unsupervised Learning: Clustering: K-means/Kernel K-means

Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion

Generative Models (mixture models and latent factor models)

UNIT-3

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)

Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning

UNIT-4

Scalable Machine Learning (Online and Distributed Learning), Introduction to Bayesian Learning and Inference, Recent trends in various learning techniques of machine learning and classification methods.

TEXT/REFERENCES BOOKS:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)

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3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007

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Course outcomes:

After completion of course, students would be able to:

1. Extract features that can be used for a particular machine learning approach in various IOT applications.
2. To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
3. To mathematically analyze various machine learning approaches and paradigms.

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B. Tech. Semester – V (Computer Science and Engg.)
HUMANITIES- II (ECONOMICS FOR ENGINEERS)
CODE: HSMC -301

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL: 100

UNIT-1

Introduction to the subject: Micro and Macro Economics, Relationship between Science, Engineering, Technology and Economic Development. Production Possibility Curve, Nature of Economic Laws.

Time Value of Money: concepts and application. Capital budgeting; Traditional and modern methods, Payback period method, IRR, ARR, NPV, PI (with the help of case studies)

UNIT-2

Meaning of Demand, Law of Demand, Elasticity of Demand; meaning, factors effecting it and its practical application and importance. Demand forecasting (a brief explanation), Meaning of Production and factors of production, Law of variable proportions and returns to scale. Internal and external economies and diseconomies of scale, Concepts of cost of production, different types of costs; accounting cost, sunk cost, marginal cost, Opportunity cost.

UNIT-3

Break even analysis, Make or Buy decision (case study), Relevance of Depreciation towards industry. Meaning of market, types of market, perfect competition, Monopoly, Monopolistic, Oligopoly. (main features), Supply and law of supply, Role of demand and supply in price determination.

UNIT-4

Indian Economy, nature and characteristics. Basic concepts; fiscal and monetary policy, LPG, Inflation, Sensex, GATT, WTO and IMF, Difference between Central bank and Commercial banks

TEXT/REFERENCES BOOKS:

1. Jain T.R., Economics for Engineers, VK Publication
2. Chopra P. N., Principle of Economics, Kalyani Publishers
3. Dewett K. K., Modern economic theory, S. Chand
4. H. L. Ahuja., Modern economic theory, S. Chand
5. Dutt Rudar & Sundhram K. P. M., Indian Economy
6. Mishra S. K., Modern Micro Economics, Pragati Publications
7. Pandey I.M., Financial Management; Vikas Publishing House

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B. Tech. Semester – V (Computer Science and Engg.)

CONSTITUTION OF INDIA/ ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

CODE: MC-301

NO OF CREDITS: 0

L T P

2 0 0

INTERNAL MARKS: 10

EXTERNAL MARKS: 40

TOTAL : 50

CONSTITUTION OF INDIA– BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the —basic structurel of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of —Constitutionalisml – a modern and progressive concept historically developed by the thinkers of —liberalisml – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of —constitutionalisml in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of —diversityl. It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be —staticl and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it —as one of the strongest court in the worldl.

COURSE CONTENT

UNIT-1

1. Meaning of the constitution law and constitutionalism.
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of the Constitution of India.

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UNIT-2

4. Scheme of the fundamental rights.
5. The scheme of the Fundamental Duties and its legal status.
6. The Directive Principles of State Policy – Its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.

UNIT-3

8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency

UNIT-4

12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

REFERENCES:

1. The Constitutional Law Of India 9th Edition, by Pandey. J. N.
2. The Constitution of India by P.M.Bakshi
3. Constitution Law of India by Narender Kumar
4. Bare Act by P. M. Bakshi

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – V (Computer Science and Engg.)
DATABASE MANAGEMENT SYSTEMS LAB
CODE: PCC-CS-301-P.

NO OF CREDITS: 2
L T P
0 0 4

INTERNAL MARKS: 10
EXTERNAL MARKS: 40
TOTAL: 50

At least 10 to 15 experiments to be performed related to the subject.

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BPS Mahila Vishwavidyalaya, Khanpur Kalan, Sonepat (Hr.)

B. Tech. Semester – V (Computer Science and Engg.)
JAVA PROGRAMMING LAB
CODE: PCC-CS-305-P

NO OF CREDITS: 2
L T P
0 0 4

INTERNAL MARKS: 10
EXTERNAL MARKS: 40
TOTAL: 50

At least 10 to 15 experiments to be performed related to the subject.

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B. Tech. Semester – V (Computer Science and Engg.)

INDUSTRIAL PRACTICAL TRAINING- I

CODE: ITP-CS-301-P

NO OF CREDITS: 2	INTERNAL MARKS: 00
L T P	EXTERNAL MARKS: 50
0 0 0	TOTAL: 50

Note: Practical training conducted after fourth semester will be evaluated in the fifth Semester based on Viva-Voce.

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BPS Women University

Chairperson, CSE&IT <docse@bpswomenuniversity.ac.in>

Regarding teaching of current issues and Societal Development (CSID-001) in 5th semester as per Resolution No. 18 of 27th Academic Council Meeting held on 15/03/2024.

1 message

ar academic <acad@bpswomenuniversity.ac.in>
To: "Chairperson, CSE&IT" <DOCSE@bpswomenuniversity.ac.in>

Wed, Jul 10, 2024 at 10:52 AM

Madam

Refer to your office letter no. BPSMV/CSE/IT/24/D/280 dated 01/07/2024 regarding teaching of current issues and Societal Development (CSID-001) in 5th semester as per Resolution No. 18 of 27th Academic Council Meeting held on 15/03/2024. , please find enclosed herewith the desired information, please.

Regards
Incharge, Academic

Minutes.PDF
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At the outset, the Vice-Chancellor welcomed all the members to the 28th Meeting of the Academic Council. She informed the House about the four newly started PG programmes from the Academic Session 2024-25 i.e. Master of Arts in Hindi, Master of Arts in Sanskrit, Master of Arts in Psychology and Master of Science in Environmental Sciences and one UG programme i.e. Bachelor of Arts in Journalism and Mass Communication (Hons) (Interdisciplinary) Programme under National Education Policy – 2020.

The House was also apprised about the achievements of BPS Mahila Vishwavidyalaya in brief. She informed about the PMUSHA Project wherein an amount of Rs.20 crore has been sanctioned to strengthen the University. She also informed the House that two PG programmes will be started in the MSM Institute of Ayurveda very soon.

The Hon'ble Vice-Chancellor appreciated the efforts of Dr. Sandeep Dahiya, (Controller of Examinations), for smooth conducting of examinations and declaring the results of various classes in time.

The House was also informed that the University is going to establish a Census Data Research Work Station in the Campus very soon as per the directions of Govt. of India and also informed that New Education Policy-2020 has been implementation in BPSMV from the current Academic Session i.e. 2024-25. In spite of multiple assignments to the Teachers, they all have completed their work related to NEP-2020 well in time.

After the exchange of pleasantries, the formal agenda items with the permission of the Chairperson were taken up by the Registrar.

1. Confirmation of the Minutes of the 27th meeting of Academic Council held on 15/03/2024.

RESOLVED THAT THE MINUTES OF THE 27TH MEETING OF THE ACADEMIC COUNCIL HELD ON 15/03/2024 BE CONFERMED.
HOWEVER, THE CHAIRPERSON DEPARTMENT OF COMPUTER SCIENCE RAISED THE OBSERVATION WITH REGARD TO AGENDA NO.18 OF 27TH MEETING.
RESOLOVED THAT THE OBSERVATION OF THE CHAIRPERSON BE APPROVED AND THE PAPER CURRENT ISSUES AND SOCIATIL DEVELOPMENT (CISD-001) SHALL BE IMPLEMENTED IN THE 5TH SEMESTER IN ALL THE DEPARTMENTS OF FACULTY OF ENGINEERING AND TECHNOLOGY (CSE&IT, ECE AND FT) INSTEAD OF 3RD SEMESTER.

Action By -Examination Branch & Academic Branch

2. Follow up Action Report.

RESOLVED THAT THE FOLLOWUP ACTION TAKEN ON THE DECISIONS OF THE ACADEMIC COUNCIL MEETING HELD ON 15/03/2024 BE NOTED.

Action By - Academic Branch

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Minutes of the meeting of the committee constituted by the Vice-Chancellor to examine the instructions/guidelines received from UGC/State Govt. from time to time and further recommendations regarding inclusion of a new subject/paper/chapter at UG level in all courses, being run by the University, held on 20/02/2017 at 1.00 p.m. in the office of Dean Academic Affairs, BPSMV, Khanpur Kalan.

The following were present:-

1. Prof. Shweta Singh, Dean Academic Affairs — Chairperson
2. Prof. Sanket Vij, Chairperson, Deptt. of Commerce — Member

The committee considered the syllabus submitted by Dr. Bhupinder Singh, Assistant Professor in Environmental Studies and recommended that the same be referred to the Academic Council for approval and implementation from the Academic Session 2017-18 in all the three years of UG courses being run by the University as per directions of the State Govt./UGC.

Further, the committee also considered the contents of syllabus submitted by the Dr. Anshu Bhardwaj, Asstt. Professor in Management and Dr. Manju Panwar, Assistant Professor in Social Work on Urban Planning and Gender Sensitization respectively, for inclusion in the common paper "Current Issues and Societal Development"

After analyzing all the contents the following syllabi for the common paper "Current Issues and Societal Development" is proposed by the committee for implementation in all the UG courses from the Academic Session 2017-18, for further approval of the Academic Council

Current Issues and Societal Development
Course Code: CISD-001
(for all UG courses being run by the University)

Maximum Marks: 100
Time: 03 Hours

External Marks:80
Internal Marks:20

Unit-1

Legal Literacy

- Law relating to Hindu Marriage, Dowry, Sexual Harassment of Women, Consumer Protection Act-2000.

- Fundamental Rights of Citizens, Rights in relation to police, Right to Information, Lokayukt, Right of Children to Free and Compulsory Education Act- 2009.
- Property Rights, Human Rights, Right to Maintenance, Objects and scope of Motor Vehicle Act-1988
- Labour Law, Trafficking in Human Beings

Unit-2

Financial Literacy

- Salary: Concept and components like Basic, DA, TA, HRA, Child Education Allowance etc.
- Business Income and Agricultural Income: Concept and difference between the two.
- Banks: Types and functions
- Post Office: Current saving schemes for individuals.
- Investment opportunities: Debt, Equity and Mutual Funds (concept, Merits and Demerits of each type). Procedure for applying and availing of loans for entrepreneurship and home construction/purchase from Banks.
- Insurance: concept and types of insurance related to business and individuals.

Unit-3

Gender Sensitization alongwith stories of Patriots/Martyr & Historical Play Veer Shiromani Maharaja Surajmal

- Introduction: Sex and Gender
- Types of Gender : Gender Roles and Gender Division of Labour
- Gender Stereotyping and Gender Discrimination
- From Women's Studies to Gender Studies: A Paradigm Shift
- Introduction Gender Roles: Biological vs Cultural Determinism
- Foundation of Gender: Power relations, Human Development indicators and gender disparity
- Social Dynamics of Gender Patriarchy and Gender –power
- Caste, Class and Gender
- Stories of Patriots: Bhagat Singh, Rajguru, Sukhdev, Rani Lakshmibai, Behan Subhasini Devi
- Historical Play: Veer Shiromani Maharaja Surajmal

Unit-4

Urban Planning

- History of Human Settlement & Planning Principles
- Housing & Community Planning
- Planning Theory and Techniques
- Urban Ecology & Environment Planning

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- Transportation Planning
- Urban Infrastructure Planning
- Urban regeneration & Conservation Techniques
- Urban Development Models

The Committee further recommended that the HOD's may once again be requested to supply the list of courses to be offered through MOOCs alongwith the Academic Session from which they propose to commence the course as required by the UGC for further consideration of the committee.

Prof. Shweta Singh

Prof. Sanket Vij

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पर्यावरण अध्ययन

Maximum Marks: 100
Time: 03 Hours
Credits: 04

External Marks: 80
Internal Marks: 20
Code: EVS 201

पाठ्यक्रम का उद्देश्य: पर्यावरण सम्बंधित विषयों के प्रति विद्यार्थियों को संवेदनशील बनाना।विभिन्न गतिविधियों के द्वारा विद्यार्थियों में स्वच्छ और हरित चेतना जगाना जैसे पौधारोपण, जल व बिजली संरक्षण और हरे व स्वच्छ परिसर ड्राइव आदि । इसके अलावा विभाग व विश्विद्यालय स्तर पर ईको-क्लब गठन करने की योजना बनाई जाएगी जो कि एक सबसे महतवपूर्ण उद्देश्य है। जिसके द्वारा पर्यावरण के प्रति जागरूकता फैलाने की विभिन्न मुहीम शुरु की जाएँगी । प्रत्येक विद्यार्थी बी.पी.एस म.वि ईको-क्लब का सदस्य बनेगा ।

इकाई 1

पर्यावरण अध्ययन का परिचय - पर्यावरण अध्ययन की प्रकृति: क्षेत्र और महत्व; सतत विकास अवधारणा ।

प्राकृतिक संसाधन - भूमि संसाधन :भूमि का ह्रास: मृदा अपरदन और मरुस्थलीकरण:वन संसाधन: वनों की कटाई- कारण और खनन एवं बांध निर्माण के वन और जनजातियों पर प्रभाव । जल: सतही जल और भूजल का उपयोग और क्षरण :पानी को ले कर टकराव । ऊर्जा के संसाधन नवीकरणीय और अनवीकरणीय: वैकल्पिक ऊर्जा के संसाधनों का उपयोग, प्रकरण अध्ययन ।

इकाई 2

पारितंत्र - पारितंत्र की परिभाषा; पारितंत्र की संरचना और कार्य: ऊर्जा का प्रवाह, खाद्य श्रृंखला , खाद्य जाल और पारिस्थितिक पिरामिड, पारितंत्र के प्रकार; प्रकरण अध्ययन ।

जैव-विविधता और संरक्षण - जैव-विविधता का संरक्षण: परिभाषा; मूल्य; अनुवांशिक प्रजातिय और पारितंत्र विविधता; भारत के जैव- भौगोलिक क्षेत्र; विश्व में जैव-विविधता के अति सक्रिय क्षेत्र; भारत एक महा जैव-विविधता राष्ट्र के रूप में; भारत की विलुप्तप्राय और स्थानिक प्रजातियाँ, जैव-विविधता को खतरा व उसका संरक्षण।

इकाई 3

पर्यावरण प्रदूषण - पर्यावरण प्रदूषण: प्रकार ,कारण ,प्रभाव और नियंत्रण :वायु ,जल ,मृदा और ध्वनि प्रदूषण, नाभिकीय खतरे, ठोस अपशिष्ट और उसका प्रबंधन : भूमंडलीय तापमान में वृद्धि ,ओजोन परत का क्षरण, अम्लीय वर्षा व उनके प्रभाव, प्रदूषण प्रकरण अध्ययन।

आपदा प्रबंधन – सूखा, बाढ़, भूकंप, चक्रवात, सुनामी और भूस्खलन।

इकाई 4

पर्यावरण नीतियाँ और प्रथाएँ - पर्यावरण हेतु कानून: पर्यावरण सुरक्षा अधिनियम(1986): वायु (प्रदूषण निवारण और नियन्त्रण) अधिनियम(1981): जल (प्रदूषण निवारण और नियन्त्रण) अधिनियम(1974): वन्यजीव (संरक्षण) अधिनियम(1972), वन संरक्षण अधिनियम(1980) ।

मानव समुदाय और पर्यावरण - मानव जनसंख्या वृद्धि: प्रभाव व नियंत्रण, औषधि व्यसन- मादक पदार्थ व उनके प्रभाव, पर्यावरण आन्दोलन चिपको, मूक घाटी (साइलेंट वैली) , पर्यावरण नैतिकिता- भारतीय एवं अन्य धर्मों का पर्यावरण संरक्षण में भूमिका।

क्षेत्र कार्य – (किन्ही दो गतिविधियों पर केवल आन्तरिक मूल्यांकन के लिए रिपोर्ट लिखें)

1. अपने इलाके की पर्यावर्णीय समस्याओं का वर्णन करना और उनके निदान के बारे में सुझाव देना।
2. एक स्थानीय प्रदूषित क्षेत्र भ्रमण - शहरी/ ग्रामीण/ औधोगिक/ कृषि क्षेत्र/ दूषित जल उपचार संयत्र।
3. पर्यावरणीरण सम्पदाओं के अवलेखन के लिए एक क्षेत्र का भ्रमण: नदी/ वन/ वनस्पति/ जीव/ औषधिय उत्पाद।
4. घरेलू अपशिस्ट पदार्थों में से जैव निम्नीकृत व अजैव निम्नीकृत घटकों को अलग करके उसकी खाद बनाना।

, विद्यार्थियों को पर्यावरणीरण मुद्दों के बारे में जागरूक करने के लिए रैली, प्रश्नोतरी, निबंध व नारा लिखना और चित्रकला प्रतियोगिता आदि आयोजित की जाएंगी। कागज, पानी, व बिजली संरक्षण, पॉलिथीन मुक्त परिसर व पॉलिथीन मुक्त पर्यावरण, एक विद्यार्थी एक पेड़ अभियान आदि की शुरुआत की जाएगी। इसके अलावा विद्यार्थियों को स्वच्छ भारत लक्ष्य में योगदान देने के लिए प्रोत्साहित किया जाएगा ।

परीक्षक के लिए निर्देश

The examiner is requested to set nine questions in all taking two questions from each unit and one compulsory question. The compulsory question will consist of four parts and will be distributed over the whole syllabus. The candidate is required to attempt five questions in all by selecting at least one question from each unit along with one compulsory question.

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Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester - 6

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-CS-302	Compiler Design	3	0	0	3	20	80	100
2.	PCC	PCC-CS-304	Computer Networks	3	0	0	3	20	80	100
3.	PEC	PEC	Elective-I	3	0	0	3	20	80	100
4.	PEC	PEC	Elective-II	3	0	0	3	20	80	100
5.	OEC	OEC	Open Elective-I	3	0	0	3	20	80	100
Lab										
6.	Project	PROJ-CS-300-P	Project-I	0	0	4	2	10	40	50
7.	PCC	PCC-CS-302-P	Compiler Design lab	0	0	4	2	10	40	50
8.	PCC	PCC-CS-304-P	Computer Networking Lab	0	0	4	2	10	40	50
9	PEC	PEC	Electives-I Course Lab	0	0	2	1	10	40	50
		Total		15	0	14	22	140	560	700

Total Contact Hours =29 **Total Credit= 22**

Note: 1. 4-6 weeks industrial practical training –II training will be held after sixth semester. However, Viva- Voce will be conducted in the seventh semester.

2. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

3. Project coordinator and other assisting co-coordinators will be assigned the load maximum of 02 Hours per week including their own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

S.No	Elective – I	Elective – I Lab	Elective –II	Open Elective- I
1.	PEC- CS-306 Digital Image Processing	PEC- CS-306- P Digital Image Processing Lab	PCC-IT-303 Multimedia and Technologies	OE-CS-322 Soft Skills & Interpersonal Communication
2.	PEC-CS-308 Artificial Intelligence	PEC-CS-308-P Artificial Intelligence Lab	PEC-CS-316 High Speed Network	OE-CS-324 Cyber Law and Ethics
3.	PEC-CS-310 Computer Graphics	PEC-CS-310-P Computer Graphics Lab	PEC-CS-318 Soft Computing	OE-CS-326 Data Analytics using R
4.	PEC-CS-312 Cloud Computing	PEC-CS-312-P Cloud Computing Lab	PEC-CS-320 Data Mining	OE-CS-328 Microprocessor and Interfacing

B. Tech. Semester – VI (Computer Science and Engineering)

COMPILER DESIGN

CODE: PCC-CS-302

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL: 100

Course Objectives:

1. Apply the knowledge of lex tool & yacc tool to develop a scanner & parser.
2. Design and conduct experiments for Intermediate Code Generation in compiler.
3. Develop program to solve complex problems in compiler
4. Learn the new code optimization techniques to improve the performance of a program in terms of speed and space.

UNIT-1

Introduction: Compilers and translators need of translators, structure of compiler: its different phases, Compiler construction tools.

Lexical Analysis: Role of lexical analyzer; Design of lexical analyzer; Regular expressions ;Specification and recognition of tokens; Input buffering; Finite automata; Conversion from regular expression to finite automata, and vice versa; Minimizing the number of states of DFA, Implementation of lexical analyzer.

UNIT-2

Syntactic Techniques & Parsing: Context free Grammars; Derivations & parse trees; Capabilities of CFGs; Role of parsers, Shift- Reduce Parsing ; Operator precedence parsing; top down parsing; predictive parsing, LR parsers; LR(0) items SLR, LALR and Canonical LR parser.

UNIT-3

Syntax Directed Translation , Symbol Table & Error Handling : Syntax directed definition, construction of syntax trees. syntax directed translation scheme, implementation of syntax directed translation, Intermediate Code ;Parse trees & Syntax trees; Three address code, quadruples and triples; Translation of Boolean Expressions. Symbol tables, its contents and data structure for symbol tables; trees, arrays, linked lists, hash tables; Operations on symbol table; Errors (lexical phase error, syntactic phase error, semantic error).

UNIT-4

Code Optimization & Code Generation: Sources of code optimization; Loop optimization (Denominators, Reducible flow graphs, depth first search, loop invariant computation, Induction variable elimination); Directed acyclic representation of basic blocks Code generation, forms of objects code, machine dependent code, register allocation for temporary and user defined variables; Problems in code generation; Peephole optimization.

TEXT / REFERENCE BOOKS:

1. Compilers Principle, Techniques & Tools - Alfrend V. AHO, Ravi Sethi& J.D. Ullman; - 1998Addison Wesley.
2. Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc: Graw Hill.

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3. System Software by Dhamdhare, 1986, MGH.
4. Principles of Compiler Design, Alfred V Aho , Jeffery D. Ullman , Narosa Publication

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After taking the course, students will be able to:

1. Students will get the concepts of Compilers and the actual roles of the lexical analyzer
2. Students will get the concepts of different Parsing techniques and Construction of syntax trees
3. Students will get the concepts of Type checking and Run time environments
4. Students will get the concepts of Intermediate code generation, Code optimization and Code generations.

B. Tech. Semester – VI (Computer Science and Engineering)

COMPILER DESIGN LAB

CODE: PCC-CS-302-P

NO OF CREDITS:2

L	T	P
0	0	4

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL:	50

At least 10 to 15 experiments to be performed related to the subject.

B. Tech. Semester – VI (Computer Science and Engineering)

COMPUTER NETWORKS

CODE: PCC-CS-304

NO OF CREDITS: 3	**INTERNAL MARKS: 20**
L T P	**EXTERNAL MARKS: 80**
3 0 0	**TOTAL : 100**

Course Objectives:

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

UNIT-1

Data Communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT-2

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA

UNIT-3

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT-4

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

TEXT / REFERENCE BOOKS:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.

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5. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes

After taking the course, students will be able to:

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

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B. Tech. Semester – VI (Computer Science and Engineering)
COMPUTER NETWORKING LAB
CODE: PCC-CS-302-P

NO OF CREDITS:2

L	T	P
0	0	4

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL:	50

At least 10 to 15 experiments to be performed related to the subject.

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B. Tech. Semester – VI (Computer Science and Engineering)
DIGITAL IMAGE PROCESSING (ELECTIVE-I)
CODE: PEC-CS-306

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. To learn and understand the fundamentals of digital image processing.
2. To learn and understand various image Transforms.
3. To learn and understand Image Enhancement Techniques.
4. To learn image restoration Techniques and methods, image compression and Segmentation used in digital image processing.

UNIT- 1

Digital Image Fundamental: - Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

UNIT- 2

Image Enhancements, Filtering And Restoration:- Enhancement in spatial domain; pixel grey level transformation, image negatives, logarithmic transformation; bit-plane slicing, histogram processing; enhancement in frequency domain; image smoothing (low pass filter), image sharpening (high pass filter), selective filtering (band pass and band reject filters); noise models for images, signal-to-noise ratio, image restoration in the presence of noise using spatial filtering, periodic noise reduction by frequency domain filtering; estimating the degradation function, inverse filtering.

UNIT- 3

Color Image Processing & Image Segmentation:- Color fundamentals, color models, RGB, CMY and CMYK color models, HSI model; pseudocolor image processing, basics of full color processing, color transformations, smoothing and sharpening; noise in color images, grey level to color transformation; Image Segmentation: fundamentals, edge-based segmentation; image thresholding, intensity thresholding; basic global thresholding, multi-variable thresholding.

UNIT- 4

Image Compression:- Redundancy–inter-pixel and psycho-visual; Loss less compression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.

TEXT AND REFERENCE BOOKS:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008.

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2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004.
3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

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

1. Represent various types of images and analyze them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Work with colored images and perform image segmentation.
4. Develop algorithms for image compression and coding.

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B. Tech. Semester – VI (Computer Science and Engineering)
DIGITAL IMAGE PROCESSING LAB (ELECTIVE-I LAB)
CODE: PEC-CS-306-P

NO OF CREDITS:1	INTERNAL MARKS: 10
L T P	EXTERNAL MARKS: 40
0 0 2	TOTAL: 50

At least 10 to 15 experiments to be performed related to the subject.

B. Tech. Semester – VI (Computer Science and Engineering)

ARTIFICIAL INTELLIGENCE (ELECTIVE-I)

CODE: PEC-CS-308

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL : 100

Course Objectives:

1. To understand the basic concepts of AI and problem solving
2. To analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search techniques to solve them
3. To represent knowledge and draw inferences
4. To explore learning techniques and existing expert systems

UNIT- 1

Introduction: The AI problems; what is an AI technique; Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving; Production systems; Control strategies: forward and backward chaining Exhaustive searches: Depth first Breadth first search.

UNIT- 2

Heuristic Search Techniques: Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problem reduction and AO* algorithm; Constraint Satisfaction problems Game Playing Minmax search procedure; Alpha-Beta cutoffs; Additional Refinements

UNIT- 3

Knowledge Representation & Reasoning:- Propositional logic, First order predicate logic, Inference in FOPL, Skolemnisation; Resolution Principle and Unification; Forward & Backward chaining, Inference Mechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Conceptual Dependency

UNIT- 4

Learning Techniques: - Supervised and unsupervised learning, Decision trees, Statistical learning models, Reinforcement learning.

Expert Systems: Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; Case Studies: MYCIN, Learning, Rote Learning; Learning by Induction; Explanation based learning.

TEXT/REFERENCES BOOKS:

1. Elaine Rich and Kevin Knight; Artificial Intelligence- Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems- Prentice Hall of India.
3. Nils J.Nilsson: Principles of Artificial Intelligence- Narosa Publishing house.

4. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norvig, Pearson Education
5. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of course, students would be able to:

1. Analyze and formalize problem and solve them using AI techniques
2. Use Heuristic search techniques for game playing and other problems
3. Represent diverse knowledge using AI and analyze
4. Understand and design an expert system

B. Tech. Semester – VI (Computer Science and Engineering)
ARTIFICIAL INTELLIGENCE LAB (ELECTIVE-I LAB)
CODE: PEC-CS-308-P

NO OF CREDITS:1

L	T	P
0	0	2

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL:	50

At least 10 to 15 experiments to be performed related to the subject.

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Chairperson
Department of Computer Science &
Engineering and Information Technology
BPS Mahila Vishwavidyalaya, Sonepat (HR.)

B. Tech. Semester – VI (Computer Science and Engineering)
COMPUTER GRAPHICS (ELECTIVE-I)
CODE: PEC-CS-310

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:

1. To list the basics concepts used in computer graphics.
2. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.
3. To describe the importance of viewing and projections.
4. To design an application with the principles of virtual reality and understand a typical image processing.

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, Line drawing algorithms; DDA, Bresenham's; Circle drawing algorithms: Using polar coordinates. Bresenham's circle drawing, mid point circle drawing algorithm; Filled area algorithms: Scanline: Polygon filling algorithm, boundary filled algorithm.

UNIT-2

Two/Three Dimensional Viewing: The 2-D viewing pipeline, windows, viewports, window to view port mapping; Clipping: point, clipping line (algorithms):- 4 bit code algorithm, Sutherland-cohen algorithm, parametric line clipping algorithm (Cyrus Beck).
Polygon clipping algorithm: Sutherland-Hodgeman polygon clipping algorithm. Two dimensional transformations: transformations, translation, scaling, rotation, reflection, composite transformation.
Three dimensional transformations: Three dimensional graphics concept, Matrix representation of 3-D Transformations, Composition of 3-D transformation.

UNIT-3

Viewing in 3D: Projections, types of projections, the mathematics of planner geometric projections, coordinate systems.
Hidden surface removal: Introduction to hidden surface removal .Z- buffer algorithm , scanline algorithm, area 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. What is an image? Filtering, image processing, geometric transformation of images.

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

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completing the course the student will be able to:

1. Understand the basics concepts used in computer graphics.
2. Implement various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.
3. Understand the importance of viewing and projections.
4. Design an application with the principles of virtual reality and understand a typical image processing.

B. Tech. Semester – VI (Computer Science and Engineering)

COMPUTER GRAPHICS LAB (ELECTIVE-I LAB)

CODE: PEC-CS-310-P

NO OF CREDITS:1

L	T	P
0	0	2

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL:	50

At least 10 to 15 experiments to be performed related to the subject.

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to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of course, students would be able to:

1. Define concepts related to cloud computing
2. Express deployment models for clouds.
3. Apply cloud computing techniques for various applications.
4. Analyse cloud computing services used at various levels.
5. Assess real time cloud services

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B. Tech. Semester – VI (Computer Science and Engineering)
CLOUD COMPUTING (ELECTIVE-I)
CODE: PEC-CS-312

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:

The objective of the course is to give students a comprehensive view of storage and networking infrastructures for highly virtualized cloud ready deployments. The course discusses the concepts and features related to Virtualized data-centre and cloud, information storage and design of applications.

UNIT- 1

Introduction: Distributed Computing, Cluster Computing, Grid Computing, Overview of Cloud Computing, History of Cloud Computing, Defining a Cloud, Benefits of Cloud Computing, Cloud Computing Architecture, Services Models (XaaS), Infrastructure as a Service, Platform as a Service, Software as a Service.

UNIT -2

Deployment Models, Public Cloud, Private Cloud, Hybrid Cloud, CommUNITy Cloud, Dynamic Provisioning and Resource Management, Virtualization: Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Pros and Cons of Virtualization, Xen, VMware, Hyper-V.

UNIT -3

Cloud Platform in Industry: Amazon Web Services- Compute Services, Storage Services, Communication Services, Additional Services, Google App Engine- Architecture and Core Concepts, Application Life Cycle, Cost Model, Microsoft Azure – Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance.

UNIT -4

Cloud Application: Scientific Applications- ECG Analysis in cloud, Protein Structure Prediction, Gene Expression data analysis for Cancer Diagnosis, Satellite Image Processing, Business and Consumer Applications-CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online gaming. Cloud Security.

TEXT/ REFERENCE BOOKS:

1. Rajkumar Buyya, Christian Vecchiola and S ThamaraiSelvi, Mastering Cloud Computing, Tata McGraw Hill Education Pvt. Ltd., 2013.
2. Kai Hwang, Geofferyu C. Fox andJack J.Dongarra, Distributed and Cloud Computing, Elsevier, 2012.
3. John W. Ritting and James F. Ransome, Cloud Computing: Implementation Management and Security, CRC press, 2012.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required

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B. Tech. Semester – VI (Computer Science and Engineering)

CLOUD COMPUTING LAB (ELECTIVE-I LAB)

CODE: PEC-CS-312-P

NO OF CREDITS:1

L	T	P
0	0	2

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL:	50

At least 10 to 15 experiments to be performed related to the subject.

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CO

B. Tech. Semester – VI (Computer Science and Engineering)
MULTIMEDIA AND TECHNOLOGIES (ELECTIVE-II)
CODE: PCC-IT-303

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:
The objective of this course is to make students learn how to develop multimedia programs and demonstrate how still images, sound, and video can be digitized on the computer.

UNIT -1
Introduction to Multimedia concepts, Types of Multi-media Applications, Methods to deliver Multimedia, Introduction to Multimedia Database, Multimedia Input and Output Devices.

UNIT- 2
Introduction about font and faces, Using Text in Multimedia, Applying different types of text in multimedia Font Editing and Design tools, Hypermedia and Hypertext application.

UNIT -3
The power of images, Making Still Images, Colouring, Image File Formats (GIF, JPEG, PNG etc.) The power of sound, MIDI Vs. Digital Audio, Audio File Formats (AIFF, WAV, MPEG, MOV etc.) Adding Sound to multimedia project.

UNIT -4
Working of a Video and its Display, Digital Video Containers (Codecs & Video Format Converters) Obtaining Video Clips, Shooting and editing Video, Non Linear Editing(NLE) in Videos The stages of Multimedia Project, Hardware and Software requirements ,Authoring Systems Team for Multimedia Development, Different stages of multimedia, The internet and multimedia Text and

TEXT/REFERENCE BOOKS

1. Tay Vaughan, Multimedia: Making It Work, Tata McGraw Hills, 2008.
2. James E Shuman, Multimedia in Action, Vikas Publishing House, 1997.
3. Andreas Holzinger, Multimedia Basics Technology, Volume 1, Firewall Media, 2005.
4. Rangan Parekh, Principles of Multimedia, Tata McGraw Hills, 2007.

Course Outcomes:

1. By the end of the course students will be able to:
2. Outline the basic concepts of multimedia technology.
3. Discuss the concepts of animation, digitized sound, video control, and scanned images.
4. Use basic instructional design principles in the development of Multimedia.
5. Compare various audio and video file formats.
6. Devise solutions for multimedia problems.

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B. Tech. Semester – VI (Computer Science and Engineering)
HIGH SPEED NETWORK (ELECTIVE-II)
CODE: PEC-CS-316

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:
High Speed Network Technologies is a professional core course based around Network Architectures, protocols used across the layers, techniques used in communication and modes of data transfer. The course deals with creating High Speed Networks for any organization/institute with its various phases/life cycles.

UNIT -1

High Speed LAN
Gigabit Ethernet: Overview of fast Ethernet, Gigabit Ethernet – overview, specifications, layered protocol architecture, frame format, network design using Gigabit Ethernet, applications, 10GB Ethernet – overview, layered protocol architecture, frame format. Fiber Channel: Fiber channel – overview, topologies, ports, layered protocol architecture, frame structure, class of service.

UNIT- 2

High Speed WAN
Frame Relay: Protocol architecture and frame format. ISDN & B-ISDN: Channels, interfaces, addressing, protocol architecture, services. ATM: Virtual circuits, cell switching, reference model, traffic management.

UNIT- 3

Wireless LAN
Wireless Networks: Existing and emerging standards, Wireless LAN (802.11), Broadband Wireless (802.16), Bluetooth (802.15) their layered protocol architecture and security. Mobile Networks – GSM, CDMA.

UNIT- 4

Internet Suite of Protocols
Internet Layer: IPV4 and IPV6, IP addressing, IP classes, CIDR. Transport Layer: UDP/TCP protocols & architecture, TCP connection management. Application Layer: DNS, E-Mail, Voice over IP.

TEXT/ REFERENCE BOOKS:
1. Jochen Schiller, Mobile Communication, 2nd Edition, Pearson,2009.
2. Andrew S Tanenbaum, Computer Networks, 5th Edition, Pearson 2013.
3. William C Y Lee, Mobile Communication Engineering: Theory and Applications, 2nd Edition, McGraw Hill, 1997.

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Course Outcomes:

By the end of the course students will be able to:

1. Define different high speed network technologies
2. Explain working of different wired / wireless technologies suitable for LAN and WAN communication.
3. Illustrate the mapping of OSI reference model to different high speed technologies and Internet Suite of Protocols
4. Analyze the performance of different high speed technologies in different scenarios / situations.
5. Design a network for any organization using high speed technologies along with Internet connectivity.

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B. Tech. Semester – VI (Computer Science and Engineering)

SOFT COMPUTING (ELECTIVE-II)

CODE: PEC-CS-318

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

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 a hand-on experience on MATLAB to implement various strategies.

UNIT-1

Introduction to soft computing:- Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics.

UNIT-2

Fuzzy Logic:- Fuzzy Sets. Operations on Fuzzy Sets. Fuzzy Relations, Membership Functisons: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-3

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-4

Genetic Algorithms & MATLAB:- Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition. Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

TEXT/REFERENCE BOOKS:

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 McGrawHill.
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.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of course, students would be able to:

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

B. Tech. Semester – VI (Computer Science and Engineering)
DATA MINING (ELECTIVE-II)
CODE: PEC-CS-320

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. To learn data mining and Data pre-processing concepts.
2. To know about the association rules in data mining.
3. To perform various Classification and clustering algorithms.
4. To understand the strengths and limitations of various data mining models.

UNIT - 1

Introduction to Data Mining:- Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT - 2

Association Rules:- Problem Definition, Frequent Item Set Generation, Frequent Itemsets, Closed Itemsets, and Association Rules. Apriori Algorithm: Finding Frequent Itemsets by Confined Candidate Generation, Generating Association Rules from Frequent Itemsets , Improving the Efficiency of Apriori, A Pattern-Growth Approach for Mining Frequent Itemsets ,Mining Frequent Itemsets Using Vertical Data Format, Mining Closed and Max Patterns.

UNIT - 3

Classification:- Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction ,Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

Clustering:- Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm, PAM Algorithm, Hierarchical Clustering - Agglomerative Methods and divisive methods, Strengths and Weakness; Outlier Detection.

UNIT - 4

Web and Text Mining:- Introduction, web mining, web content mining, web structure mining. Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

TEXT/ REFERENCE BOOKS:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition,2006.

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2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, PearsonEducation.
3. Data mining Techniques and Applications, Hongbo Du Cengage IndiaPublishing
4. Data Mining Techniques, Arun K Pujari, 3rd Edition, UniversitiesPress
5. Data Mining Principles & Applications – T.V Sveresh Kumar, B. Eswarc Reddy,Jagadish S Kalimani,Elsevier.
6. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford UniversityPress

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completing the course the student will be able to:

1. Perform the pre-processing of data and apply mining techniques on it.
2. Identify the association rule applied on datasets.
3. Perform Classification and clustering algorithms
4. Classify web pages, extract knowledge from the Web.

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B. Tech. Semester – VI (Computer Science and Engineering)

SOFT SKILLS & INTERPERSONAL COMMUNICATION (OPEN ELECTIVE-I)

CODE: OE-CS-322

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS:	20
EXTERNAL MARKS:	80
TOTAL :	100

Course Objectives:

The course aims at creating awareness among the stock holders of the corporate world in which the role of individuals as team players and also as responsible leaders materializes to a great extent. The course, with its interactive and need based modules, will address various challenges of communication as well as behavioral skills faced by individuals at workplace and organizations in bridging the gaps through effective skills of interviews, group discussions, meeting management, presentations and nuances of drafting various business documents for sustainability in today's global world.

UNIT-1

Introduction: Introduction to Soft Skills, Aspects of Soft Skills, Effective Communication Skills, Classification of Communication, Personality Development, Positive Thinking, Telephonic Communication Skills, Telephonic Communication Skills, Communicating Without Words, Paralanguage, Proxemics, Haptics: The Language of Touch, Meta-communication, Listening Skills, Types of Listening, Negotiation Skills, Culture as Communication, Communicating across Cultures , Organizational Communication.

UNIT-2

Communication breakdown: Advanced Writing Skills, Principles of Business Writing, Types of Business Writing, Business Letters, Business Letters: Format and Style, Types of Business Letter.

UNIT-3

Skill development: Writing Reports, Types of Report, Strategies for Report Writing, Strategies for Report Writing, Evaluation and Organization of Data, Structure of Report, Report Style, Group Communication Skills, Leadership Skills, Group Discussion, Meeting Management, Adaptability & Work Ethics.

Advanced Speaking Skills, Oral Presentation, Speeches & Debates, Combating Nervousness, Patterns & Methods of Presentation, Oral Presentation: Planning & Preparation

UNIT-4

Presentation and Interviews: Making Effective Presentations, Speeches for Various Occasions, Interviews, Planning & Preparing, Effective Résumé, Drafting an Effective Résumé, Facing Job Interviews, Emotional Intelligence & Critical Thinking, Applied Grammar

Course Outcomes:

After completion of the course student will be able to:

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1. Understand the concept of soft skills including communication skills, listening skills, positive thinking and also will be able to enhance own personality.
2. Able to write business letters.
3. Able to write reports.
4. Able to make effective resume and will also be able to present himself/herself in interview, speeches, presentations, talks etc.

TEXT/REFERENCES BOOKS:

1. Butterfield, Jeff. Soft Skills for Everyone. New Delhi: Cengage Learning. 2010.
2. Chauhan, G.S. and Sangeeta Sharma. Soft Skills. New Delhi: Wiley. 2016.
3. Goleman, Daniel. Working with Emotional Intelligence. London: Banton Books.1998.
4. Hall, Calvin S. et al. Theories of Personality. New Delhi: Wiley. rpt. 2011.
5. Holtz, Shel. Corporate Conversations. New Delhi: PHI. 2007.
6. Kumar, Sanajy and Pushp Lata. Communication Skills. New Delhi: OUP. 2011.
7. Lucas, Stephen E. The Art of Public Speaking. McGraw-Hill Book Co. International Edition, 11th Ed. 2014.
8. Penrose, John M., et al. Business Communication for Managers. New Delhi: Thomson South Western. 2007.
9. Sharma, R.C. and Krishna Mohan. Business Correspondence and Report Writing New Delhi: TMH. 2016.
10. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. New Delhi: PHI Learning. 2009, 6th Reprint 2015.
11. Thorpe, Edgar and Showick Thorpe. Winning at Interviews. Pearson Education. 2004.
12. Turk, Christopher. Effective Speaking. South Asia Division: Taylor & Francis. 1985.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – VI (Computer Science and Engineering)
CYBER LAW AND ETHICS (OPEN ELECTIVE-I)
CODE: OE-CS-324

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

UNIT-1

Introduction: Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, Cyber Jurisprudence at International and Indian Level

Cyber law- International perspectives: UN & International Telecommunication Union (ITU) Initiatives Council of Europe – Budapest Convention on Cybercrime, Asia-Pacific Economic Cooperation (APEC), Organization for Economic Co-operation and Development (OECD), World Bank, Commonwealth of Nations

UNIT-2

Constitutional & human rights issues in cyberspace: Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace – Access to Internet, Right to Privacy, Right to Data Protection

Cyber crimes & legal framework: Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft & Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act, 2000

UNIT-3

Cyber torts: Cyber Defamation, Different Types of Civil Wrongs under the IT Act, 2000

Intellectual property issues in cyber space: Interface with Copyright Law, Interface with Patent Law, Trademarks & Domain Names Related issues

UNIT-4

E-commerce concept: E-commerce-Salient Features, Online approaches like B2B, B2C & C2C Online contracts, Click Wrap Contracts, Applicability of Indian Contract Act, 1872

Dispute resolution in cyberspace: Concept of Jurisdiction, Indian Context of Jurisdiction and IT Act, 2000, International Law and Jurisdictional Issues in Cyberspace, Dispute Resolutions, Information warfare policy and ethical Issues

TEXT/REFERNCE BOOKS

1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012)
3. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, NewDelhi, (2004)
4. Jonthan Rosenoer, Cyber Law, Springer, New York, (1997).

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. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur(2003).
. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi,(2003).

: Nine questions will be set in all by the examiners taking two questions from each unit and one ion containing short answer type questions from entire syllabus. Students will be required to ıptdfive questions, selecting one question from each unit. Question No.1 is compulsory which is entire syllabus.

B. Tech. Semester – VI (Computer Science and Engineering)
DATA ANAYTICS USING R (OPEN ELECTIVE-I)
CODE: OE-CS-326

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:

Data analytics is a growing and stimulating field that turns data into valuable insights. This course includes programming in R for acquiring, cleaning, visualizing and analyzing data. In addition, it also involves predictive modeling. This course will introduce students to the basic principles, tools and the craft for devising solutions for problems that come in the domain of data science. The emphasis of the course is on integration and synthesis of concepts and their applications for effective engineering solutions.

UNIT- 1

Introduction to R programming: Data types or objects in R, Creating and manipulating objects like factors, vectors, lists and data frames, Subsetting matrices and data frames, Vectorized operations for vectors and matrices and data frames, Getting data in and out of R.

UNIT- 2

Control structure in R: If-else statements, for and while loops, loop functions like lapply, apply, sapply and mapply etc.; writing user defined functions in R. visualizing data through various plots and charts (bar charts, histogram, frequency polygon, scatter plot, quantile and box plots etc.), basics of ggplot package.

UNIT- 3

Doing basic descriptive statistics: Data types for data analysis and their mapping to R objects, Mean, Median, Mode, Quantiles, Five-point summary, Variance, Correlation and Covariance, Hypothesis testing, Basic probability, permutation and combination, normal distribution, uniform distribution using R, cleaning, transforming and exploring data, basics of dpyr package.

UNIT -4

Predictive modelling: Linear Regression, Classification, Decision tree (ID3 or C5.0), Knn, and Bayesian classification models, Evaluating predictive models, Bias and variance trade off. Text and

TEXT/REFERENCE BOOKS

1. Hadley Wickham and Garrett Grolemund., R for Data Science Import, Tidy, Transform and model Data, O'Reilly, 2017.
2. Roger D. Peng, R Programming for Data Science, Lean Publishing, 2015.
3. Paul Teeter, R Cookbook, O'Reilly, 2011.
4. W. N. Venables, D. M. Smith and the R core Team, An introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics, version 3.3.2, 2016.

lichael J. Crawley, Statistics. An introduction using R, Second edition, John Wiley, 2015
Ian, J., Kamber, M, Pei, J.. Data Mining Concepts and Techniques, Third edition, Morgan fmann, 2012.
revor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data ing; Inference and Prediction, Springer, 2nd edition, 2009.

: Nine questions will be set in all by the examiners taking two questions from each unit and one tion containing short answer type questions from entire syllabus. Students will be required to npt five questions, selecting one question from each unit. Question No.1 is compulsory which is entire syllabus.

rse Outcomes:

he end of the course students will be able to:
utline concepts related to R programming and data analysis.
xplain the basic concepts and tools that are used to solve problems in data analytics.
terpreting results of descriptive and inferential statistics.
pply R programming for reading, cleaning, visualizing and analysing data.
nalyse the trends in data through exploratory data analysis.
evise solutions for descriptive and predictive modeling.

B. Tech. Semester – VI (Computer Science and Engineering)
MICROPROCESSOR AND INTERFACING (OPEN ELECTIVE-I)
CODE: OE-CS-328

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS:	20
EXTERNAL MARKS:	80
TOTAL :	100

Course Objectives:

1. To become familiar with 8085 & 8086 Microprocessor Architecture, Instructions, Operating Modes and Programming.
2. To use 8086 microprocessor for various applications.
3. To study various peripherals for microprocessor based systems.

UNIT- 1

Introduction to 8085 Microprocessor: Development of microprocessors, 8085 Microprocessor - Architecture, Organization, Instruction set, Addressing modes, Basic Timing Diagrams, Interrupts and Simple Programs.

UNIT- 2

Introduction to 8086 Microprocessor: 8086 Microprocessor - Architecture, Organization, Instruction set, Addressing modes, Interrupt system. Pin diagram, Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.

UNIT -3

Assembly Language Programming: Assembler directives, Assembly language programs (8086) with Assembler directives for addition, subtraction, multiplication, division etc., sorting and searching, bit manipulation, look-up tables, string manipulations, Macros and Delay subroutines, Debugging.

UNIT- 4

Data transfer schemes and Peripheral Interfacing: Synchronous, Asynchronous, Interrupt driven and DMA type schemes, 8255 PPI and its interfacing, Programmable Communication Interface (8251 USART) and its interfacing, Programmable Interval Timer (8254) and its interfacing, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller (8257) and its interfacing.

Memory and I/O Interfacing to 8086: Address decoding techniques, Interfacing Static RAM and ROM chips, ADC and DAC Interfacing.

Case studies: Traffic light controller, Stepper motor control, Data acquisition, Temperature measurement and control.

TEXT/REFERENCE BOOKS

1. Ramesh S. Gaonkar, "Microprocessor architecture, programming and its applications with 8085", Penram Interantional Publications, 4th Edition.

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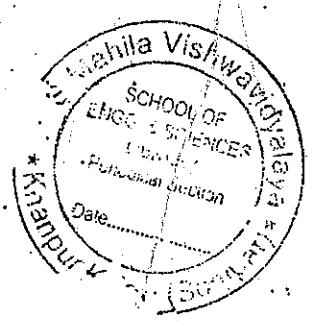
Douglas V. Hall, "Microprocessors and Interfacing: Programming and Hardware", 2nd Edition, Tata McGraw-Hill.
Barry B. Brey, "The Intel Microprocessors-Architecture, Programming and Interfacing", 8th Edition, PHI

Raj, Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design , Pearson Education, 2005.
Steve Furbur, ARM System onchip Architecture, 2nd Edition, Addison Wesley, 2000.
Y. Liu and Glenn A. Gibson, "Microcomputer Systems: 8086/8088 Family Architecture, Programming and Design", 2nd Edition, PHI.
Y. Liu and Glenn A. Gibson, "Microcomputer Systems: 8086/8088 Family Architecture, Programming and Design", 2nd Edition, PHI.

Nine questions will be set in all by the examiners taking two questions from each unit and one on containing short answer type questions from entire syllabus. Students will be required to ot five questions, selecting one question from each unit. Question No.1 is compulsory which is entire syllabus.



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B. Tech. Semester – VI (Computer Science and Engineering)

PROJECT-1

CODE: PROJ-CS-300-P

NO OF CREDITS:2

L T P

0 0 4

INTERNAL MARKS: 10

EXTERNAL MARKS: 40

TOTAL: 50

Students may choose a project based on any subject of Computer Science. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester -7

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PEC	PEC	Elective-III	3	0	0	3	20	80	100
2.	PEC	PEC	Elective-IV	3	0	0	3	20	80	100
3.	OEC	OEC	Open Elective-II	3	0	0	3	20	80	100
4.	OEC	OEC	Open Elective-III	3	0	0	3	20	80	100
5.	BSC	BSC-401	Bioinformatics	2	1	0	2	20	80	100
Lab										
6.	Project	PROJ-CS-401-P	Project-II	0	0	4	2	20	80	100
7.	Project	PROJ-CS-403-P	Seminar	0	0	2	1	50	-	50
8.	Project	ITP-CS-405-P	Industrial Practical Training- II	0	0	0	2	-	100	100
9	PEC	PEC	Electives-III Course Lab	0	0	2	1	10	40	50
		Total		**14**	**1**	**08**	**20**	**180**	**620**	**800**

Total Contact Hours =23 **Total Credit= 20**

Note: 1. Practical training was conducted after sixth semester. However, Viva-Voce for evaluation of Practical Training will be conducted in this semester.

2. Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

3. Project coordinator and other assisting co-coordinators will be assigned the load maximum of 02 Hours per week including their own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her

S.No	Elective –III	Elective –III Labs	Elective – IV	Open Elective- II	Open Elective – III
1.	PEC - CS-401 Information Security	PEC- CS-401 -P Information Security Lab	PEC- CS-409 Queuing Theory and Modeling	OE-CS-417 Human Resource Management	OE-CS-425 Financial Management
2.	PEC -CS-403 Wireless and Mobile Communication	PEC-CS-403-P Wireless and Mobile Communication Lab	PEC-CS-411 Internet of Things	OE-CS-419 ICT for Development	OE-CS-427 E-Commerce & Entrepreneurship
3.	PEC-CS-405 Advanced Operating Systems	PEC-CS-405 -P Advanced Operating Systems Lab	PEC-CS-413 Speech and Natural Language Processing	OE-CS-421 Intellectual Property Rights	OE-CS-429 Basics of Operation Research
4.	PCC-IT-302 Web and Internet Technology	PCC-IT-302-P Web and Internet Technology Lab	PEC-CS-415 Optimization Techniques	OE-CS-423 International Business Environment	OE-CS-43 Renewable Energy System

Chairperson
Dept. Board of Computer Science & Engineering & Information Technology
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B. Tech. Semester – VII (Computer Science and Engineering)

INFORMATION SECURITY (ELECTIVE-III)

CODE: PEC-CS-401

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL : 100

Course Objectives:

1. To learn about data hiding applications and their techniques.
2. To learn about hacking.
3. To learn security based protocols, attacks and intrusions.
4. To work with advance data hiding techniques.

UNIT- 1

Introduction: - The need for security, security approach, principles of security, types of attack, denial of service, IP spoofing, Phishing. Digital signature, Firewall.

UNIT- 2

Hacking:- Basics, Email hacking, computer hacking, types of hacking, practice against hacking, Access Authorization, Compression, LZW Compression and Decompression Method.

UNIT- 3

Data hiding:- Terms related to data hiding, Differences between cryptography, stenography & watermarking, history of stenography. Applications of data hiding.

UNIT- 4

Advance data hiding techniques :- Transform domain, difference between special domains and transform domain, wavelets, advantages of wavelet, and wavelet based techniques for data hidings.

TEXT/ REFERENCE BOOKS:

1. Cryptography and Network Security by Atul Khat e, Mc Graw Hill Publisher
2. E-mail Hacking by Ankit Fadia, Vikash Publishers
3. Data communication and Networking , Behrouz A. Forouzan .

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completing the course the student will be able to:

Explain information security.

1. Give an overview of access control of relational databases.
2. State the basic concept in information systems security, including security technology and principles, software security and trusted systems and IT security management.
3. Learn advance data hiding techniques.

Manju

Chairperson
Department of Computer Science & Engineering and Information Technology
M.D. University, Khanpur Kalan, Sonepat (HR.)

B. Tech. Semester – VII (Computer Science and Engineering)

INFORMATION SECURITY LAB (ELECTIVE-III LAB)

CODE: PEC-CS-401

NO OF CREDITS: 1

L T P

0 0 2

INTERNAL MARKS: 10

EXTERNAL MARKS: 40

TOTAL : 50

At least 10 to 15 experiments to be performed related to the subject.

B. Tech. Semester – VII (Computer Science and Engineering)
WIRELESS AND MOBILE COMMUNICATION (ELECTIVE-III)
CODE: PEC-CS-403

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

UNIT -1

Introduction to Wireless Communication Systems , Evolution, Mobile Systems around the World, Example of the mobile radio systems, Recent trends, 2G, 3G , 4G and 5G Cellular networks. The Cellular Concept Frequency reuse, Channel assignment, Hand off process, Types of Interference, Cellular Capacity.

UNIT -2

Mobile Radio Propagation Path loss, Radio wave propagation, Reflection, Diffraction, Scattering, Link budget Design, Outdoor and indoor propagation models
Principle of multi path propagation
Impulse response model of channels, parameters for mobile multi path channels, concept of fading, Rayleigh and Ricean fading, Simulation of fading channels.

UNIT-3

Modulationstechniquesfor mobile communication
Pulse shaping, Linear and non-linear Modulation techniques, constant envelop modulation, QPSK, MSK, GMSK. Spread spectrum modulation techniques - Direct sequence and Frequency Hopping Spread Spectrum and their applications.

UNIT -4

Multiple access techniques [5 hrs.]
Introduction, FDMA, TDMA, CDMA, SDMA, capacity of cellular systems
Introduction to Multicarrier systems [5 hrs.]
OFDM and wireless LAN, WiMAX, GSM, WCDMA, 3GPP LTE and other 4G standards.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

B. Tech. Semester – VII (Computer Science and Engineering)

WIRELESS AND MOBILE COMMUNICATION LAB (ELECTIVE-III LAB)

CODE: PEC-CS-403-P

NO OF CREDITS: 1

L T P

0 0 2

INTERNAL MARKS:	10
EXTERNAL MARKS:	40
TOTAL :	50

At least 10 to 15 experiments to be performed related to the subject.

B. Tech. Semester – VII (Computer Science and Engineering)
ADVANCED OPERATING SYSTEMS (ELECTIVE-III)
CODE: PEC-CS-405

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:

1. To learn the fundamentals of different types of Operating Systems.
2. To learn the mechanisms to handle processes scheduling, synchronization and memory management in Distributed OS.
3. To understand the system architecture of Multiprocessor OS and learn the mechanisms to handle processes scheduling, synchronization, memory management and fault tolerance in Multiprocessor OS.
4. To understand the characteristics and system architecture of Real-Time OS and learn the mechanisms of processes scheduling, real-time OS protocols and Case studies.
5. To learn the mechanisms to design fast OS with proper resource utilization.

UNIT-1

Introduction
Introduction of Operating Systems, Evolution of OS, Types of OS: Batch OS, single user & Multi-user OS, Multiprogramming and Multi-tasking, Multi-threading, Time-sharing, Embedded OS, Distributed Operating Systems, Multi-processor Operating Systems, Real-time Operating Systems, Mobile Operating Systems

UNIT-2

Distributed operating systems
Introduction, Characteristics, Network OS & Distributed OS, Various issues, Communication in Distributed Systems, Clock Synchronization, Mutual Exclusion Algorithms, Deadlock Detection and Prevention, Distributed Process Scheduling Algorithms, Distributed File Systems.

UNIT-3

Multi-processor operating systems
Introduction, System Architecture, Structure of Multi-processor OS, Process Synchronization, Processor Scheduling Algorithms, Memory Sharing, Process Migration, Fault Tolerance

Real-time operating systems
Introduction, Characteristics, Structure of a Real-time System, Scheduling Algorithms, Mutual Exclusion, Priority Inheritance Protocol, Priority Ceiling Protocol, Case Studies

UNIT-4

Mobile operating systems

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Introduction, Mobile Devices, Characteristics of Mobile Devices, Resource management in Mobile OS: Power Management, Battery Management, Thermal Management, Memory Management, Scheduling, File System, Security, Android OS.

TEXT/REFERENCES BOOKS

1. MukeshSinghal,Niranjan G. Shivaratri, "Advanced Concepts In Operating Systems",Tata McGraw-Hill Education; 2nd edition, [ISBN: 007057572X], 2001.
2. Dr.NareshChauhan, "Principles of Operating Systems", Oxford University Press; 1st edition, [ISBN: 978-0198082873],2014.
3. Andrew S. Tanenbaum, Herbert Bos,"Modern Operating Systems",Pearson Prentice Hail™; 4th edition, [ISBN: 9781292061429],2014.
4. D. M. Dhamdhere," Operating Systems",Tata McGraw Hill; 1st edition, [ISBN: 97812821872451,2006.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After the successful completion of the course students will be able to:

1. Understand the characteristics of different OS.
2. Develop algorithms for process scheduling, synchronization for different OS.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time for different OS.
4. Design and implement file management system for different OS.
5. Design and implement security policies in OS.

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B. Tech. Semester – VII (Computer Science and Engineering)

ADVANCED OPERATING SYSTEMS LAB (ELECTIVE-III LAB)

CODE: PEC-CS-405-P

NO OF CREDITS: 1	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 2	TOTAL :	50

At least 10 to 15 experiments to be performed related to the subject.

B. Tech. Semester – VII (Computer Science and Engineering)
WEB & INTERNET TECHNOLOGY (ELECTIVE-III)
CODE: PCC-IT-302

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL: 100

Course Objectives:

1. To familiarize the students with the basic concepts of internet, its history, ways to connect to internet and basics of World Wide Web and search engines.
2. To familiarize the student with the fundamental language of internet i.e. HTML
3. To teach the student aware of the concepts of cascading style sheets
4. To teach the student the students the basics of client side and Server side scripting

UNIT-1

Introduction to networks and www

Introduction to internet, history, Working of Internet, Modes of Connecting to Internet, Internet Address, standard address, classful and classless ip addressing, subnetting, supernetting, w3c consortium, searching the www: Directories search engines and Meta search engines, search fundamentals, search strategies, Architecture of the search engines, Crawlers and its types, Delivering multimedia over web pages, VRML.

UNIT-2

Hypertext markup language

The anatomy of an HTML document: Marking up for structure and style: basic page markup, absolute and relative links, ordered and unordered lists, embedding images and controlling appearance, table creation and use, frames, nesting and targeting.

Style sheets

Separating style from structure with style sheets, internal style specifications within HTML. External linked style specification using CSS, page and site design considerations.

UNIT-3

Client side programming

Introduction to Client side programming, Java Script syntax, the Document object model, Event handling, Output in JavaScript, Forms handling, cookies, Introduction to VBScript, Form Handling.

UNIT-4

Server side scripting

CGI, Server Environment, Servlets, Servlet Architecture, Java Server Pages, JSP Engines, Beans, Introduction to J2EE.

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TEXT/REFERENCE BOOKS:

1. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp 2001, TMH.
2. Internet & World Wide Programming, Deitel,Deitel& Nieto, 2000, Pearson Education
3. Complete idiots guide to java script,. Aron Weiss, QUE, 1997.
4. Network firewalls, Kironjeetsyan - New Rider Pub.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

At the end of the course/session the student would be

1. Acquainted with the basics of internet &search engines.
2. Have a hands on HTML
3. Learned the need and basics of CSS
4. Learned the concepts of client side and server side scripting.

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B. Tech. Semester – VII (Computer Science and Engineering)
WEB & INTERNET TECHNOLOGY LAB (ELECTIVE-III LAB)
CODE: PCC-IT-302-P

NO OF CREDITS: 1	**INTERNAL MARKS: 10**
L T P	**EXTERNAL MARKS: 40**
0 0 2	**TOTAL : 50**

At least 10 to 15 experiments to be performed related to the subject.

B. Tech. Semester – VII (Computer Science and Engineering)
QUEUING THEORY AND MODELING (ELECTIVE-IV)
CODE: PEC-CS-409

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. It provides an essential base for mathematical modeling which is normally used to solve the problems of pattern recognition and machine learning.
2. It is used in the research of various science and engineering problem.

UNIT-1

Introduction to Queues and Queueing Theory, Stochastic Processes, Markov Processes and Markov Chains, Birth-Death Process, Basic Queueing Theory (M/M/-/- Type Queues, Departure Process from M/M/-/- Queue, Time Reversibility, Method of Stages, Queues with Bulk Arrivals, Equilibrium Analysis of the M/G/1 Queue

UNIT-2

Analyzing the M/G/1 Queue using the Method of Supplementary Variables, M/G/1 Queue with Vacations, M[x] /G/1 Queue, Priority Operation of the M/G/1 Queue, M/M/n/K Queue with Multiple Priorities

UNIT-3

M/G/1/K Queue, G/M/1, G/G/1 G/G/m, and M/G/m/m Queues, Queueing Networks - Classification and Basic Concepts, Open and Closed Networks of M/M/m Type Queues, Jackson's Theorem

UNIT-4

Analysis of Closed Queueing Networks using Convolution and Mean Value Algorithms, Norton's Theorem for Closed Queueing Networks, Mixed Queueing Networks, Queueing Network Analyzer (QNA) Approach, Simulation Techniques for Queues and Queuing Networks, Discrete Time Queues.

TEXT/REFERENCES BOOKS:

1. Donald Gross, James M. Thompson, John F. Shortle and Carl W. Harris, Fundamentals of QueueingThoery, Wiley 2008.
2. Sanjay K. Bose, An Introduction to Queueing Systems, Springer 2002.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After undergoing the course, students will be able to

1. Develop an understanding to the basic concepts of Queuing theory and type of queues.
2. Understand and apply the Queuing theory to Science and Engineering problems and applications.
3. Calculate the n-step transition probabilities for any Markov chain and understand about the birth and death of processes.
4. Apply Markov chain & Birth Death process to real life problems.
5. Develop an understanding of various Queuing Systems.

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B. Tech. Semester – VII (Computer Science and Engineering)
INTERNET OF THINGS (ELECTIVE-IV)
CODE: PEC-CS-411

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. Student will be able to learn the basics of IOT.
2. Student will be able to analyse basic protocols of wireless and MAC.
3. Students will get familiar with web of things.
4. Students will get basic knowledge of resource management.

UNIT-1

Introduction to IOT

Introduction to IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs ,IoT& M2M Machine to Machine, Difference between IoT and M2M, Software define Network, Challenges in IoT(Design ,Development, Security).

UNIT-2

Network and communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.

UNIT-3

Web of things

Web of Things vs Internet of things, two pillars of web, Architecture and standardization of IoT, Unified multitier-WoT architecture, WoT portals and Business intelligence, Cloud of things: Grid/SOA and cloud computing, Cloud middleware, cloud standards

UNIT-4

Resource management in iot

Domain specific applications of IoT, Home automation, Industry applications, Surveillance applications, Other IoT applications Clustering, Synchronization, Software agents.

TEXT/ REFERENCE BOOKS:

1. Vijay Madisetti, ArshdeepBahga, "Internet of Things: A Hands-On Approach"
2. WaltenegusDargie,ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to

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attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

On successful completion of the course, the student will:

1. Understand the concepts of Internet of Things
2. Analyze basic protocols network
3. Understand the concepts of Web of Things
4. Design IoT applications in different domain and be able to analyze their performance

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B. Tech. Semester – VII (Computer Science and Engineering)

SPEECH AND NATURAL LANGUAGE PROCESSING (ELECTIVE-IV)

CODE: PEC-CS-413

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL: 100

Course Objectives:

1. To make the students familiar with difference levels/stages of natural language processing and to introduce concept of Formal languages and grammars: Chomsky hierarchy and problems associated (like Left-Associative grammars, ambiguous grammars) with them.
2. To introduce the students with Morphology and Part of Speech Tagging by taking examples from Hindi, English.
3. To introduce the top down and the bottom up parsing approaches and their respective types of parsers.
4. To make the students familiar with grammar types like ATN & RTN.
5. To make the students familiar with the basic techniques of parsing like CKY, Earley& Tomita's algorithms and role Hidden Markov Model in NLP
6. To make the students familiar with Semantics-knowledge and its utilization.

UNIT-1

Automatic speech recognition

Introduction to Automatic Speech Recognition (ASR), Components in ASR, Challenges in ASR, Issues in ASR based Application development.

COMPONENTS OF NATURAL LANGUAGE PROCESSING

Lexicography, syntax, semantics, pragmatics: word level representation of natural languages prosody& natural languages.

UNIT-2

Formal languages and grammars

Chomsky hierarchy, Left-Associative grammars, ambiguous grammars, resolution of ambiguities. Introduction of top down and bottom up parsers.

UNIT-3

Computation linguistics

Morphology of natural languages like Hindi, English etc.,Part of Speech Tagging (POS), recognition and parsing of natural language structures: ATN & RTN, General techniques of parsing: CKY, Earley& Tomita's algorithms. Introduction to Hidden Markov Model (HMM)

UNIT-4

Semantics-knowledge representation

Semantic networks logic and inference pragmatics, graph models and optimization, Prolog for natural language semantic (e.g. DCG).

Application of NLP: Intelligent Work Processors
Machine translation, user interfaces, Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP.

TEXT/REFERENCE BOOKS:

1. "Natural Language Understanding" James Allen, -1995Benjamin/cummings Pub. Comp. Ltd
2. "Language as a cognitive process", Terry Winograd 1983, AW
3. "Natural Language processing in prolog", G. Gazder, 1989, Addison Wesley.
4. " Introduction of Formal Language Theory", MdljArbib&Kfaury, 1988, Springer Verlog.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course outcomes:

Upon successful completion of the course, the student will be able to understand:

1. Difference levels/stages of natural language processing and the concept of Formal languages and grammars: Chomsky hierarchy and problems associated (like Left Associative grammars, ambiguous grammars) with them.
2. The top down and the bottom up parsing approaches and their respective types of parsers like CKY, Earley& Tomita's
3. The Hidden Markov Model and its application in NLP
4. The student will be able to write small ATN & RTN grammars for simple English sentences.
5. The student will be able to do Morphology of words from natural languages like Hindi, English and Semantics-knowledge and its important to understand the documents.

B. Tech. Semester – VII (Computer Science and Engineering)

OPTIMIZATION TECHNIQUES (ELECTIVE-IV)

CODE: PEC-CS-415

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. The objective of this course is to provide insight to the mathematical formulation of real world problems.
2. To optimize these mathematical problems using nature based algorithms. And the solution is useful, especially for NP-Hard problems.

UNIT-1

Engineering applications of optimization, Formulation of design problems as mathematical programming problems. General Structure of Optimization Algorithms, Constraints, The Feasible Region.

UNIT-2

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

UNIT-3

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

UNIT-4

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

TEXT/REFERENCE BOOKS:

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

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8. Der-San Chen; Robert G. Batson; Yu Dang (2010), " Applied Integer Programming: Modeling and Solution". John Wiley and Sons. ISBN 978-0-470-37306-4.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of course, students would be able to:

1. Apply basic concepts of mathematics to formulate an optimization problem
2. Understand and apply the concept of optimality criteria for various types of optimization problems.
3. Solve various constrained and unconstrained problems in Single variable as well as multivariable.
4. Apply the methods of optimization in real life situations.

B. Tech. Semester – VII (Computer Science and Engineering)

HUMAN RESOURCE MANAGEMENT (OPEN ELECTIVE-II)

CODE: OE-CS-417

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS:	20
EXTERNAL MARKS:	80
TOTAL :	100

Course objectives:

The primary concern of this course is to sensitize students to the various facts of managing people and to create an understanding of the various policies and practices of human resource management.

UNIT-1

Human Resource Management: concept, evolution and scope; Strategic objectives of HR management; Roles, responsibilities and competencies of HR manager; Challenges to HR professionals; Human Resource Planning & Forecasting: significance and process; Human Resource Information System.

UNIT-2

HR Sourcing and Recruitment; Selection: process, Placement; Induction and Socialization. Job Analysis: job Description and job Specification; Job Design: approaches and methods; Job Evaluation-concept & methods; Performance Management System: appraisal and counselling.

UNIT-3

Training: training process, training need analysis (TNA); training methods and techniques; Designing Training programs; Training evaluation; Career planning and Development; Potential Appraisal and Succession planning; Employee Compensation: basic concepts & determinants; New trends in compensation management.

UNIT-4

Industrial Relations and Grievance Handling; Employee welfare; Dispute Resolution; International Human Resource Management; Contemporary Issues in HRM: knowledge Management, HR Audit &Accounting, HR in virtual organizations, ethics &corporate social responsibility.

TEXT/RERERENCE BOOKS:

1. K. Aswathapa Human resource Management: Text and cases, 6th edition, Tata McGraw Hill, New Delhi.
2. Uday Kumar Haldar&JuthikaSarkarHuman resource Management New Delhi, Oxford University Press.
3. De Cenvo, Da & Robbins S.P. Fundamentals of Human Resource Management, 9th edition, New York, John Wiley & Sons.
4. Gary Dessler, Human Resource Management, 11th edition New Delhi: Pearson Prentice Hall.
5. TanujaAgarwala, Strategic Human resource Management, Oxford University Press

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Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

1. The course will help to understand the basics of HRM with roles and responsibilities of a HR manager.
2. This course enables the students to meet HR challenges in present scenario
3. It will facilitate them in employing, maintaining and promoting a motivated force in an organization.
4. Students will be aware about contemporary issues of human resource management.

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B. Tech. Semester – VII (Computer Science and Engineering)
ICT FOR DEVELOPMENT (OPEN ELECTIVE-II)
CODE: OE-CS-419

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course objectives:
With rising use of Information and Communication technologies available, there is a high potential for these technologies to address sustainability issues. The students must be equipped with the knowledge about their applications in the development field so as to enable them to provide ICT solutions to the target communities. The students will gain knowledge and skills on how ICTs can be best used to overcome sustainability challenges. In order to succeed in the practice of sustainable development, professionals must be trained in a basic set of competencies that integrate cross-disciplinary knowledge for practical problem solving with the use of information and communication technologies.

UNIT-1

Introduction
Introduction to ICTs for sustainable Development Introduction to Information and Communication Technology (ICT); Role of ICTs in Sustainable Development; Current Status of ICTs in Sustainable Development- Global and India Scenario. Potential of ICTs in various fields, impact of information Technologies on GDP growth

Building knowledge societies
The concept of Knowledge Society; identifying stakeholders and target communities; Understanding information needs, Traditional vs. contemporary knowledge systems, information processing and retrieval; Understanding means of communication in different areas, developing an effective communication strategy Case: Warna Unwired

UNIT-2

Information and communication technologies
The hardware and software, the physical infrastructure, satellite, wireless solutions, telecommunication technologies, mobiles, fixed line, internet and world wide web, community radio, technology-user interface, design of relevant ICT products and services.

ICT applications
Applications of ICT in education, Health (telehealth, telemedicine and health Informatics), Gender Equality, Agriculture (e Governance, telecentres, Mobiles for development, climate change and disaster management, ICT Networks for water management (This module will be dealt with the help of country case studies in all the sectors and inputs from ICT4D practitioners Case Studies: eCME, Apollo Telemedicine Network Foundation, Bhoomi, eSewa, Gyandoot, eAgriculture. M-PESA, CYCLETEL)

UNIT-3

ICT for development in India
Policy and Institutional Framework in India, e governance, ICT Models in health, education, agriculture, finance, gender equality, Mobiles for Development Experience sharing by ICT for Development practitioners Case Studies: Reuters Market Light, Iffco Kisaan Sanchar Ltd.

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UNIT-4

ICT 4D implementation

Developing an ICT4D Project, Critical Success factors for technology diffusion and use, Constraints in adoption, The role of national policies, Institutional Policy framework, Multistakeholder partnerships, Role of Private Sector Case Studies: echaupal , Lifelines India.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of the course:

1. Students will be familiarized with main theories and conceptual frameworks in the field of ICT for development
2. Students will learn potential of both information and communication technologies in different areas such as health, education, agriculture, finance, gender equality and climate change.
3. Students will be able to understand the existing innovative business models and other applications in the above mentioned areas with reference to India and other developing countries
4. Students will be able to compare and contrast various business models (public, private sector, PPP, civil society) with respect to technology, infrastructure, capacity building, human resource etc.
5. Students will be able to learn how ICT models can be successfully implemented at the field and understand critical success factors and constraints in adoption.

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B. Tech. Semester – VII (Computer Science and Engineering)

INTELLECTUAL PROPERTY RIGHTS (OPEN ELECTIVE-II)

CODE: OE-CS-421

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS:	20
EXTERNAL MARKS:	80
TOTAL :	100

Course Objectives:

1. To make the student aware about Intellectual Property and why it is important
2. To study the concept of Patents, history of patent and its categorization.
3. To learn the procedure of obtaining Patents.
4. To make the student learn Assignment and Revocation of Patent
5. To study the concept of infringement and its defence.

UNIT-1

Introduction to Intellectual Property

Concept of Intellectual Property, Kinds of Intellectual Property, Economic Importance of Intellectual Property, Indian Theory on Private Property: Constitutional Aspects of Property, Constitutional Protection of Property and Intellectual Property, Economic Development and Intellectual Property Rights Protection

UNIT-2

Introduction to Patents

Overview, Historical Development, Concepts: Novelty, Utility, Patentable Subject-matter: Patent Act, 1970- Amendments of 1999, 2000, 2002 and 2005, Pharmaceutical Products and Process and Patent , Protection, Software Patents, Business Method, Protection of Plant Varieties and Farmers' Rights Act, 2001, Patenting of Micro-organism

UNIT-3

Procedure of obtaining of Patents

Concepts of a Patent Application,, Specification: Provisional, Complete, Disclosure Aspects, Claims: Principal, Dependant, Omnibus, Examination of Application, Opposition of Application, Scaling of Patents

UNIT-4

Working of Patents – Compulsory License

Commercialization of Inventions: License- Terms of License Agreement, Assignments of Patents, Revocation of Patents

Infringement

What is Infringement?, How is Infringement determined? Who is an Infringer?, Direct, Contributory and Induced, Defences of Infringement: Research Exemption, Invalidity, Misuse, Failure to mark, Laches and Estoppel and first sale doctrine

TEXT/ REFERENCE BOOKS:

1. W.R. Cornish, Intellectual Property, Sweet & Maxwell, London (2000)
2. P. Narayana, Patent Law, Wadhwa Publication
3. Merges, Patent Law and Policy: Cases and Materials, 1996
4. Brian C. Reid, A Practical Guide to Patent Law, 2nd Edition, 1993
5. Brinkhof (Edited), Patent Cases, Wolters Kluwer.
6. Prof. Willem Hoyng & Frank Eijsvogels, Global Patent Litigation, Strategy and Practice, Wolters Kluwer.
7. Gregory Stobbs, Software Patents Worldwide, Wolters Kluwer.
8. Feroz Ali Khader, The Law of Patents- With a special focus on Pharmaceuticals in India, Lexis Nexis Butterworths Wadhwa, Nagpur.
9. Sookman, Computer Law, 1996
10. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009). Eastern Book Company, Lucknow

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of the course student will be able to:

1. Understand the concept of Intellectual Property and its importance.
2. Understand Patents, categorization and procedure for obtaining patents.
3. Understand the commercialization of invention
4. Understand the concept of infringement and its defence.

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B. Tech. Semester – VII (Computer Science and Engineering)

INTERNATIONAL BUISNESS ENVIRONMENT (OPEN ELECTIVE-II)

CODE: OE-CS-423

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS:	20
EXTERNAL MARKS:	80
TOTAL:	100

Course Objectives:

To provide knowledge about International Business Environment. To provide the framework on basis of which business can be run smoothly.

UNIT-1

International business environment; Concept of international business; domestic vs international business, stages of internationalization, tariff and non-tariff barriers,Risks involved in international business

UNIT-2

Theories of international trade: Adam Smith, Ricardo and Ohlin & Heckler theory, Leontif paradox, PLC

UNIT-3

International Monetary Systems: Historical background and structure. International Financialinstitutions: IMF, .World Bank, Euro Currency.International financial markets and instruments.

UNIT-4

Free trade zones.Bilateral and Multilateral Trade Laws – General Agreement on Trade and Tariffs. (GATT), World Trade Organization – IPR, TRIPS, TRIMS, GATS. Regional Economic Integrations: NAFTA, EU. Trade Blocks; ASEAN, SAAARC, BRICS

TEXT/RERERENCE BOOKS:

1. Lasserre, Philippe Global Strategic Management, Palgrave MacMillan.
2. John D Daniels, Lee H Radebaugh Daniel P Sullivan ,Prashant Salwan. International Business Environments and Operatipns, Pearson Education
3. Tamer Cavusgil, Gary Knight International Business: Strategy, Management and the New Realities, 1st Edition, Pearson Education.
4. K Aswathappa, International Business, Tata Mcgraw Hill.
5. Richard Hodgetts, Fred Luthans, Jonathan Doh. International Management: Culture, Strategy And Behaviour, Pearson Education.
6. Deresky, International Management: Managing across borders and culture. Pearson Education.
7. Nandi : "International Business Environment" McGraw Hill Education.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to

attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

1. The student will be aware of the international organizations in which India is a member or otherwise.
2. The students may take opportunity to take their business from domestic to international.
3. International organizations and their links to India will be understood by students in an easy manner.
4. The students will be aware business environment at international level

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B. Tech. Semester – VII (Computer Science and Engineering)

FINANCIAL MANAGEMENT (OPEN ELECTIVE-III)

CODE: OE-CS-425

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL : 100

Course Objectives:

To develop understanding among the students regarding nature of finance and its interaction with other Management functions and the objectives of Financial Management.

UNIT-1

Financial management-scope finance functions and its organisation, objectives of financial management; time value of money; sources of long term finance.

UNIT-2

Investment decisions importance, difficulties, determining cash flows, methods of capital budgeting with excel; risk analysis (risk adjusted discount rate method and certainty equivalent method); cost of different sources of raising capital; weighted average cost of capital.

UNIT-3

Capital structure decisions-financial and operating leverage; EBIT/EPS Analysis, capital structure theories- NI, NOI, traditional and M-M theories; determinants of dividend policy and dividend models -Walter, Gordon & M.M. models.

UNIT-4

Working Capital- meaning, need, determinants; estimation of working capital need; management of cash, inventory and receivables.

TEXT/RERERENCE BOOKS:

1. Pandey, I.M., "Financial Management", Vikas Publishing House, New Delhi
2. Khan M.Y, and Jain P.K., "Financial Management", Tata McGraw Hill, New Delhi
3. Keown, Arthur J., Martin, John D., Petty, J. William and Scott, David F, "Financial Management", Pearson Education
4. Chandra, Prasanna, "Financial Management", TMH, New Delhi
5. Van Horne, James C., "Financial Management and Policy", Prentice Hall of India
6. Brigham & Houston, "Fundamentals of Financial Management", Thomson Learning, Bombay.
7. Kishore, R., "Financial Management", Taxman's Publishing House, New Delhi

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

1. It creates understanding among the students regarding the key decisions like Investment, Financing and dividend Decisions of financial Management.
2. They are able to understand the usage and applications of leverages in financial decisions.
3. The students are able to use their best knowledge in finance towards the value creation for the organization.
4. The students will be made aware of working capital management concept.

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B. Tech. Semester – VII (Computer Science and Engineering)

E-COMMERCE AND ENTERPRNEURSHIP (OPEN ELECTIVE-III)

CODE: OE-CS-427

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS:	20
EXTERNAL MARKS:	80
TOTAL :	100

Course Objectives:

1. To understand the basic concept of electronic transactions, types of business models and about customer relationship management.
2. To study about various legal and ethical issues related to electronic transactions and also understating the concepts of IPR.
3. To understand the skills of Entrepreneurship, to identify the projects and the analysis and report making.

UNIT-1

Introduction To E-Commerce

Need, importance, Business models, revenue models and business processes, economic forces & e-commerce, identifying e-commerce opportunities, international nature of e-commerce, technology infrastructure-internet & WWW; Business strategies for ecommerce: Revenue models in transaction, revenue strategic issues, customer behavior and relationship intensity, advertising on the web, e-mail marketing, technology enabled CRM

UNIT-2

Business To Business Strategies

(Overview strategic methods for Developing E-Commerce) Purchasing, logistics and supply activities, electronic data interchange (EDI), electronic data interchange on the internet, supply chain management using internet technologies, electronic market place & portals (Home shopping, E-marketing, Tele marketing), auctions, online auctions, virtual communicative & web portals; legal, and ethical issues in e-commerce — use and protection of intellectual property in online business, online crime, terrorism & warfare, ethical issues.

UNIT-3

Entrepreneurship

Definition, Concept, Growth and role. The Entrepreneur: types, Characteristics, theories of Entrepreneurial class, Urges and importance of Entrepreneurship Stimulants; Seed-Beds of Entrepreneurship, Influencing Factors; Problems (Operational and Non-Operational) and Obstacles. Entrepreneurial Management. Role of socio-economic environment

UNIT-4

Skills for a New Class of Entrepreneurs, The Ideal Entrepreneurs, The Entrepreneurship Audit, Identification of opportunities by an Entrepreneur, The steps to identify the project /ventures, Process of converting business opportunities into reality. Feasibility Report and analysis, Process of setting up a

small scale industry / unit Promotion of a venture, External Environment Analysis: Economic, Social, Technological and competition, Legal Framework for establishing and fund raising Venture Capital: Sources and Documents required.

TEXT/REFERENCE BOOKS:

1. Gary P. Schneider, "Electronic Commerce", Seventh Edition, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. K.K.Bajaj, D. Nag "E-Commerce", 2nd Edition, McGraw Hill Education, New Delhi
3. P.T. Joseph, "E-Commerce An Indian Perspective", PHI Publication, NewDelhi.
4. Bhaskar Bharat, "Electronic Commerce-Technology and Application", McGraw Hill Education, New Delhi
5. Mary Sumner, "Enterprise Resource Planning", 2005, PHI Learning India Pvt. Ltd. / Pearson Education, Inc. New Delhi. 6. Chan, " E-Commerce fundamentals and Applications", Wiley India, New Delhi

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of course, students would be able to:

1. The students will be able to understand the basic concepts of electronic transactions.
2. Study of various types of business models and customer relationship management.
3. Students will be able to understand about various business strategies and marketing strategies.
4. Study of various legal and ethical issues related to electronic transactions.
5. Study of intellectual property rights and its importance.
6. Study of Entrepreneurship management
7. Study of analyzing the external environment, the competition and designing the framework for establishing a venture capital.
8. Study of business intelligence and knowledge management tools.

B. Tech. Semester – VII (Computer Science and Engineering)

BASIC OF OPERATION RESEARCH (OPEN ELECTIVE-III)

CODE: OE-CS-429

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. Understand what R is and what it can be used for
2. Why would you choose R over another tool
3. Troubleshoot software installs (keep your fingers crossed)
4. Gain familiarity with using R from within the RStudio IDE
5. Get to know the basic syntax of R functions
6. Be able to install and load a package into your R library

UNIT-1

Definition of operations research, models of operations research, scientific methodology of operations research, scope of operations research, importance of operations research in decision making, role of operations management, limitations of OR.

UNIT-2

Linear Programming: Introduction – Mathematical formulation of a problem – Graphical solutions, standard forms the simplex method for maximization and minimization problems. Method application to management decisions.

Transportation problem – Introduction – Initial basic feasible solution - NWC method – Least cost method – Vogel's method – MODI – moving towards optimality – solution procedure without degeneracy

UNIT-3

Sequencing and replacement model: Sequencing problem – processing through 2 machines, 3 machine s jobs and k machines and traveling salesman problem.

Replacement of items that deteriorate gradually – with time, without time, that fails completely – individual replacement – group replacement

UNIT-4

Network models and simulation: Network models for project analysis CPM; Network construction and time analysis: cost time trade off, PERT – problems

TEXT/REFERENCE BOOKS:

1. Jared P. Lander, R for Everyone: Advanced Analytics and Graphics, Pearson Edu. Inc.

2. Christian Heumann, Michael Schomaker and Shalabh, Introduction to Statistics and Data Analysis - With Exercises, Solutions and Applications in R , Springer, 2016

3. Pierre Lafaye de Micheaux, Rémy Drouilhet, Benoit Liquet, The R Software-

Fundamentals of Programming and Statistical Analysis, Springer 2013

4. By Alain F. Zuur, Elena N. Ieno, Erik H.W.G. Meesters, A Beginner's Guide to R (Use R) Springer 2009

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After completion of the course, students will be able to:

1. Familiarize themselves with R and the RStudio IDE
2. Understand and use R functions
3. Install and load a package into your R library
4. Get insight into the capabilities of the language as a productivity tool for data manipulation and statistical analyses.

Chairperson
Department of Computer Science & Engineering and Information Technology
DPS Mahila Vishwavidyalaya, Khanpur Kalan, Sonepat (HR.)

B. Tech. Semester – VII (Computer Science and Engineering)
RENEWABLE ENERGY SYSTEMS (OPEN ELECTIVE-III)
CODE: OE-CS-431

NO OF CREDITS: 3

L	T	P
3	0	0

INTERNAL MARKS:	20
EXTERNAL MARKS:	80
TOTAL :	100

Course Objectives:

1. To learn various renewable energy sources
2. To gain understanding of integrated operation of renewable energy sources
3. To understand Power Electronics Interface with the Grid

UNIT-1

Introduction, Distributed vs Central Station Generation Sources of Energy such as Micro-turbines Internal Combustion Engines.

UNIT-2

Introduction to Solar Energy, Wind Energy, Combined Heat and Power Hydro Energy, Tidal Energy, Wave Energy Geothermal Energy, Biomass and Fuel Cells.

UNIT-3

Power Electronic Interface with the Grid Impact of Distributed Generation on the Power System Power Quality Disturbances

UNIT-4

Transmission System Operation, Protection of Distributed Generators, Economics of Distributed Generation

TEXT/REFERENCE BOOKS:

1. Ranjan Rakesh, Kothari D.P, Singal K.C, "Renewable Energy Sources and Emerging Technologies", 2nd Ed. Prentice Hall of India ,2011
2. Math H. Bollen, Fainan Hassan, "Integration of Distributed Generation in the Power System", July 2011,Wiley –IEEE Press
3. Loi Lei Lai, Tze Fun Chan, "Distributed Generation: Induction and Permanent Magnet Generators", October 2007, Wiley-IEEE Press.
4. Roger A. Messenger, Jerry Ventre, "Photovoltaic System Engineering", 3rd Ed, 2010
5. James F. Manwell, Jon G.McGowan, Anthony L Rogers, "Wind energy explained: Theory Design and Application", John Wiley and Sons 2nd Ed, 2010

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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Course Outcomes:

After completion of the course, Students will be able to:

1. Gain knowledge about renewable energy
2. Understand the working of distributed generation system in autonomous/grid connected modes
3. Know the Impact of Distributed Generation on Power System

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B. Tech. Semester – VII (Computer Science and Engineering)

BIOINFORMATICS

CODE: BSC-401

NO OF CREDITS: 2

L T P

2 1 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL : 100

UNIT-1

Introduction to bioinformatics and data generation

What is bioinformatics and its relation with molecular biology. Examples of related tools(FASTA, BLAST, BLAT, RASMOL), databases(GENBANK, Pubmed, PDB) and software(RASMOL,Ligand Explorer).

Data generation; Generation of large scale molecular biology data. (Through Genome sequencing, Protein sequencing, Gel electrophoresis, NMR Spectroscopy, X-Ray Diffraction, and microarray). Applications of Bioinfonnatics.

UNIT-2

Biological Database and its Types

Introduction to data types and Source. Population and sample, Classification and Presentation of Data. Quality of data, private and public data sources. General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite, and Secondary). Specialized Genome databases: (SGD, TIGR, and ACeDB). Structure databases (CATH, SCOP, and PDBsum)

UNIT-3

Data storage and retrieval and Interoperability Flat files, relational, object oriented databases and controlled vocabularies. File Format (Genbank, DDBJ, FASTA, PDB, SwissProt).

Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search. The challenges of data exchange and integration. Ontologies, interchange languages and standardization efforts. General Introduction to XML, UMLS, CORBA, PYTHON and OMG/LIFESCIENCE.

UNIT-4

Sequence Alignments and Visualization

Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment (algorithm and example), Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm).

Methods for presenting large quantities of biological data: sequence viewers (Artemis, SeqVISTA), 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol), Anatomical visualization.

TEXT/REFERENCE BOOKS:

1. "Biology: A global approach" Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M.
2. L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
3. "Outlines of Biochemistry" , Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H.

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4. John Wiley and Sons
5. "Principles of Biochemistry(V Edition)". By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
6. "Molecular Genetics (Second edition)", Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
7. "Microbiology" , Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

After studying the course, the student will be able to:

1. Describe how biological observations of 18th Century that lead to major discoveries.
2. Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
3. Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
4. Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
5. Classify enzymes and distinguish between different mechanisms of enzyme action.
6. Identify DNA as a genetic material in the molecular basis of information transfer.
7. Analyse biological processes at the reductionistic level
8. Apply thermodynamic principles to biological systems.
9. Identify and classify microorganisms.

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B. Tech. Semester – VII (Computer Science and Engineering)
PROJECT-II
CODE: PROJ-CS-401-P

NO OF CREDITS: 2	**INTERNAL MARKS:**	**20**
L T P	**EXTERNAL MARKS:**	**80**
0 0 4	**TOTAL :**	**100**

Note: Students may choose a project based on any subject of Computer Science. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

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B. Tech. Semester – VII (Computer Science and Engineering)

SEMINAR

CODE: PROJ-CS-403-P

NO OF CREDITS: 1

L T P

0 0 2

INTERNAL MARKS: 50

EXTERNAL MARKS: 00

TOTAL : 50

The topic of the seminar will be based on emerging technology or any topic related to the field of Computer Science & Engineering. An assigned teacher will evaluate the performance of the students & marks will be awarded accordingly.

Chairperson
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Maharishi Vishwavidyalaya, Khanpur Kalan, Sonepal (HR.)

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B. Tech. Semester – VII (Computer Science and Engineering)

INDUSTRIAL PRACTICAL TRAINING- II

CODE: ITP-CS-405-P

NO OF CREDITS: 2

L T P

0 0 0

INTERNAL MARKS:	00
EXTERNAL MARKS:	100
TOTAL :	100

Industrial practical training conducted after sixth semester will be evaluated in the Seventh Semester based on Viva-Voce.

Department of Computer Science & Engineering & Information Technology

Course Curriculum & Scheme of Examinations

For

B.Tech Computer Science & Engineering

(w.e.f Academic Session 2024- 2025)

Semester - 8

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PEC	PEC	Elective-V	3	0	0	3	20	80	100
2.	OEC	OEC	Open Elective-IV	3	0	0	3	20	80	100
Lab										
3.	Project	PROJ-CS-402 – P	Project-III	0	0	12	5	40	160	200
4.	Project	PROJ-CS-404-P	Seminar	0	0	2	1	50	0	50
5.	MC (Non Credit)	GPP-CS-406-P	General Proficiency	0	0	0	0	0	100	100
		Total		**6**	**0**	**14**	**12**	**130**	**320**	**450**

Total Contact Hours =20 **Total Credit= 12**

Note: Minimum passing marks for any subject (paper) shall be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

2. General Fitness for Profession: A comprehensive viva-voce of the students will be taken by external examiner and Chairperson of the department (internal examiner) and Class Coordinator at the end of the semester. The evaluation of the student for General Fitness for the Profession will be carried out through viva-voce taken by the committee of examiners.

3. Project coordinator and other assisting co-coordinators will be assigned the load maximum of 02 Hours per week including their own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

S.No	Elective – V	Open Elective- IV
1.	PEC- CS-402 Block Chain	OE-CS-410 Economic policies in India
2.	PEC-CS-404 Deep Learning	OE-CS-412 Quality Engineering
3.	PEC-CS-406 Neural Networks	OE-CS-414 Optical Network Design
4.	PEC-CS-408 Software Testing and Quality Assurance	OE-CS-416 Embedded System

B. Tech. Semester – VIII (Computer Science and Engineering)

BLOCKCHAIN (ELECTIVE-V)

CODE: PEC-CS-402

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. To introduce basic concepts of Blockchain.
2. To understand abstract models for Blockchain technology
3. To learn about usage of Blockchain technology in financial services.
4. To visualize the scope of blockchain & its role in futuristic development.

UNIT- 1

Introduction to Blockchain:- Overview of blockchain, need for blockchain, history of centralized services, trusted third party, Distributed consensus in open environments, Distributed Vs Decentralized Network, 51 % attack theory, Public blockchains, Private blockchains, Blockchain Architecture and working, Mining, Limitations of blockchain, Applications of blockchain

UNIT- 2

Models for blockchain:- GARAY model, RLA Model, Proof of Work (PoW), HashcashPoW, PoW Attacks and the monopoly problem, Proof of Stake(PoS), hybrid models(PoW+PoS), Proof of Burn and Proof of Elapsed Time.

UNIT-3

Permissioned Blockchain:- Permissioned model and use cases, Design issues for Permissioned blockchains, State machine replication, Consensus models for permissioned blockchain. Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem. Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

UNIT- 4

Blockchain in Financial Service:- Digital Currency, Cross border payments, Stellar and Ripple protocols, Project Ubin, Know Your Customer (KYC), Privacy Consents, Mortgage over Blockchain, Blockchain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Insurance.

Blockchain Security: Security properties, Security considerations for Blockchain, Intel SGX, Identities and Policies, Membership and Access Control, Blockchain Crypto Service Providers, Privacy in a Blockchain System, Privacy through Fabric Channels, Smart Contract Confidentiality.

TEXT/REFERENCES BOOKS:

1. Blockchain: Blueprint for a New Economy, by Melanie Swan.
2. Blockchain: The blockchain for beginners guide to blockchain technology and leveraging blockchain programming, by Josh Thompsons
3. Blockchain Basics by Daniel Drescher, Apress

Department of Computer Science & Engineering and Information Technology
Guru Nanak Khalsa College, Karnal

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B. Tech. Semester – VIII (Computer Science and Engineering)

DEEP LEARNING (ELECTIVE-V)

CODE: PEC-CS-404

NO OF CREDITS: 3		INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
3 0 0		TOTAL :	100

UNIT-1

Mathematical Preliminaries Introduction to Linear Algebra; Principal Component Analysis; Probability and Statistics; Numerical Methods, Gradient and constraint-based optimization

UNIT-2

Machine Learning Basics Learning algorithms; Training, validation and test sets; neural networks, convolution and recurrent networks, back propagation; Performance metrics, hyper parameters and debugging strategies

UNIT-3

Introduction to Deep Networks Problems with back propagation and modern approaches; Auto encoders, representation learning; Regularization, dropout, optimization strategies

Sequence Learning and LSTMs Deep recurrent networks, bidirectional networks and encoder-decoder architectures; Introduction to LSTM, building an LSTM network

UNIT-4

Applications Deep convolution network for Telugu OCR and performance analysis; LSTM networks for text processing

GANs and Latest Advances Generative adversarial networks (GAN), building and training GANs; GAN variants and current results; limitations and weaknesses of deep learning

TEXT/REFERENCE BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville. Deep Learning, MIT Press, 2015.
2. Technical papers from time-to-time on different topics (some of these will be given at the beginning of the semester and others during the semester).

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

At the end of the course, students will develop understanding for:

1. Recognizing goals of Blockchain.
2. Smart Contracts, transactions in Blockchain and Permissioned Blockchain.
3. Analyzing usage of Blockchain in finance.
4. Security issues in Blockchain.

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B. Tech. Semester – VIII (Computer Science and Engineering)

NEURAL NETWORKS (ELECTIVE-V)

CODE: PEC-CS-406

NO OF CREDITS: 3	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:

1. To introduce neural networks concepts and associated techniques
2. To design appropriate neural network based technique for a given scenario.
3. To introduce the concept of associative memories and their capabilities in pattern completion and repair.
4. To introduce the unsupervised learning self organizing maps

UNIT-1

Introduction to neural networks

Artificial neurons, Neural networks and architectures, Feedforward and feedback architectures, Learning types-supervised, unsupervised and reinforced, learning mechanisms-Gradient Descent, Boltzmann, and Hebbian, Single Perceptron as classifier, Multi-layer perceptron model. .

UNIT-2

Recurrent networks

Attractor Neural Networks, Associative learning and Memory Model, Discrete Hopfield Network, Condition for Perfect Recall in Associative Memory, Bi-direction Associative memories (BAM)-Auto and Hetro-association, Boltzmann machine, Introduction to Adaptive Resonance Networks.

UNIT-3

Feed forward networks

Gradient Descent and Least Mean Squares Algorithm, Back Propagation Algorithms, Multi-Class Classification Using Multi-layered Perceptrons., Support Vector Machine (SVM), Radial Basis Function Networks: Cover's Theorem, Learning Mechanisms in RBF.

UNIT-4

Principal components and analysis

Introduction to PCA, Dimensionality reduction Using PCA, Hebbian-Based Principal Component Analysis, Introduction to Self Organizing Maps : Cooperative and Adaptive Processes in SOM, and Vector-Quantization Using SOM.

TEXT/REFERENCE BOOKS:

1. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999.
3. Satish Kumar, "Neural Networks: A Classroom Approach"

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4. Hertz J, Krogh A, R.G. Palmer, "Introduction to the Theory of Neural Computation", Addison-Wesley, California, 1991.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes

After successful completion of the course, the students will be able to:

1. Use neural networks concepts and associated techniques for solving classification and regression problems.
2. Design and Use neural networks for pattern recall, completion and repair.
3. Design and Use neural networks for self learning and unsupervised classifications.
4. Choose the appropriate classifier.

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B. Tech. Semester – VIII (Computer Science and Engineering)

SOFTWARE TESTING AND QUALITY ASSURANCE (ELECTIVE-V)

CODE: PEC-CS-408

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL : 100

Course Objective:

The purpose of this course is to presents the knowledge about Testing background such introduction of Bug , cause of Bug, how it effect on cost of project, role of STLC cycle realities of software testing. This subject also gives the knowledge software testing fundamentals, under the study of types of testing this subject enlighten the Configuration testing, Compatibility testing, Foreign language testing, Usability testing, Testing the documentation, Testing for software security, Web site testing and more. At the end this subject focuses on the test planning and quality assurance.

UNIT-1

Introduction to Software Testing

Introduction – s/w testing background - What is a bug? Why do bugs occur? The cost of bugs. Goals of a software tester. Characteristics of s/w tester. Software development process- product component, software project staff, software development lifecycle model. The realities of s/w testing – testing axioms, s/w testing terms and definitions, Software Testing Life Cycle(STLC).

Unit-2

S/w testing fundamentals

S/w testing fundamentals- Examining the specifications - Black box and white box testing, Static and dynamic testing, Static black box testing, Performing a high level review of the specification, low level specification test techniques. Testing the s/w with blinders on – Dynamic black box testing, Test to pass and test to fail, Equivalence partitioning, data testing, State testing, Other black box test techniques. Examining the code – Static white box testing, Formal review, Coding standards and guidelines, Generic code review checklist. Testing the software with X-ray glasses – Dynamic white box testing, Dynamic white box testing, verses debugging testing the pieces

UNIT-3

Types of testing

Configuration testing, Compatibility testing, Foreign language testing, Usability testing, Testing the documentation, Testing for software security.Web site testing, Automated testing and test tools-Benefits of automation and tools, various test tools, Software test automation, Random testing. Bug bashes and beta testing – Having other people test your s/w, Test sharing, Beta testing, Outsourcing your testing. Performance Testing – Introduction, Benefits of performance testing. Types of performance testing Tools for performance Testing, Process for performance testing, challenges.

UNIT-4

Test planning and quality assurance

Planning the test – Goal of test planning, Various test planning topics, Writing and tracking test cases- Goal of test case planning, Test case planning overview, Test case organization and tracking, Reporting what you find - Getting the bug fixed, Isolating and replacing bugs, Bug's lifecycle, Bug tracking system, Measuring the success, Software quality assurance- Quality is free, Testing and quality assurance in the work place, Test management and organizational structures, capability maturity model (CMM), ISO 9000 Test Metrics and Measurement – Test Defect Metrics.

TEXT/ REFERENCE BOOKS:

1. Ron Patton, "Software Testing" SAMS Publishing
2. Marnei L. Hutcheson – "Software Testing Fundamentals: Methods and Metrics" WILEY Pub.
3. Pressman "Software Engineering" McGraw-Hill publications.
4. Strinivasan Desikan and Gopal swami Ramesh,Software Testing – Principles and Practices, Pearsons.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes

After completion of course students will be able to

1. To discuss software testing background
2. To introduce software testing techniques
3. To explain different types of testing to understand realistic problem
4. To create awareness about the process part as per as software testing is concern

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B. Tech. Semester – VIII (Computer Science and Engineering)

ECONOMIC POLICIES IN INDIA (OPEN ELECTIVE-IV)

CODE: OE-CS-410

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:

The candidates at the post-graduate level are expected to analyze various issues pertaining to India's economic development. The performance of the economy is to be assessed on the backdrop of various Five Year Plans implemented in the economy. Wherever possible, critical appraisal is expected by taking cognizance of the contemporary developments in the economy.

UNIT-1

Framework of Indian Economy

National Income: Trends and Structure of National Income, Demographic Features and Indicators of Economic Growth and Development Rural-Urban Migration and issues related to Urbanization, Poverty debate and Inequality, Nature, Policy and Implications, Unemployment-Nature, Central and State Government's policies, policy implications, Employment trends in Organized and Unorganized Sector

UNIT-2

Development Strategies In India

Agricultural- Pricing, Marketing and Financing of Primary Sector, Economic Reforms- Rationale of Economic Reforms, Liberalization, Privatization and Globalization of the Economy, Changing structure of India's Foreign Trade, Role of Public Sector- Redefining the role of Public Sector, Government Policy towards Public Sector, problems associated with Privatization, issues regarding Deregulation- Disinvestment and future of Economic Reforms

UNIT-3

The Economic Policy And Infrastructure Development

Energy and Transport, Social Infrastructure- Education, Health and Gender related issues, Social Inclusion, Issues and policies in Financing Infrastructure Development, Indian Financial System-issues of Financial Inclusion, Financial Sector Reforms-review of Monetary Policy of R.B.I. Capital Market in India.

UNIT-4

The Economic Policy And Industrial Sector

Industrial Sector in Pre-reforms period, Growth and Pattern of Industrialization, Industrial Sector in Post-reform period- growth and pattern of Micro, Small, Medium Enterprises s, problems of India's Industrial Exports, Labour Market- issues in Labour Market Reforms and approaches to Employment Generation Basic.

TEXT/REFERENCE BOOKS

1. Brahmananda, P.R. and V.A. Panchmukhi.[2001]. Ed. 'Development Experience in Indian Economy, Inter-state Perspective,' Bookwell, New Delhi.
2. Gupta,S.P.[1989].'Planning and Development in India: A Critique,' Allied Publishers Private Limited, New Delhi.
3. Bhagwati, Jagdish.[2004].'In Defense of Globalization,' Oxford University
4. Dhingra, Ishwar C.[2006].'Indian Economy,' Sultan Chand and Sons, New Delhi.
5. Datt, Ruddar and Sundaram, K.P.M.[Latest edition] ,'Indian Economy,' S. Chand and Co, New Delhi.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

B. Tech. Semester – VIII (Computer Science and Engineering)

QUALITY ENGINEERING (OPEN ELECTIVE-IV)

CODE: OE-CS-412

NO OF CREDITS: 3

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL: 100

UNIT -1

Basic Concept Quality Costs: Fitness for Use, Quality Characteristics, and Parameters of Fitness for use, Definition of quality and its meaning and importance in industry, Control and Quality control, Quality Tasks, Quality functions, The system Concept, Quality systems, quality assurance and ISO 9000 quality system standards, Quality costs concept, Quality cost categories, Examples of Quality cost studies, Securing the Cost figures, Pareto Analysis, Cost reduction Programs and economics of quality.

UNIT-2

Control charts: Statistical Tools in Quality control, The concept of variation, Tabular Summarization of Data, Frequency distribution, Graphical Summarization of Data: The Histogram, Quantitative methods of summarizing data: Numerical Indices, Probability distributions : General, The normal Probability distribution, The normal curve and Histogram Analysis, The causes of variation, statistical aspect of control charting, concept of rational sub-grouping and detecting patterns on the control charts, for variables and attributes: X and R, X and S, p, np, c and u charts; specification and tolerances, natural tolerance limits, specification limits, process capability ratio analysis and narrow limit gauging

UNIT-3

Basic statistical concepts: Descriptions of Binomial, Poisson and Normal distribution with practical examples basics of sampling distribution. Acceptance Sampling: Principle of acceptance sampling, Acceptance sampling by attributes: single multiple and sequential sampling plans, lot quality protection and average outgoing quality protection, Acceptance sampling by variables sampling plans of process parameters,

UNIT-4

Total quality Management: Basic concepts of TQM, historical review, leadership, concepts, role of senior management, quality statements, plans for process parameters, Modern Quality Management Techniques: TQM tools: Benchmarking, QFD, Taguchi quality loss function TPM, FMEA. Lean Manufacturing continuous improvement techniques, JIT systems, pareto diagrams, cause and effect diagrams, scatter diagram, run charts, affinity diagrams, inter-relationship diagram, process decision program charts

TEXT/ REFERENCE BOOKS:

1. Quality planning and Analysis, Juran and Gryna, TMH, New Delhi
2. Quality Management, Kanishka Bed, Oxford University Press, New Delhi
3. Introduction to SQC, Montgomery DC, 3e, Wiley, New Delhi

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4. Fundamentals of quality control and improvement, A Mitra, Mcmillan pub. Company, NY
5. Fundamentals of Applied Statistics, Gupta and Kapoor, Sultan Chand and Sons, New Delhi.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

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B. Tech. Semester – VIII (Computer Science and Engineering)
OPTICAL NETWORK DESIGN (OPEN ELECTIVE-IV)
CODE: OE-CS-414

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objectives:

1. To make students familiar with SONET and SDH Architecture and add Drop Multiplexer.
2. To make students aware of wavelength division multiplexing techniques.
3. To introduce T-Carrier multiplexed hierarchy.
4. To introduce features of SONET and SDH.
4. To study about LDP protocol in detail

UNIT-1

Introduction To Optical Networking

Introduction SONET/SDH and dense wavelength-division multiplexing (DWDM) , Add/drop multiplexers (ADMs), DWDM, CWDM, Time-Division Multiplexing, Synchronous TDMs, Statistical TDMs, Circuit Switched Networks, T-Carrier multiplexed Hierarchy, DS framing, DS multiframing formats, D4 Superframe, D5 extended superframe, E-Carrier multiplexed Hierarchy, TDM network elements, and Ethernet switching.

Sonet Architectures

SONET integration of TDM signals, SONET electrical and optical signals, SONET Layers, SONET framing, SONET transport overhead, SONET alarms, multiplexing, virtual tributaries, SONET network elements, SONET topologies, SONET protection mechanisms, APS, two-fiber UPSR, DRI, and two-fiber and four-fiber BLSR rings. SPR,RPR

UNIT-2

SDH Architectures

SDH integration of TDM signals, SDH electrical and optical signals, SDH Layers, SDH framing, SDH higher layer graming, SDH transport overhead, SDH alarms, multiplexing, virtual containers, SDH network elements, SDH topologies, SDH protection mechanisms, APS, 1+1 protection, 1:1protection, 1:N protection, Unidirection v/s bidirectionsl rings, Path and multiplex section switching, Subetwork Connection protection rings, DRI, and two-fiber and four-fiber Multiplex section-shared protection rings,

UNIT-3

Wavelength-Division Multiplexing

Wavelength-division multiplexing principles, coarse wavelength-division multiplexing, dense wavelength-division multiplexing, WDM systems, WDM characteristics, impairments to transmission, and dispersion and compensation in WDM systems. Optical link design, factors affecting system design, point-to-point link based on Q-factor and OSNR, OSNR calculations for fiber amplifiers.

-4/3

UNIT-4

LABEL DISTRIBUTION PROTOCOLS

The Label Distribution Protocol (LDP), Label Spaces, LDP Sessions, and Hello Adjacencies , The LDP PDU Format, The LDP Message Format, The LDP Messages, The Multi-Protocol Label Switching (MPLS) Architecture, Label Allocation Schemes, The Next Hop Label Forwarding Entry (NHLFE), Explicit Routing, An Example of the Use of the Label Stack, Schemes for Setting up an LSP

TEXT/REFERENCE BOOKS

1. "Optical Network Design and Implementation (Networking Technology)", by Vivek Alwayn, Cisco press
2. "Handbook of Fiber Optic Data Communication", Third Edition: A Practical Guide to Optical Networking by Casimer De Cusatis

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

Upon successful completion of the course, the student will be able to understand

1. SONET and SDH Architecture.
2. Wavelength and time division multiplexing techniques.
3. SONET and SDH frames and their architectures
4. LDP protocol in detail

-4/4

B. Tech. Semester – VIII (Computer Science and Engineering)
EMBEDDED SYSTEM (OPEN ELECTIVE-IV)
CODE: OE-CS-416

NO OF CREDITS: 3
L T P
3 0 0

INTERNAL MARKS: 20
EXTERNAL MARKS: 80
TOTAL : 100

Course Objective:
An embedded system is a self-contained unit that have a dedicated purpose within a device. We come across a variety of applications of embedded systems in navigation tools, telecom applications, and networking equipment to name just a few. An Embedded System's Architecture begins with a view of embedded development and how it differs from the other systems. Students learn about setting up a development environment and then move on to the core system architectural concepts, exploring pragmatic designs, boot-up mechanisms, and memory management. They are also explored to programming interface and device drivers to establish communication via TCP/IP and take measures to increase the security of IoT solutions.

UNIT- 1

Embedded Systems: A Pragmatic Approach-Domain definitions, Embedded Linux systems, Low-end 8-bit microcontrollers, Hardware architecture, Understanding the challenge, Multithreading, RAM, Flash memory, Interfaces and peripherals, Asynchronous UART-based serial communication:-SPI -I2C -USB, Connected systems, The reference platform, ARM reference design, The Cortex-M microprocessor

Work Environment and Workflow Optimization: Workflow overview, C compiler, Linker, Build automation, Debugger, Embedded workflow, The GCC toolchain, The cross-compiler, Compiling the compiler, Linking the executable, Binary format conversion, Interacting with the target, The GDB session, Validation, Functional tests, Hardware tools, Testing off-target, Emulators.

UNIT- 2

Architectural Patterns: Configuration management, Revision control, Tracking activities, Code reviews, Continuous integration, Source code organization, Hardware abstraction, Middleware Application code, The life cycle of an embedded project, Defining project steps, Prototyping Refactoring, API and documentation,

The Boot-Up Procedure: The interrupt vector table, Startup code, Reset handler, Allocating the stack, Fault handlers, Memory layout, Building and running the boot code, The makefile, Running the application, Multiple boot stages, Bootloader, Building the image, Debugging a multi-stage system, Shared libraries

UNIT-3

Distributed Systems and IoT Architecture: Network interfaces, Media Access Control, Ethernet, Wi-Fi, Low-Rate Wireless Personal Area Networks (LR-WPAN), LR-WPAN industrial link-layer extensions, 6LoWPAN, Bluetooth, Mobile networks, Low-power Wide Area Networks (LPWANs), Selecting the appropriate network interfaces, The Internet Protocols, TCP/IP implementations, Network device drivers, Running the TCP/IP stack, Socket communication, Mesh networks and dynamic

routing, Transport Layer Security, Securing socket communication, Application protocols, Message protocols, REST architectural pattern, Distributed systems; single points of failure, Summary

UNIT- 4

Low-Power Optimizations: System configuration, Hardware design, Clock management, Voltage control, Low-power operating modes, Deep-sleep configuration, Stop mode, Standby mode, Wake-up intervals, Measuring power, Development boards, Designing low-power embedded applications, Replacing busy loops with sleep mode, Deep sleep during longer inactivity periods, Choosing the clock speed, Power state transitions

Embedded Operating Systems: Real-time application platforms, FreeRTOS, ChibiOS, Low-power IoT systems, Contiki OS, Riot OS, POSIX-compliant systems, NuttX, Frosted, The future of safe embedded systems, Process isolation; Tock, Summary.

TEXT AND REFERENCE BOOKS:

1. Daniele Lacamera, Embedded Systems Architecture, Packt Publishing, May 2018, ISBN: 9781788832502.
2. Raj Kamal, Embedded Systems, TMH, 2004.
3. M.A. Mazidi and J. G. Mazidi, The 8051 Microcontroller and Embedded Systems, PHI, 2004.
4. David E. Simon, An Embedded Software Primer, Pearson Education, 1999.
5. K.J. Ayala, , The 8051 Microcontroller, Penram International, 1991.
6. Rajiv Kapadia, 8051 Microcontroller & Embedded Systems, Jaico Press, 2004.
7. Prasad, Embedded Real Time System, Wiley Dreamtech, 2004.
8. John B. Peatman, Design with PIC Microcontrollers, Pearson Education Asia, 2002.
9. Wayne Wolf, Computers as components: Principles of Embedded Computing System Design, Morgan Kaufman Publication, 2000.
10. Tim Wilmshurst, The Design of Small-Scale embedded systems, Palgrave, 2003.
11. Marwedel, Peter, Embedded System Design, Kluwer Publishers, 2004.

Note: Nine questions will be set in all by the examiners taking two questions from each unit and one question containing short answer type questions from entire syllabus. Students will be required to attempt five questions, selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

Course Outcomes:

By the end of the course students will be able to:

1. State the concepts related to embedded system design.
2. Discuss the principles of embedded systems and their applications
3. Apply the principles of embedded design for problem solving.
4. Analyze architectural design patterns and engineering tradeoffs.
5. Design architectural patterns for connected and distributed devices in the IoT

B. Tech. Semester – VIII (Computer Science and Engineering)
PROJECT-III
CODE: PROJ-CS-402-P

NO OF CREDITS: 5

L	T	P
0	0	12

INTERNAL MARKS:	**40**
EXTERNAL MARKS:	**160**
TOTAL :	**200**

Note: Students may choose a project based on any subject of Computer Science. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

B. Tech. Semester – VIII (Computer Science and Engineering)
SEMINAR
CODE: PROJ-CS-404-P

NO OF CREDITS: 1
L T P
0 0 2

INTERNAL MARKS:	**50**
EXTERNAL MARKS:	**00**
TOTAL :	**50**

The topic of the seminar will be based on emerging technology or any topic related to the field of Computer Science & Engineering. An assigned teacher will evaluate the performance of the students & marks will be awarded accordingly.

B. Tech. Semester – VIII (Computer Science and Engineering)

GENERAL PROFICIENCY

CODE: GPP-CS-406-P

NO OF CREDITS: 0

L	T	P
0	0	0

INTERNAL MARKS:	00
EXTERNAL MARKS:	100
TOTAL :	100

General Fitness for Profession: A comprehensive viva-voce of the students will be taken by external examiner and Chairperson of the department (internal examiner) and Class Coordinator at the end of the semester. The evaluation of the student for General Fitness for the Profession will be carried out through viva-voce taken by the committee of examiners