SCHEME

(Choice Based Credit Scheme)

For

BACHELOR OF TECHNOLOGY PROGRAMME

In

INFORMATION AND TECHNOLOGY

(w.e.f Session 2018-2019)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING & INFORMATION TECHNOLOGY

BPSMV, 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	29
4	Professional core courses	49
5	Professional Elective courses relevant to chosen specialization/branch	18
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	16
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	Non-credit
9	Total *Minor variation is allowed as per need of the respective disciplines.	160

SEMESTER WISE SUMMARY OF THE PROGRAMME

Sr.No.	Semester	No. of Contact Hours	Marks	Credits
1	I	22	500	17.5
2	II	27	650	20.5
3	III	31	700	23
4	IV	31	700	22
5	V	28	850	24
6	VI	29	650	21
7	VII	25	750	20
8	VIII	20	450	12
Total			**5200**	**160**

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CREDIT DISTRIBUTION IN THE FIRST YEAR OF UNDERGRADUATE ENGINEERING PROGRAM

	Lecture (L)	Tutorial (T)	Laboratory/Practical(P)	Total credits(C)
Chemistry -I	3	1	3	5.5
Physics	3	1	3	5.5
Maths-1	3	1	0	4
Maths -2	3	1	0	4
Programming for Problem solving	3	0	4	5
English	2	0	2	3
Engineering Graphics & Design	1	0	4	3
Workshop/Practicals	1	0	4	3
Basic Electrical Engg.	3	1	2	5
*Biology	2	1	0	2
*Engg. Mechanics	3	1	0	4
*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

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- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT

Sr. 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]

Sr.No	Code No.	Course	Hours Per Week			Total Credits	Semester
			L	T	P		
1	BSC-101	Physics(Semi Conductor Physics)	3	1	3	5.5	1
2	BSC-104	Mathematics –II (Probability & Statistics)	3	1	0	4	2
3	BSC-103	Mathematics –I (Calculus & Linear Algebra)	3	1	0	4	1
4	BSC-102	Chemistry-I	3	1	3	5.5	2
5	BSC-401	Biology	2	1	0	2	7
6	BSC-201	Mathematics –III (Differential Calculus)	3	0	0	3	3
		Total Credits				24	

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ENGINEERING SCIENCE COURSE [ESC]

Sr. 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-201	Analog Electronic Circuits	3	0	4	5	3
6	ESC-203	Digital Electronics	3	0	4	5	3
7	ESC-303	Digital System Design	3	0	0	3	5
Total Credits						29	

PROFESSIONAL CORE COURSES [PCC]

Sr.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-P	IT Workshop-(Sci-lab/MATLAB)	0	0	4	2	3
3	PCC-CS 202	Discrete Mathematics	3	1	0	4	4
4	PCC-CS 204	Computer Organization & Architecture	3	0	4	5	4
5	PCC-CS 206	Operating System	3	0	4	5	4
6	PCC-CS 208	Design & Analysis of Algorithms	3	0	4	5	4
7	PCC-CS 301	Database Management System	3	0	4	5	5
8	PEC-CS- 308	Software Engineering	3	0	0	3	5
9	PCC-CS 305	Object Oriented Programming	3	0	4	5	5
10	PCC-IT 302	Intelligent Systems	3	0	4	5	6
11	PCC-CS 304	Computer Networks	3	0	4	5	6
Total Credits						49	

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PROFESSIONAL ELECTIVE COURSES [PEC]

Sr.No.	Code No.	Course Title	Hours Per Week			Total Credits	Semester
			L	T	P		
1	PEC	Elective-I	3	0	0	3	5
2	PEC	Elective-II	3	0	0	3	6
3	PEC	Elective-III	3	0	0	3	6
4	PEC	Elective-IV	3	0	0	3	7
5	PEC	Elective-V	3	0	0	3	7
6	PEC	Elective-VI	3	0	0	3	8
Total Credits						18	

OPEN ELECTIVE COURSES [OEC]

Sr. 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

Sr. No	Code No.	Course Title	Hours Per Week			Total Credits	Semester
			L	T	P		
1	PROJ-IT-300-P	Project I	0	0	6	2	6
2	PROJ-IT-401-P	Project II	0	0	8	3	7
3	PROJ-IT-402-P	Project III	0	0	12	5	8
4	PROJ-IT-403-P	Seminar	0	0	2	1	7
5	PROJ-IT-404-P	Seminar	0	0	2	1	8
6	IPT-301-P	Industrial Practical Training-I	0	0	0	2	5
7	IPT-405-P	Industrial Training – II	0	0	0	2	7
Total Credits						16	

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For

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Semester -1

Sr. 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	3	1.5	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	9	17.5	100	400	500

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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Semester -2

Sr. 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	3	1.5	10	40	50
		Total		12	2	13	20.5	120	480	600

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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Semester -3

Sr. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	ESC	ESC-201	Analog Electronic Circuits	3	0	0	3	20	80	100
2.	PCC	PCC-CS-201	Data Structure & Algorithms	3	0	0	3	20	80	100
3.	PCC	ESC-203	Digital Electronics	3	0	0	3	20	80	100
4.	BSC	BSC-201	Mathematics- III (Calculus and Ordinary Differential Equations)	3	0	0	3	20	80	100
5.	HSMC	HSMC-201	Humanities –I (Effective Technical Communication)	3	0	0	3	20	80	100
Lab										
5.	PCC	PCC-CS-203-P	IT Workshop Scilab /MATLAB	0	0	4	2	10	40	50
6.	ESC	ESC-201-P	Analog Electronic Circuits LAB	0	0	4	2	10	40	50
7.	PCC	ESC-203- P	Digital Electronics LAB	0	0	4	2	10	40	50
8.	PCC	PCC-CS-201 –P	Data Structure & Algorithms LAB	0	0	4	2	10	40	50
			Total	**15**	**0**	**16**	**23**	**140**	**560**	**700**

Total Contact Hours =31 **Total Credit= 23**

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

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Semester -4

Sr. 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.	ESC	PCC-CS-204	Computer Organization & Architecture	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.	HSMC	HSMC-202	Management – I (Organizational Behavior)	3	0	0	3	20	80	100
6.	MC	MC -202	Environmental Sciences	3	0	0	0	10	40	50
Lab										
5.	ESC	PCC-CS-204-P	Computer Organization & Architecture LAB	0	0	4	2	10	40	50
6.	PCC	PCC-CS-206-P	Operating System LAB	0	0	4	2	10	40	50
7.	PCC	PCC-CS-208-P	Design & Analysis of Algorithms LAB	0	0	4	2	10	40	50
Total				**18**	**1**	**12**	**22**	**140**	**560**	**700**

Total Contact Hours =31 **Total Credit= 22**

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) shell 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

Sr. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	ESC	ESC-303	Digital System Design	3	0	0	3	20	80	100
2.	PCC	PCC-CS-301	Database Management Systems	3	0	0	3	20	80	100
3.	PCC	PEC-CS-308	Software Engineering	3	0	0	3	20	80	100
4.	PCC	PCC-CS-305	Object Oriented Programming	3	0	0	3	20	80	100
5.	HSMC	HSMC-301	Humanities- II (Economics for Engineers)	3	0	0	3	20	80	100
6.	PEC	PEC	Elective -I	3	0	0	3	20	80	100
7.	MC	MC -301	Constitution of India/Essence of Indian Traditional Knowledge	2	0	0	0	10	40	50
Lab										
8.	PCC	PCC-CS-301-P	Database Management Systems LAB	0	0	4	2	10	40	50
9.	PCC	PCC-CS-305- P	Object Oriented Programming LAB	0	0	4	2	10	40	50
10.	Project	IPT-301-P	Industrial Practical Training- I	0	0	0	2	-	100	100
Total				20	0	8	24	150	700	850

Total Contact Hours =28 **Total Credit= 24**

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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) shell be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

Elective –I

1. PEC- CS-307 Graph Theory
2. PEC-CS-309 Advanced Computer Architecture
3. PEC-CS-311 Machine Learning
4. PEC-CS-313 Digital Signal Processing

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Semester -6

Sr. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PCC	PCC-IT-302	Intelligent Systems	3	0	0	3	20	80	100
2.	PCC	PCC-CS-304	Computer Network	3	0	0	3	20	80	100
3.	PEC	PEC	Elective-II	3	0	0	3	20	80	100
4.	PEC	PEC	Elective-III	3	0	0	3	20	80	100
5.	OEC	OEC	Open Elective-I	3	0	0	3	20	80	100
Lab										
7.	Project	PROJ-IT-300-P	Project-I	0	0	6	2	10	40	50
8.	PCC	PCC-IT-302-P	Intelligent Systems Lab	0	0	4	2	10	40	50
9.	PCC	PCC-CS-304-P	Computer Networking Lab.	0	0	4	2	10	40	50
Total				15	0	14	21	130	520	650

Total Contact Hours =29 Total Credit= 21

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) shell be 40% in the external examination and 40% in the aggregate of internal and external examinations of the subject.

Sr.No	Elective – II	Elective –III	Open Elective- I
1.	PEC- CS-306 Advanced Algorithms	PEC- CS-314 Parallel and Distributed Algorithms	OE-CS-322 Soft Skills & Interpersonal Communication
2.	PCC-CS-303 Formal Language & Automata Theory	PEC-CS-316 Embedded Systems	OE-CS-324 Cyber Law and Ethics
3.	PEC-CS-310 Data Mining	PEC-CS-318 Soft Computing	OE-CS-326 Data Analytics using Python
4.	PEC-CS-312 Cloud Computing	PEC-CS-320 Computer Graphics	OE-CS-328 Electronic Devices

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Semester -7

Sr. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PEC	PEC	Elective-IV	3	0	0	3	20	80	100
2.	PEC	PEC	Elective-V	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	Biology	2	1	0	2	20	80	100
Lab										
6.	Project	PROJ-IT-401-P	Project-II	0	0	8	3	20	80	100
7.	Project	PROJ-IT-403-P	Seminar	0	0	2	1	50	-	50
8.	Project	ITP-405-P	Industrial Practical Training- II	0	0	0	2	-	100	100
Total				14	1	10	20	170	580	750

Total Contact Hours =25 **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.

Sr.No	Elective – IV	Elective –V	Open Elective- II	Open Elective - III
1.	PEC- CS-401 Queuing Theory and Modeling	PEC- CS-409 Game Theory	OE-CS-417 Human Resource Management	OE-CS-425 Financial Management
2.	PEC-CS-403 Advanced Operating Systems	PEC-CS-411 Ad-Hoc and Sensor Networks	OE-CS-419 ICT for Development	OE-CS-427 E-Commerce & Entrepreneurship
3.	PEC-CS-405 Speech and Natural Language Processing	PEC-CS-413 Information Retrieval	OE-CS-421 Intellectual Property Rights	OE-CS-429 R Programming
4.	PEC-CS-407 Optimization Techniques	PEC-CS-415 Web and Internet Technology	OE-CS-423 International Business Environment	OE-CS-431 Renewable Energy System

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Semester -8

Sr. No.	Category	Course Code	Course Title	Hours per week			Credits	Marks		Total
				L	T	P		Internal Marks	External Marks	
Theory										
1.	PEC	PEC	Elective-VI	3	0	0	3	20	80	100
2.	OEC	OEC	Open Elective-IV	3	0	0	3	20	80	100
Lab										
3.	Project	PROJ-IT-402 -P	Project-III	0	0	12	5	40	160	200
4.	Project	PROJ-IT-404-P	Seminar`	0	0	2	1	50	-	50
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.

Sr. No	Elective – VI	Open Elective- IV
1.	PEC- CS-402 Information Theory and Coding	OE-CS-410 Economic policies in India
2.	PEC-CS-404 Internet of Things	OE-CS-412 Quality Engineering
3.	PEC-CS-406 Neural Networks and Deep Learning	OE-CS-414 Optical Network Design
4.	PEC-CS-408 Cryptography and Network Security	OE-CS-416 High Speed network

Semester-I

CODE: BSC - 101

Semi Conductor Physics

CREDITS: 4

B.TECH. Ist SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 1 0	TOTAL:	100

Prerequisite: "Introduction to Quantum Mechanics" Desirable

UNIT- 1

Module 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.

Module 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- 2

Module 3: Light-semiconductor interaction (6)

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

UNIT- 3

Module 4: Measurements (6)

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, DLTS, band gap by UV-Vis spectroscopy,absorption transmission.

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UNIT- 4

Module 5: Engineered semiconductor materials (6)

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

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).

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

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.

CODE: BSC -103

Mathematics- I :Calculus and Linear Algebra

CREDITS: 4

B.TECH. 1ST SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 1 0	TOTAL :	100

UNIT- 1

Module 1: Calculus: (6 lectures)

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.

Module 2: Calculus: (6 lectures)

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

Module 3: Matrices (in case vector spaces is to be taught) (8 lectures)

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

Module 4: Vector spaces (Prerequisite Module 3-Matrices) (10 hours)

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

Module 5: Vector spaces (Prerequisite Module 3 –Matrices & Module-4 Vector spaces) (10 lectures)

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.

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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, 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

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:

- 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.
- 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.

CODE: ESC- 101

Basic Electrical Engineering

CREDITS: 4

B.TECH. 1st SEMESTER		INTERNAL MARKS:	20
L	T P	EXTERNAL MARKS:	80
3	1 0	TOTAL:	100

UNIT- 1

Module 1: DC Circuits (8 hours)

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation.Superposition, Thevenin and Norton Theorems.Time-domain analysis of first-order RL and RC circuits.

Module 2: AC Circuits (8 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, Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT- 2

Module 3: Transformers (6 hours)

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.Auto-transformer and three-phase transformer connections.

UNIT- 3

Module 4: Electrical Machines (8 hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic, Loss components and efficiency, starting and speed control of induction motor, Single-phase induction motor, Construction, working, torque-speed characteristic and speed control of separately excited dc motor, Construction and working of synchronous generators.

UNIT- 4

Module 5: Power Converters (6 hours)

DC-DC buck and boost converters, duty ratio control, Single-phase and three-phase voltage source inverters: sinusoidal modulation.

Module 6: Electrical Installations (6 hours)

Components of L.T Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Types of Batteries, Important Characteristics for Batteries, Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Text / Reference Books

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

(ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

(iii) L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

(iv) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

(v) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Course Outcomes

- To understand and analyze basic electric and magnetic circuits
- To study the working principles of electrical machines and power converters.
- To introduce the components of low voltage electrical installations

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.

CODE: BSC- 101- P

Physics Lab

CREDITS: 1.5

B.TECH. 1st SEMESTER	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 3	TOTAL:	50

List of Experiments

1. To find the capacitance of unknown capacitor using flashing and quenching of Argon bulb.
2. To study the photoconducting 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

1009

CODE: ESC -101- P

Basic Electrical Engineering Lab

CREDITS: 1

B.TECH. 1st SEMESTER		INTERNAL MARKS:	10
L	T P	EXTERNAL MARKS:	40
0	0 2	TOTAL:	50

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (nonsinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at supersynchronous speed.

- Demonstration of cut-out sections of machines: dc machine (commutator-brush

- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
- Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of L.T switchgear.

Laboratory Outcomes

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.
- Get an exposure to the working of power electronic converters.

CODE: ESC- 102- P

Engineering Graphics & Design (Theory & Lab)

CREDITS: 3

B.TECH. 1st SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
1 0 4	TOTAL:	100

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

Traditional Engineering Graphics:

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:

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 covering, 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 covering, those 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, 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 covering, 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 functionscovering 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 toleranceing: 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:

(i) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014). Engineering Drawing, Charotar Publishing House

(ii) Shah, M.B. &Rana B.C. (2008). Engineering Drawing and Computer Graphics, Pearson Education

(iii) Agrawal B. &Agrawal C. M. (2012). Engineering Graphics, TMH Publication

(iv) Narayana, K.L. & P Kannaiah (2008). Text book on Engineering Drawing, Scitech Publishers

(v) (Corresponding set of) CAD Software Theory and User Manuals

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.

This course is designed to:

- To prepare you 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

- To prepare you to communicate effectively
- To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

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

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.

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 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 IIITDMJ, 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 labour 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 everyday for the 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 IIITDMJ 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.

3 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.

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 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.

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 Indue- tion 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 competition 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.

Semester-2

CODE: BSC-102

Chemistry- I

CREDITS: 4

B.TECH. 2nd SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 1 0	TOTAL:	100

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

UNIT- 1

Module 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

Module 2:Spectroscopic techniques and applications (8 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.

Module 3: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 H_3, H_2F and HCN and trajectories on these surfaces.

UNIT- 3

Module 4: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.

Module 5:Periodic properties (4 Lectures)

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

Module 6: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

Module 7: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

(i) University chemistry, by B. H. Mahan

(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

(iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell

(iv)Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S Krishnan

(v) Physical Chemistry, by P. W. Atkins (vi) Organic Chemistry: Structure and Function by K. P. C. Vollhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometerlevels, one has to base the description of all chemical processes at molecular levels. 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.
- List major chemical reactions that are used in the synthesis of molecules.

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.

CODE: BSC- 104

Mathematics-II :Probability and Statistics

CREDITS: 4

B.TECH. 2nd SEMESTER	INTERNAL MARKS 20
L T P	EXTERNAL MARKS: 80
3 1 0	TOTAL : 100

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

UNIT- 1

Module 1: Basic Probability: (12 lectures)

Probability spaces, conditional probability, independence: Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables: Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

UNIT- 2

Module 2: Continuous Probability Distributions: (4 lectures)

Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities.

Module 3: Bivariate Distributions: (4 lectures)

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT- 3

Module 4: Basic Statistics: (8 lectures)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression Rank correlation.

Module 5: Applied Statistics: (4 lectures)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

UNIT- 4

1025

Applied Statistics: (4 lectures): Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Module 6: Small samples: (4 lectures)

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Suggested Text/Reference Books

(i) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(ii) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).

(iii) S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

(iv) W. Feller, An Introduction to Probability Theory and its Applications, Vol. I, 3rd Ed., Wiley, 1968.

(v) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

(vi) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

(vii) Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

Course Outcomes

The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

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.

CODE: ESC - 103

Programming for problem solving

CREDITS: 3

B.TECH. 2nd SEMESTER		INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
3 0 0		TOTAL :	100

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

UNIT- 1

Introduction to Programming (4 lectures)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (1 lecture). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (1 lecture) From algorithms to programs: source code, variables (with data types) variables and memory locations. Syntax and Logical Errors in compilation, object and executable code- (2 lectures)

Arithmetic expressions and precedence (2 lectures)

UNIT- 2

Conditional Branching and Loops (6 lectures) Writing and evaluation of conditionals and consequent branching (3 lectures) Iteration and loops (3 lectures)

Arrays (6 lectures) Arrays (1-D, 2-D), Character arrays and Strings

Basic Algorithms (6 lectures) Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT- 3

Function (5 lectures)

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Recursion (4 -5 lectures) Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT- 4

Structure (4 lectures) Structures, Defining structures and Array of Structures

Pointers (2 lectures) Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Course Outcomes

The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- 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.

CODE: HSMC -101

English

CREDITS: 2

B.TECH. 2nd SEMESTER		INTERNAL MARKS:	20
L	T P	EXTERNAL MARKS:	80
2	0 0	TOTAL:	100

UNIT- 1

Module 1: Vocabulary Building

1.1 The concept of Word Formation 1.2 Root words from foreign languages and their use in English 1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. 1.4 Synonyms, antonyms, and standard abbreviations.

Module2: Basic Writing Skills

2.1 Sentence Structures 2.2 Use of phrases and clauses in sentences 2.3 Importance of proper punctuation 2.4 Creating coherence 2.5 Organizing principles of paragraphs in documents 2.6 Techniques for writing precisely

UNIT- 2

Module 3: Identifying Common Errors in Writing

3.1 Subject-verb agreement 3.2 Noun-pronoun agreement 3.3 Misplaced modifiers 3.4 Articles 3.5 Prepositions 3.6 Redundancies 3.7 Clichés

UNIT- 3

Module 4: Nature and Style of sensible Writing

4.1 Describing 4.2 Defining 4.3 Classifying 4.4 Providing examples or evidence 4.5 Writing introduction and conclusion

UNIT- 4

Module 5: Writing Practices

5.1 Comprehension 5.2 Précis Writing 5.3 Essay Writing

Module 6: Oral Communication

(This unit involves 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

Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995.

(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007

(iii)On Writing Well. William Zinsser. Harper Resource Book. 2001

(iv)Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

(vi)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.

CODE: HSMC -101-P

English Language Lab

CREDITS: 1

B.TECH. 2nd SEMESTER		INTERNAL MARKS:	10
L	T P	PRACTICAL EXAM:	40
0	0 2	TOTAL:	50

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

CODE: ESC -104-P

Workshop / Manufacturing Practices

CREDITS: 3

B.TECH. 2nd SEMESTER		INTERNAL MARKS:	20
L	T P	EXTERNAL MARKS:	80
1	0 4	TOTAL :	100

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:

(i) 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.

(ii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.

(iii)Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology I" Pearson Education, 2008.

(iv)Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

(v) 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.

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

CODE: ESC -103-P

Programming for problem solving Lab

CREDITS: 2

B.TECH. 2nd SEMESTER		INTERNAL MARKS:	10
L T P		PRACTICAL EXAM:	40
0 0 4		TOTAL :	50

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

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

CODE: BSC -102 –P

Chemistry Lab

CREDITS: 1.5

B.TECH. 2nd SEMESTER		INTERNAL MARKS:	10
L	T P	EXTERNAL MARKS	40
0	0 3	TOTAL :	50

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:

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

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

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Semester-3

CODE: ESC-201

ANALOG ELECTRONIC CIRCUITS

CREDITS: 3

B.TECH. 3rd SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

UNIT-1

Diode Circuits

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clipping circuits.

BJT Circuits

Structure and I-V characteristics of a BJT; BJT as a switch, BJT as an amplifier; small-signal model, biasing circuits, current mirror; common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

UNIT-2

MOSFET Circuits

MOSFET structure and I-V characteristics.MOSFET as a switch, MOSFET as an amplifier; small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, transconductance, high frequency equivalent circuit.

UNIT-3

Differential, multi-stage and operational amplifiers

Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)

UNIT-4

Linear applications of op-amp

Idealized analysis of op-amp circuits, Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift), Analog to Digital Conversion.

Nonlinear applications of op-amp

Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators, Precision rectifier, peak detector,Monoshot.

Course Outcomes:

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

1. Understand the characteristics of transistors.
2. Design and analyse various rectifier and amplifier circuits.
3. Design sinusoidal and non-sinusoidal oscillators.
4. Understand the functioning of OP-AMP and design OP-AMP based circuits.

References

1. A. S. Sedra and K. C. Smith, "Microelectronic Circuits", New York, Oxford University Press, 1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, "Introduction to Operational Amplifier theory and applications", McGraw Hill I S., 1992.
3. J. Millman and A. Grabel, "Microelectronics", McGraw Hill Education, 1988.
4. P. Horowitz and W. Hill, "The Art of Electronics", Cambridge University Press, 1989.
5. P. R. Gray, R. G. Meyer and S. Lewis, "Analysis and Design of Analog Integrated Circuits", John Wiley & Sons, 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.

CODE: PCC-CS-201

DATA STRUCTURES & ALGORITHMS

CREDITS: 3

B.TECH. 3rd SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Fundamentals of Computer and Programming in C

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, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.

UNIT-2

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-3

Linked lists

Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.

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

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.

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.

References

1. A. M. Tenenbaum. Langsam. Moshe J. Augentem . "*Data Structures using C*." PHI Pub.
2. A. K. Sharma. "*Data Structures using C*" Pearson Pub
3. A.V. Aho. J.E. Hoperoft and T.D. Ullman. "*Data Structures and Algorithms*" Original edition. Addison-Wesley. 1999. Low Priced Edition.
4. Ellis Horowitz &SartajSahni. "*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.

CODE: ESC-203

DIGITAL ELECTRONICS

CREDITS: 3

B.TECH. 3rd SEMESTER		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 IC's, digital logic families, TTL, Schottky 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, elementary ALU design, popular MSI chips, 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, special counter IC's, asynchronous sequential counters, 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 IC's, 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

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).

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.

References

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.

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CODE: BSC-201

MATHEMATICS- III

CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS

NO OF CREDITS: 3

B.TECH 3rd SEMESTER		INTERNAL MARKS:	20
L	T P	EXTERNAL MARKS:	80
3	0 0	TOTAL :	100

Pre-requisites: Calculus, Multivariable Calculus (Differentiation)

UNIT-1

SEQUENCES AND SERIES

Convergence of sequence and series, tests for convergence, power series, Taylor's series, Series for 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.

REFERENCES

1. G.B. Thomas and R.L. Finney, "*Calculus and Analytic geometry*", 9th Edition, Pearson, Reprint, 2002.
2. 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.
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.

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.

References

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey, New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 031240684 3)
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. Nebec, 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.

CODE: PCC-CS-203-P

IT WORKSHOP- MATLAB

CREDITS: 2

B.TECH. 3rd SEMESTER	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 4	TOTAL :	50

Pre-requisites: There are no formal prerequisites for this course.

Course Objectives:

The course is intended to assist undergraduates in learning the basics of programming in general and programming MATLAB in particular. Basics of programming in MATLAB will be covered, with the goal of having students become comfortable enough to continue learning MATLAB and other programming languages on their own.

UNIT-1

Introduction

Data types and variables: Introduction to MATLAB, Data Types, Inter-conversion of Data types, MATLAB Variables, Keywords and Constant, Session Command. *MATLAB Operators and Operations:* Operators (Arithmetic, Relational, Logical, Bitwise), Set Operations, Operator Precedence, Mathematical Functions.

UNIT-2

Programming in MATLAB

Script and Function: Decision Making, Loops, branches, Functions, Working on Script File (Creating, Saving and Executing), MATLAB I/O, Formatted I/O Method..

UNIT-3

Arrays and Graphics

Matrices and Arrays: Introduction to Matrices, Operations on Arrays Matrices, Manipulations of Arrays Matrices, Expansion of Matrix Size, Reduction of Matrices Arrays order.

Graphics: Introduction to plot, Basic 2-D Plots(Style options, Labels, Axis control, etc.), specialized 2-D Plots, drawing multiple plots, Using MATLAB for fractals and chaos and Conway game of life

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UNIT-4

File Handling and Debugging

File Handling: Introduction to file handling, working on files, accessing of Text File, Saving/ Loading MATLAB Variables, reading data without opening file, reading and writing Excel.

Debugging: Introduction to debugging, Break points, debugger, stepping, watching variable values, debugging commands.

Course Outcomes:

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

1. Use MATLAB for programming purposes
2. Learn and explore MATLAB further on their own
3. Use this learning experience to learn other programming languages.

References:

1. Delores M. Etter, David C. Kuncicky, Holly Moore, "*Introduction to MATLAB 7.0*", Pearson, 2013.
2. RudraPratap, "*Getting Started with MATLAB*", OXFORD University Press, 2010.
3. Agam Kumar Tyagi, "*MATLAB and Simulink for Engineers*", University Press, 2012.

WEB REFERENCES

https://ocw.mit.edu/courses/mathematics/18-s997-introduction-to-matlab- programming-fall-2011/syllabus/

CODE: PCC-CS-201-P

DATA STRUCTURE & ALGORITHMS LAB

NO OF CREDITS: 2

B.TECH 3rd SEMESTER

L T P

0 0 4

INTERNAL MARKS: 10

EXTERNAL MARKS: 40

TOTAL : 50

Pre-requisites: Programming in C

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

19	list 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
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.

CODE: ESC-201-P

ANALOG ELECTRONIC CIRCUITS LAB

NO OF CREDITS: 2

B.TECH 3rd SEMESTER	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.

CODE: ESC-203-P

DIGITAL ELECTRONICS LAB

NO OF CREDITS: 2

B.TECH 3rd SEMESTER	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.

1052

Semester--4

CODE: PCC-CS-202

DISCRETE MATHEMATICS

NO OF CREDITS: 4

B.TECH 4th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 1 0	TOTAL:	100

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.
2. Construct correct direct and indirect proofs.
3. Use division into cases in a proof.
4. Use counterexamples.
5. 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

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.

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.

References:

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. TataMegraw-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.

CODE: PCC-CS-204

COMPUTER ORGANIZATION AND ARCHITECTURE

NO OF CREDITS: 3

B.TECH 4th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Digital Electronics

Course Objectives: To expose the students to the following:

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).

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.

References:

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.

CODE: PCC-CS-206

OPERATING SYSTEMS

NO OF CREDITS: 3

B.TECH 4[III] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL:	100

Pre-requisites: Fundamentals of Computers. Computer Organization & Architecture

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 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

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.

REFERENCES:

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.

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CODE: PCC-CS-208

DESIGN AND ANALYSIS OF ALGORITHMS

NO OF CREDITS: 3

B.TECH 4[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	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

Course Outcomes:

1. For a given algorithms 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. For a given model engineering problem model it using graph and write the corresponding algorithm to solve the problems.
6. Explain the ways to analyze randomized algorithms (expected running time, probability of error).
7. Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS and FPTAS).

References

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.

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.

CODE: HSMC-202

MANAGEMENT –I (ORGANIZATIONAL BEHAVIOUR)

NO OF CREDITS: 3

B.TECH 4[TH] SEMESTER

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 behavioural 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

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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REFERENCES:

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.
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.

CODE: MC-202

ENVIRONMENTAL SCIENCES

NO OF CREDITS: 0

B.TECH 4TH SEMESTER

L T P

3 0 0

INTERNAL MARKS: 10

EXTERNAL MARKS: 40

TOTAL: 50

Pre-requisites: None

Course Objectives:

The prime objective of the course is to provide the students a detailed knowledge on the threats and challenges to the environment due to developmental activities. The students will be able to identify the natural resources and suitable methods for their conservation and sustainable development. The focus will be on awareness of the students about the importance of ecosystem and biodiversity for maintaining ecological balance. The students will learn about various attributes of pollution management and waste management practices. The course will also describe the social issues both rural and urban environment and environmental legislation

UNIT-1

The Multidisciplinary Nature of Environmental Studies

Definition, scope and importance. Need for public awareness.

Natural Resources: Renewable and Non-Renewable Resources

Natural resources and associated problems:

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

UNIT-2

Ecosystems

Concept of an ecosystem.Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological succession.Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity and its Conservation

Introduction – Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels.India as a mega-diversity nation.Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: insitu and ex-situ conservation of biodiversity

UNIT-3

Environmental Pollution Definition

Causes, effects and control measures of: Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards .Solid waste Management: Causes, effects and control measures of urban andindustrial wastes. Role of an individual in prevention of pollution.Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

Social Issues and the Environment

From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns.Case studies.

Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.Wasteland reclamation.Consumerism and waste products.Environment Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and Control of Pollution) Act Wildlife Protection Act.Forest Conservation Act. Issues involved in enforcement of environmental legislation Public awareness.

UNIT-4

Human Population and the Environment

Population growth, variation among nations.Population explosion Family Welfare Programme.Environment and human health.Human Rights.Value Education.HIV/AIDS.Women and Child Welfare.Role of Information Technology in Environment and human health.Case Studies.

Field Work

Visit to a local area to document environmental assets-river / forest / grassland / hill / mountain. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural. Study of common plants, insects, birds. Study of simple ecosystems – pond, river, hill slopes, etc.

Course Outcomes:

RERERENCES

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela 2008 PHI Learning Pvt Ltd.
3. Environmental Science by Daniel B. Botkin& Edwards A. Keller, Wiley INDIA edition.
4. Fundamentals of Ecology by Odum, E.P., Barrick, M. and Barret, G.W. Thomson Brooks/Cole Publisher, California, 2005.

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.

1066

CODE: PCC-CS-204-P

COMPUTER ORGANIZATION & ARCHITECTURE LAB

NO OF CREDITS: 2

B.TECH 4[TH] SEMESTER	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 4	TOTAL:	50

Pre-requisites: Computer Organization & Architecture

LAB Objectives:

1. The student will learn about the basic of assembly language.
2. The student will learn about the basic of microprocessor architecture.
3. Able to understand the microprocessor kit components.

List of Experiments:

1. Write an Assembly Language Program to add two 8-bit numbers such that sum is also of 8-bits using 8085 kit.
2. Write an ALP to subtract two 8-bit numbers and store the result in 2503h memory location using 8085 kit.
3. Write an ALP to add two 8-bit numbers such that sum is 16-bits using 8085 kit.
4. Write an ALP to add 16-bit numbers and sum is 16-bits
5. Write a program to sort given `n` numbers in ascending order
6. Write an assembly language program to arrange the given list in descending order using 8085 kit.
7. Write an ALP to find out largest numbers from a data array using 8085 kit.
8. Write an assembly language program to find the square of a given number
9. Write an ALP to calculate the factorial of given number using Turbo Assembler.
10. Write an ALP to calculate the sum of series of ten numbers using TASM.
11. Write an ALP to print the alphabets (i.e a-z) using TASM.
12. Write an ALP to print the reverse of a string using TASM
13. Write an ALP for the concatenation of two strings using TASM

Course Outcomes:

1. The student will be able to write assembly language program using TASM.
2. The student will be able to understand the microprocessor architecture.
3. Able to write program on 8085 and 8086 the microprocessor kit.

1617

CODE: PCC-CS-206-P

OPERATING SYSTEM LAB

NO OF CREDITS: 2

B.TECH 4[TH] SEMESTER	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.

CODE: PCC-CS-208-P

DESIGN AND ANALYSIS OF ALGORITHMS LAB

NO OF CREDITS: 2

B.TECH 4TH SEMESTER	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.

Semester-5

CODE: ESC-303

Digital System Design

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course objectives

1. Consolidation of the design methodologies for combinational and sequential digital systems.
2. To attain knowledge and use of hardware description languages for simulation
3. To Implement of digital systems on reconfigurable programmable logic devices (CPLDs and FPGAs).
4. To study of different memory structures and technologies Detailed contents:

UNIT- 1

LOGIC SIMPLIFICATION AND COMBINATIONAL LOGIC DESIGN: Review of Boolean Algebra and De Morgan's Theorem. SOP & POS forms. Canonical forms. Karnaugh maps up to 6 variables. Binary codes. Code Conversion.

COMBINATIONAL CIRCUITS: Comparators. Multiplexers. Encoder. Decoder. Driver & Multiplexed Display. Half and Full Adders. Subtractors. Serial and Parallel Adders. BCD Adder. Barrel shifter and ALU

UNIT -2

SEQUENTIAL LOGIC DESIGN: Building blocks like S-R. JK and Master-Slave JK FF. Edge triggered FF. Ripple and Synchronous counters. Shift registers. Finite state machines. Design of synchronous FSM.Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator. PseudoRandom Binary Sequence generator. Clock generation

UNIT-3

LOGIC FAMILIES AND SEMICONDUCTOR MEMORIES: TTL NAND gate. Specifications. Noise margin. Propagation delay. fan-in. fan-out. Tristate TTL. ECL. CMOS families and their interfacing. Memory elements. Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

UNIT-4

VLSI DESIGN FLOW: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits. Course outcomes: At the end of this course students will demonstrate the ability to a. Design and analyze combinational logic circuits b. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder c. Design & analyze synchronous sequential logic circuits d. Use HDL & appropriate EDA tools for digital logic design and simulation

TEXT/REFERENCE

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009. Douglas Perry, "VHDL", Tata Mc Graw Hill, 4th edition, 2002.

2. W.H. Gothmann, "Digital Electronics- An introduction to Theory and Practice", PHI, 2 nd edition ,2006.

3. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989

4. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

CODE: PCC-CS-301

DATABASE MANAGEMENT SYSTEMS

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Pre-requisites: Operating Systems

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.
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

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

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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.

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

Course Outcomes

1. For a given query write relational algebra expressions for that query and optimize the developed expressions
2. For a given specification of the requirement design the databases using ER method and normalization.
3. For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.
4. For a given query optimize its execution using Query optimization algorithms
5. For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.
6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling

REFERENCES:

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.

CODE: PEC-CS-308

SOFTWARE ENGINEERING

NO OF CREDITS: 3

B.TECH 6th SEMESTER	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, behavioral).
4. Making the students understand to develop quality software, its maintenance & introduce about software reliability.

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

SOFTWARE 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

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

Course Objectives:

The student will be able to

1. Implement Software life cycle models and have a knowledge of different phases of Software life cycle
2. Identify. formulate. review. estimate and schedule complex software projects using principles of mathematics.
3. Create a bug free software with good design and quality by using appropriate techniques and modern engineering and IT tools.
4. Analyze verification. validation activities. static. dynamic testing. debugging tools and techniques and importance of working in teams.

REFERENCES:

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.

CODE: PCC-CS-305

OBJECT ORIENTED PROGRAMMING

NO OF CREDITS: 3

B.TECH 5th SEMESTER

L T P

3 0 0

INTERNAL MARKS: 20

EXTERNAL MARKS: 80

TOTAL : 100

Pre-requisites: Data Structure & Algorithms

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, 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, Behavioural 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.

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.

REFERENCES

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.

CODE: HSMC -301

HUMANITIES- II

(ECONOMICS FOR ENGINEERS)

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	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

REFERENCES:
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
8. Gupta Shashi K., Management Accounting, Kalyani 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.

ELECTIVE-I

CODE: PEC-CS-307

GRAPH THEORY

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS :	80
3 0 0	TOTAL :	100

Pre-requisites: Basic math and basic programming (functions. loops. recursion).

Course Objectives:

1. To introduce different types of graphs and their applications.
2. To enable the students to find different types of paths and circuits in the graph.
3. To understand about trees and fundamental circuits.
4. To understand about different representations of graphs.
5. To enable the students to solve different types of problems related to graphs.

UNIT-1

MODULE-1: INTRODUCTION TO GRAPHS

Definition of a graph and directed graph. simple graph. Degree of a vertex. regular graph. bipartite graphs. subgraphs. complete graph. complement of a graph. operations of graphs. isomorphism and homomorphism between two graphs. directed graphs and relations.

MODULE-2:PATHS AND CIRCUITS

Walks. paths and circuits. connectedness of a graph. Disconnected graphs and their components. Konigsberg 7-bridge problem. Around the world problem. Euler graphs. Hamiltonian paths and circuits. Existence theorem for Eulerian and Hamiltonian graphs.

UNIT-2

MODULE-3:TREES AND FUNDAMENTAL CIRCUITS

Trees and their properties. distance and centre in a tree and in a graph. rooted and binary trees. spanning trees and forest. fundamental circuits. cut sets. connectivity and separability.1-isomorphism. 2-isomorphism. breadth first and depth first search.

UNIT-3

MODULE-4:MATRIX REPRESENTATION OF GRAPHS

Incidence matrix and its sub matrices. Reduced incidence matrix. circuit matrix. fundamental circuit matrix. cut set matrix. fundamental cut set matrix. path matrix. adjacency matrix of a graph and of digraph.

MODULE-5:PLANAR AND DUAL GRAPH

Planar graphs. Euler's formula. Kuratowski's graphs. detections of planarity. geometric dual. combinatorial dual.

Coloring of planar graphs: Chromatic number. independent set of vertices. maximal independent set. chromatic partitioning. dominating set. minimal dominating set. chromatic polynomial. coloring and four colour problem. coverings. matchings in a graph.

UNIT-4

MODULE-6: GRAPH ALGORITHMS

Network flows. Ford-Fulkerson algorithm for maximum flow. Dijkstra algorithm for shortest path between two vertices. Kruskal's and Prim's algorithms for minimum spanning tree.

Course Outcomes:

After successful completion of course students will be able to:

1. Understand different types of graphs and their applications.
2. Find different types of paths and circuits in the graph.
3. Solve problems related to trees and fundamental circuits.
4. Represent the graphs in different ways.
5. Solve different types of problems related to graphs such as graph coloring, maximum flow and other related problems.

REFERENCES

1. DeoNarsingh. Graph Theory with Applications to engineering and computer science. Prentice Hall of India. 1992.
2. Clark John and Holton D.A.. A first Look At Graph Theory. Allied Publishers Ltd.. New Delhi.1995.
3. Aldous and Wilson. Graphs and Applications: An Introductory Approach. Springer.2000.
4. Mott J.L.. Kandel A and Baker T.P.. . Discrete Mathematics for Computer Scientists and Mathematicians. Prentice Hall of India.2001.
6. ReinhardDiestel. Graph Theory. Springer International Edition..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.

ELECTIVE-I

CODE: PEC-CS-309

ADVANCED COMPUTER ARCHITECTURE

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Computer Organization and Architecture

Course Objectives:

1. To learn the basic aspects of computer architecture. microprogramming and data representations in different IEEE format.
2. Architectures exploiting instruction-level parallelism (ILP). data-level parallelism (DLP). thread-level and task-level parallelisms are treated. Furthermore new code generation techniques needed for exploiting ILP will be treated.
3. To understand the memory hierarchy. crosscutting issues in memory hierarchy design. the caches and concept of virtual memory.
4. The student is exposed to the major differences of RISC and CISC architecture and learn the various techniques to improve performance in shared memory multiprocessors.

UNIT-1

INTRODUCTION

Some definition and terms. interpretation and microprogramming. Basic data types. Instructions set (L/S. R/M. R+M architecture). instructions (Classes. mnemonics. conventions). Computer Architectural Classification schemes. Flynn's Classification. System attributes to performance.

UNIT-2

PROGRAM AND NETWORK PROPERTIES

Conditions of parallelism. Data and resource Dependences. Hardware and software parallelism. Program partitioning and scheduling. Grain Size and latency. Program flow mechanisms. Control flow versus data flow. Data flow Architecture. Demand driven mechanisms. Comparisons of flow mechanisms.

Introduction to Data level-parallelism- SIMD and Vector. Introduction to Thread- level parallelism- Symmetric and shared memory architectures. Symbolic processors.

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UNIT-3

CACHE MEMORY NOTION

Basic Notion. Cache Organization (direct. associative. set-associative and sectored). Write policies and Strategies for replacement. Introduction to different types of caches- Split I and D-Caches. on chip caches and Two level Caches.

UNIT-4

MEMORY SYSTEM DESIGN

The physical memory: memory module. error detection and correction. memory buffer. partitioning the address space. models of simple memory processor interaction (Hellerman's. Strecker's. Rau's) memory hierarchy Technology: inclusion. coherence and locality: Interleaved memory organization Virtual memory technology: models. TLB. paging and segmentation. memory replacement policies.

Course Outcomes

By the end of the course. a student should be able to:

1. Discuss the organization of computer-based systems and the advanced concepts of computer architecture. The student will be able to expose the major differences of RISC and CISC architecture. Also analyze the L/S. R/M and R+M architectures
2. Evaluate performance of different architectures with respect to various parameters and how a range of design choices are influenced by applications
3. Understand and identify cache and memory related issues in parallel computer systems. including multiprocessor systems.
4. Incorporate parallelism in systems to improve their performance.

REFERENCES:

1. Advance computer architecture by Kai Hwang . TMH. ed 2001.
2. Pipelined and Parallel processor design by Michael J. Flynn – 1995. Narosa.
3. Computer Architecture A Quantitative Approach. John L Hennessey and David A Patterson. Morgan Kaufmann/ Elsevier. Fifth Edition. 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 to attempt five questions. selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

ELECTIVE-I

CODE: PEC-CS-311

MACHINE LEARNING

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Internet and web Technology, Computer Networks

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 analyse 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.

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 analyse various machine learning approaches and paradigms.

REFERENCES:

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

ELECTIVE-I

CODE: PEC-CS-313

DIGITAL SIGNAL PROCESSING

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

UNIT-1

DISCRETE-TIME SIGNALS AND SYSTEMS

Discrete time signals and systems: Sequences: representation of signals on orthogonal basis: Representation of discrete systems using difference equations. Samplingand reconstruction of signals - aliasing: Sampling theorem and Nyquist rate.

UNIT-2

Z-TRANSFORM

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

UNIT-3

DISCRETE FOURIER TRANSFORM

Frequency Domain Analysis. Discrete Fourier Transform (DFT). Properties of DFT. Connvolution of signals. Fast Fourier Transform Algorithm. Parseval's Identity. Implementation of Discrete Time Systems.

UNIT-4

DESIGNOF DIGITAL FILTERS

Design of FIR Digital filters: Window method. Park-McClellan's method. Design of IIR Digital Filters: Butterworth. Chebyshev and Elliptic Approximations: Low-pass. Band-pass. Bandstop and High-pass filters. Effect of finite register length in FIR filter design: Parametric and non-parametric spectral estimation: Introduction to multi-rate signal processing.

Applications of digital signal processing

Correlation Functions and Power Spectra. Stationary Processes. Optimal filtering using ARMA Model. Linear Mean-Square Estimation. Wiener Filter.

Course Outcomes:

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

1. Represent signals mathematically in continuous and discrete-time, and in the frequency domain.
2. Analyse discrete-time systems using z-transform.
3. Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms.
4. Design digital filters for various applications.
5. Apply digital signal processing for the analysis of real-life signals.

REFERENCES:

1. S. K. Mitra, "Digital Signal Processing: A computer based approach", McGraw Hill, 2011.
2. A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
3. J. G. Proakis and D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms And Applications", Prentice Hall, 1997.
4. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall, 1992.
5. J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.
6. D. J. DeFatta, J. G. Lucas andW. S. Hodgkiss, "Digital Signal Processing", John Wiley & Sons, 1988.

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.

CODE: MC-301

CONSTITUTION OF INDIA/ ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

NO OF CREDITS: 0

B.TECH 5th SEMESTER	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
2 0 0	TOTAL :	50

CONSTITUTION OF INDIA - BASIC FEATURES AND FUNDAMENTAL PRINCIPLES

The Constitution of India is the supreme law of India. Parliament of India can not 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 structure‖ 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 —Constitutionalism‖ – a modern and progressive concept historically developed by the thinkers of —liberalism‖ – 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 —constitutionalism‖ 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 —diversity‖. 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 —static‖ 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 world‖.

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.

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

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CODE: PCC-CS-301- P

DATABASE MANAGEMENT SYSTEM LAB

NO OF CREDITS: 2

B.TECH 5th SEMESTER	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 4	TOTAL :	50

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

CODE: PCC-CS-305-P

OBJECT ORIENTED PROGRAMMING LAB

NO OF CREDITS: 2

B.TECH 5th SEMESTER	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 4	TOTAL :	50

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

CODE: IPT-301-P

INDUSTRIAL PRACTICAL TRAINING- I

NO OF CREDITS: 2

B.TECH 5th SEMESTER	INTERNAL MARKS:	--
L T P	EXTERNAL MARKS:	100
0 0 0	TOTAL :	100

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

1092

Semester -6

CODE: PCC-IT-302

INTELLIGENT SYSTEMS

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Data Structures and Data Management or Data Structures

Course Objectives

1. The aim of the course is to introduce to the field of Artificial Intelligence (AI) with emphasis on its use to solve real world problems for which solutions are difficult to express using the traditional algorithmic approach.
2. It explores the essential theory behind methodologies for developing systems that demonstrate intelligent behaviour including dealing with uncertainty, learning from experience and following problem solving strategies found in nature.

Unit-1

Biological foundations to intelligent systems I: Artificial neural networks, Back propagation networks, Radial basis function networks, and recurrent networks Biological foundations to intelligent systems II: Fuzzy logic, knowledge Representation and inference mechanism, genetic algorithm, and fuzzy neural networks.

Unit -2

Search Methods Basic concepts of graph and tree search. Three simple search methods: breadth first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill climbing search. Optimization and search such as stochastic annealing and genetic algorithm.

Unit -3

Knowledge representation and logical inference Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components. Ideas of Blackboard architectures.

Unit -4

Reasoning under uncertainty and Learning Techniques on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning. A

study of different learning and evolutionary algorithms, such as statistical learning and induction learning.

Course Outcomes:

a. Able to Demonstrate knowledge of the fundamental principles of intelligent systems
b. Able to analyse and compare the relative merits of a variety of AI problem solving techniques.

REFERENCES

1. Luger G.F. and Stubblefield W.A. (2008) "*Artificial Intelligence: Structures and strategies for Complex Problem Solving*". Addison Wesley, 6th edition.
2. Russell S. and Norvig P. (2009) "*Artificial Intelligence: A Modern Approach*". Prentice- Hall, 3rd edition.

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.

CODE: PCC-CS-304

COMPUTER NETWORKS

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Computer Organization & Architecture, Operating Systems

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

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.

REFERENCES:

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.
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.

ELECTIVE –II

CODE: PEC-CS-306

ADVANCED ALGORITHMS

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Analysis & Design of Algorithms

Course Objectives: To make students able to solve various problems of computer science using algorithms of this course

UNIT-1

Sorting: Review of various sorting algorithms, topological sorting

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

UNIT-2

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT-3

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring, Fast Fourier Transform algorithm, Schonhage-Strassen Integer Multiplication algorithm

UNIT-4

Linear Programming: Geometry of the feasibility region and Simplex algorithm

NP-completeness: Examples, proof of NP-hardness and NP-completeness.

One or more of the following topics based on time and interest

Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm

Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.

REFERENCES:

1. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman.
3. "Algorithm Design" by Kleinberg and Tardos.

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.

CODE: PCC-CS-303

FORMAL LANGUAGE AND AUTOMATA THEORY

NO OF CREDITS: 3

B.TECH 5th SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Pre-requisites: Fundamentals of Computers

Objectives of the course

- Develop a formal notation for strings, languages and machines.
- Design finite automata to accept a set of strings of a language.
- Prove that a given language is regular and apply the closure properties of languages.
- Design context free grammars to generate strings from a context free language and convert them into normal forms.
- Prove equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
- Identify the hierarchy of formal languages, grammars and machines.
- 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 thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages.

Suggested books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.

Suggested reference books:

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

Course Outcomes:

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

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.

1/00

CODE:PEC-CS-310

DATA MINING

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Database Management System

Course Objectives:

1. To familiarize the students with the basic roadmap of data mining and various data mining techniques.
2. To introduce the techniques of frequent pattern mining and Clustering
3. To acquaint students with classification and prediction techniques in data mining.
4. To introduce students with time series data and data streams
5. To introduce various advance mining applications areas like web mining, social network analysis etc.

UNIT-1

INTRODUCTION

Introduction to Data Warehousing, Architecture, Data warehouse schemas, OLAP operations, KDD process, Data Mining: Predictive and Descriptive models, Data Mining primitives and Applications

FREQUENT PATTERN MINING AND CLUSTERING

Mining frequent patterns, association and correlations: Association Rule Mining, Sequential Pattern Mining concepts, Cluster Analysis – Types of Data in Cluster Analysis, Partitioning methods, Hierarchical Methods: Transactional Patterns and other temporal based frequent patterns,

UNIT-2

CLASSIFICATION AND PREDICTION

Classification by Decision tree induction, Bayesian classification, Rule based classification, backpropagation through Neural Networks, Genetic Algorithm, Support Vector Machines, Prediction: linear and non-linear regression techniques.

UNIT-3

MINING TIME SERIES DATA AND DATA STREAMS

Mining Time series Data. Periodicity Analysis for time related sequence data. Similarity search in Time-series analysis: Mining Data Streams. Methodologies for stream data processing and stream data systems. Frequent pattern mining in stream data. Classification of dynamic data streams.

UNIT-4

ADVANCED MINING APPLICATIONS

Web Mining. Web page layout structure: mining web link structure. content and usage patterns: Recent trends in Distributed Warehousing and Data Mining. Class Imbalance Problem: Graph Mining: Social Network Analysis

Course Outcomes:

1. The students will be able to understand basic concepts of data warehouse and data mining, techniques and applications
2. The students will be able to understand the techniques to extract patterns from transactional database using Association and Apriori algorithms
3. The students will be able to understand different clustering techniques and will be able to cluster data sets
4. The students will be able to classify data set into different classes and acquire the knowledge to make predications based on classified data
5. The students will be able to understand and analyze time series data
6. The students will be able to understand types of web mining viz. content. structure and usage mining.Web content mining in detail.
7. The students can extend the Graph mining algorithms to Web mining
8. Students will understand advance applications of data mining

REFERENCES

1. Jiawei Han and M Kamber. Data Mining Concepts and Techniques.. Second Edition. Elsevier Publication. 2011.
2. Introduction to Data Mining - Pang-Ning Tan. Michael Steinbach. Vipin Kumar. Addison Wesley. 2006. 3. G Dong and J Pei. Sequence Data Mining. Springer. 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.

1102

CODE:PEC-CS-312

CLOUD COMPUTING

NO OF CREDITS: 3

B.TECH 6th SEMESTER		INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
3 0 0		TOTAL :	100

Course objectives: The student will learn how to apply

1. Trust-based security model to real-world security problems.
2. An overview of the concepts, processes, and best practices needed to successfully secure information within Cloud infrastructures.
3. Students will learn the basic Cloud types and delivery models and develop an understanding of the risk and compliance responsibilities and Challenges for each Cloud type and service delivery model.

UNIT-1

INTRODUCTION TO CLOUD COMPUTING

Online Social Networks and Applications. Cloud introduction and overview, Different clouds. Risks, Novel applications of cloud computing .

CLOUD COMPUTING ARCHITECTURE

Requirements, Introduction Cloud computing architecture, On Demand Computing Virtualization at the infrastructure level, Security in Cloud computing environments, CPU Virtualization, A discussion on Hypervisors Storage Virtualization Cloud Computing Defined, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Model Cloud Deployment Models Key Drivers to Adopting the Cloud, The Impact of Cloud Computing on Users, Governance in the Cloud, Barriers to Cloud Computing Adoption in the Enterprise .

UNIT-2

SECURITY ISSUES IN CLOUD COMPUTING

Infrastructure Security, Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation Provider Data and Its Security Identity and Access Management Trust Boundaries

and IAM. IAM Challenges. Relevant IAM Standards and Protocols for Cloud Services. IAM Practices in the Cloud. Cloud Authorization Management

UNIT-3

SECURITY MANAGEMENT IN THE CLOUD

Security Management Standards. Security Management in the Cloud. Availability Management: SaaS. PaaS. IaaS Privacy Issues Privacy Issues. Data Life Cycle. Key Privacy Concerns in the Cloud. Protecting Privacy. Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing. Legal and Regulatory Implications. U.S. Laws and Regulations. International Laws and Regulations

UNIT-4

AUDIT AND COMPLIANCE

Internal Policy Compliance. Governance. Risk. and Compliance (GRC). Regulatory/External Compliance. Cloud Security Alliance. Auditing the Cloud for Compliance. Security-as-a-Cloud.

DATA INTENSIVE COMPUTING

Map-Reduce Programming Characterizing Data-Intensive Computations. Technologies for Data-Intensive Computing. Storage Systems. Programming Platforms. MapReduce Programming. MapReduce Programming Model. Example Application

Course Outcomes:

After completion of course, students would be able to:

1. Identify security aspects of each cloud model
2. Develop a risk-management strategy for moving to the Cloud
3. Implement a public cloud instance using a public cloud service provider

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.

ELECTIVE -III

CODE: PEC-CS-314

PARALLEL AND DISTRIBUTED ALGORITHMS

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Analysis and Design of Algorithms

Course Objectives:

1. To make the students familiar with Parallel Computation and techniques for parallelization
2. To enable students understand how to reduce the number of processors and calculating cost of communication
3. To give knowledge about parallel search, elementary parallel algorithm, graph algorithm, P-complete classes
4. To enable students understand the concept of Mutual exclusion and Clock Synchronization. Distributed Graph algorithms
5. To make the students understand basics of Cover MPI programming

UNIT-1

THE IDEA OF PARALLELISM

A Parallelised version of the Sieve of Eratosthenes, PRAM Model of Parallel Computation, Pointer Jumping and Divide & Conquer: Useful Techniques for Parallelization

PRAM ALGORITHMS

Parallel Reduction, Prefix Sums, List Ranking, Preorder Tree Traversal, Merging Two Sorted Lists, Graph Coloring, Reducing the Number of Processors and Brent's Theorem, Dichotomy of Parallel Computing Platforms, Cost of Communication

UNIT-2

PARALLEL COMPLEXITY

The P-Complete Class, Mapping and Scheduling, Elementary Parallel Algorithms, Matrix Multiplication, Sorting, Dictionary Operations: Parallel Search, Graph Algorithms

UNIT-4

DISTRIBUTED ALGORITHMS

Models and complexity measures. Safety. liveness. termination. logical time and event ordering. Global state and snapshot algorithms. Mutual exclusion and Clock Synchronization. Distributed Graph algorithms

DISTRIBUTED MEMORY PARALLEL PROGRAMMING

Cover MPI programming basics with simple programs and most useful directives: Demonstrate Parallel Monte Carlo

Course Outcomes:

1. The students will be able to understand basics of PRAM Model of Parallel Computation. techniques for parallelization like pointer jumping and Divide and Conquer
2. The students would be able to perform preorder traversal and understand parallel computing platforms and find the cost of communication.
3. The students will be able define elementary parallel algorithms and Dictionary operations
4. The students will be able to measure complexity.
5. The students would be able to demonstrate Parallel Monte Carlo and write simple programs using MPI programming

REFERENCES

1. Michael J Quinn. Parallel Computing. TMH
2. Joseph Jaja. An Introduction to Parallel Algorithms. Addison Wesley
3. MukeshSinghal and Niranjan G. Shivaratri. Advanced Concepts in Operating Systems. TMH
4. AnanthGrama. Anshul Gupta. George Karypis. Vipin Kumar. Introduction to Parallel Computing. Pearson

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.

CODE:PEC-CS-316

EMBEDDED SYSTEMS

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Microprocessor, Programming Language

Course Objectives:

1. The student will learn about the basic of Emdedded systems.
2. The student will learn about the basic of microprocessor and microcontroller.
3. Able to understand the Fault types and redundancy.

UNIT-1

What is an embedded system? Categories: Stand-alone, Real-time, Networked appliances, mobile devices. Requirements of Embedded systems. Challenges and issues in Embedded software development. Embedded Software Development Tools: Host and Target machines. Linker/ locators for embedded software. Getting embedded software into target system

UNIT-2

Timing and clocks in embedded systems: processor Architectures: Harvard V/S Princeton. CISC V/S RISC. Microcontroller's memory types. Microcontroller's features: clocking, I/O pins, interrupts, timers, peripherals.

UNIT-3

Task Modeling and management, saving memory space. Real time operating system issues. Recent Trends in Embedded Processors. Operating System and Development programming Languages.

UNIT-4

Fault-Tolerance. Formal verification. Redundancy: Hardware, software and time redundancy.

Course Outcomes:

1. The students will be able to understand the basics of embedded systems and familiar with the issues and challenges in the embedded system design.

2. The students will be able to familiar with the host and target machine and able to transfer the software to target machine.
3. Understand the recent trend for Embedded system development and operating system.
4. Able to apply thefault tolerance technique for real time embedded systems.

REFERENCES

1. Programming for Embedded systems by Dreamtech software team. Wiley Dreamtech India Pvt. Ltd.
2. Embedded Realtime systems programming. by Sriram V. Iyer and Pankaj Gupta. TMH
3. Emdedded software primer by Davis E. Simen. TMH
4. Embeddes System Architecture by RAJ Kamal

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.

CODE:PEC-CS-318

SOFT COMPUTING

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Basics knowledge of Mathematics and Computer Science.

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

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

UNIT-2

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-3

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

UNIT-4

MATLAB

Study of neural network toolbox and fuzzy logic toolbox. Simple implementation of Artificial Neural Network and Fuzzy Logic

Course Outcomes:

After completion of course, students would be able to:

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.

REFERENCES

1. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", PHI
2. Satish Kumar, "Neural Networks: A classroom approach" Tata McGraw Hill.
3. Haykin S., "Neural Networks-A Comprehensive Foundations", PHI
4. Anderson J.A., "An Introduction to Neural Networks", PHI
5. M.Ganesh, "Introduction to Fuzzy sets and Fuzzy Logic" PHI.
6. N P Padhy and S P Simon, " Soft Computing with MATLAB Programming", Oxford University Press

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.

CODE:PEC-CS-320

COMPUTER GRAPHICS

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Pre-requisites: Problem Solving and Programming

Course Objectives:

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Learn the various algorithms for scan conversion and filling of basic objects and their comparative analysis. To improve the object appearance by filling relevant parts of the area.
3. Learning to use composite geometric transformations on graphical objects in 2D and 3D.
4. Understand the techniques for improving the object appearance with the help of clipping objects outside the view. Explore projections for display of 3D scene on 2D screen.
5. Study different techniques that help to remove the surfaces outside the view of user by understanding the concept of rendering.

UNIT-1

INTRODUCTION TO COMUTERGRAPHICS

Computer Graphics and Its Types. Application of computer graphics. Refresh CRT. Flat Panel displays. Raster Scan Systems. Random Scan Systems. shadow-mask method. beam-penetration method. color models- RGB, CMY. setting the color attributes of pixels.

UNIT-2

SCAN-CONVERSION

Output Primitives- Points. Lines. Circle. polygons: Attributes of Output Primitives: Line Attributes. Color and Grayscale Levels. Area fill Attributes. Character Attributes. Bundled Attributes: Scan-converting Lines- DDA line drawing algorithm. Bresenhams line drawing algorithm:

Scan-Converting Circles- parametric. trigonometric . Brsenham's circle drawing algorithm: Scan-converting polygon: Region Filling-Boundary fill and Flood fill algorithm . Anti-aliasing Techniques.

UNIT-3

TRANSFORMATIONS

Two-dimensional Geometric Transformations:Basic Transformations, Matrix Representation and Homogeneous Coordinates, Composite Transformations, Reflection and Shearing; Two-Dimension Viewing : The viewing Pipeline, Window to viewport coordinate transformation : Three-Dimensional Transformations.

UNIT-4

PROJECTION AND CLIPPING

Three dimensional Viewing Pipeline , Mathematics of projection- Taxonomy of projection, Perspective and parallel Projection; Clipping-Point Clipping, Line Clipping- Cohen-Sutherland Algorithm (4-bit code), polygon Clipping- Sutherland Hodgman Algorithm

HIDDEN SURFACES

Image-space and Object-Space Method, Coherence and its types, Depth Comparison, Z-buffer (Depth Buffer), Area-subdivision

Course Outcomes:

Students completing this course are expected to be able to:

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Implement the various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Apply geometric transformations on graphics objects and their application in composite form in 2D and 3D.
4. Apply projection techniques for improving the object appearance from 3-D scene to 2-D Scene and remove the area of objects that lie outside the viewing window.
5. Apply different hidden surface removal algorithms to eliminate the surface outside the view world.

REFERENCES

a. Foley & Van Dam : Fundamentals of Interactive Computer Graphics, Addison-Wesley.
b. Plastock : Theory & Problem of Computer Gaphics, Schaum Series.
c. Donald Hearn and M. Pauline Baker : Computer Graphics, PHI Publications.

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.

OPEN ELECTIVE- I

CODE: OE-CS-322

SOFT SKILLS & INTERPERSONAL COMMUNICATION

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Basic knowledge of reading and writing English.

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 :

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.

REFERENCES:

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.

CODE: OE-CS-324

CYBER LAW AND ETHICS

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Basics of Data Structures and Mathematics

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.

References:

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

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.

CODE: OE-CS-326

DATA ANALYTICS USING PYTHON

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Basics of Data Structures and Mathematics

Course objectives: The student will learn how to apply
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, methos resolution order, magic methods and operator overloading, meta classes, abstract and inner classes, exception handling, modular programs and packeges.

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.

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.

REFERENCES:

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.

CODE: OE-CS-328

ELECTRONIC DEVICES

NO OF CREDITS: 3

B.TECH 6th SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Computer Organization.& Architecture. Digital Electronics

Course objectives:
1. To give exposure to students about Semiconductor Physics.
2. To give the exposure about characteristics of Semiconductor devices
3. To introduce the working of difficult Semiconductor Electronic devices.
4. To introduce the concept of fabrication terminologies semiconductor electronic devices.

UNIT-1

INTRODUCTION TO SEMICONDUCTOR PHYSICS
Review of Quantum Mechanics. Electrons in periodic Lattices. E-k diagrams. Energy bands in intrinsic and extrinsic silicon:

UNIT-2

CARRIER TRANSPORT
Diffusion current, drift current, mobility and resistivity: sheet resistance, design of resistors Generation and recombination of carriers: Poisson and continuity equation P-N junction characteristics, I-Vcharacteristics, and small signal switching models: Avalanche breakdown, Zener diode, Schottky diode

UNIT-3

BIPOLAR JUNCTION TRANSISTOR
I-V characteristics, Ebers-Moll Model.MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor, LED, photodiode and solar cell:

UNIT-4

INTEGRATED CIRCUIT FABRICATION PROCESS
Oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process.

Course Outcomes:

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

1. Understand the principles of semiconductor Physics
2. Understand and utilize the mathematical models of Semiconductor junctions and I. MOS transistors for circuits and systems.
3. Understand various Semiconductor, fabrication process.
4. Understand the design & characteristics of Semiconductor devices.

REFERENCES:

1. G. Streetman, and S. K. Banerjee, "*Solid State Electronic Devices*," 7th edition, Pearson.2014.
2. D. Neamen , D. Biswas "*Semiconductor Physics and Devices*," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "*Physics of Semiconductor Devices*," 3rd edition, John Wiley & Sons, 2006.
4. C.T. Sah, "*Fundamentals of Solid State Electronics*," World Scientific Publishing Co. Inc. 1991.
5. Y. Tsividis and M. Colin, "*Operation and Modeling of the MOS Transistor*," Oxford Univ.Press, 2011.

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CODE: PROJ-IT-300-P

PROJECT- I

NO OF CREDITS: 2

B.TECH 6th SEMESTER	INTERNAL MARKS:	10
L T P	EXTERNAL MARKS:	40
0 0 6	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.

CODE:PCC-IT-302-P

INTELLIGENT SYSTEMS LAB

NO OF CREDITS: 2

B.TECH 6th SEMESTER	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.

1122

CODE:PCC-CS-304-P

COMPUTER NETWORKING LAB

NO OF CREDITS: 2

B.TECH 6th SEMESTER	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.

Semester-7

ELECTIVE –IV

PEC-CS-401

QUEUING THEORY AND MODELING

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL:	100

Pre-requisites:

Course Objectives:

- It provides an essential base for mathematical modeling which is normally used to solve the problems of pattern recognition and machine learning.
- 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.

Course Outcomes:

After undergoing the course, students will be able to

- develop an understanding to the basic concepts of Queuing theory and type of queues.
- understand and apply the Queuing theory to Science and Engineering problems and applications.
- calculate the n-step transition probabilities for any Markov chain and understand about the birth and death of processes.
- apply Markov chain & Birth Death process to real life problems.
- develop an understanding of various Queuing Systems.

REFERENCES

- Donald Gross, James M. Thompson, John F. Shortle and Carl W. Harris. Fundamentals of QueueingThoery, Wiley 2008.
- 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.

PEC-CS-403

ADVANCED OPERATING SYSTEMS

NO OF CREDITS: 3

B.TECH 7TH SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL:	100

Course Objectives:

- To learn the fundamentals of different types of Operating Systems.
- To learn the mechanisms to handle processes scheduling, synchronization and memory management in Distributed OS.
- 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.
- 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.
- 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

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.

Course Outcomes:

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

- Understand the characteristics of different OS.
- Develop algorithms for process scheduling, synchronization for different OS.
- 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.
- Design and implement file management system for different OS.
- Design and implement security policies in OS.

REFERENCES

- MukeshSinghal.Niranjan G. Shivaratri. "*Advanced Concepts In Operating Systems*".Tata McGraw-Hill Education: 2nd edition. [ISBN: 007057572X]. 2001.
- Dr.NareshChauhan. "*Principles of Operating Systems*". Oxford University Press: 1st edition. [ISBN: 978-0198082873].2014.
- Andrew S. Tanenbaum. Herbert Bos."*Modern Operating Systems*".Pearson Prentice Hall[TM]: 4th edition. [ISBN: 9781292061429].2014.
- D. M. Dhamdhere." *Operating Systems*".Tata McGraw Hill: 1st edition. [ISBN: 9781282187245].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.

PEC-CS-405

SPEECH AND NATURAL LANGUAGE PROCESSING

NO OF CREDITS: 3

B.TECH 7[th] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL:	100

Course Objectives:

- 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.
- To introduce the students with Morphology and Part of Speech Tagging by taking examples from Hindi, English.
- To introduce the top down and the bottom up parsing approaches and their respective types of parsers.
- To make the students familiar with grammar types like ATN & RTN.
- To make the students familiar with the basic techniques of parsing like CKY, Earley& Tomita's algorithms and role Hidden Markov Model in NLP
- To make the students familiar with Semantics-knowledge and its utilization.

UNIT-1

AUTOMATIC SPEECG 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.

Course outcomes:

Upon successful completion of the course, the student will be able to understand:

- 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.
- The top down and the bottom up parsing approaches and their respective types of parsers like CKY, Earley& Tomita's
- The Hidden Markov Model and its application in NLP
- The student will be able to write small ATN & RTN grammars for simple English sentences.
- 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.

REFERENCES

- "*Natural Language Understanding*" James Allen, -1995Benjamin/cummings Pub. Comp. Ltd
- "*Language as a cognitive process*", Terry Winograd 1983, AW
- "*Natural Language processing in prolog*", G. Gazder, 1989, Addison Wesley.
- "*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.

PEC-CS-407

OPTIMIZATION TECHNIQUES

NO OF CREDITS: 3

B.TECH 7TH SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL:	100

Pre-requisites: Linear Algebra and Numerical Methods

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.

Course Outcomes:

After completion of course, students would be able to:

- Apply basic concepts of mathematics to formulate an optimization problem
- Understand and apply the concept of optimality criteria for various types of optimization problems.
- Solve various constrained and unconstrained problems in Single variable as well as multivariable.
- Apply the methods of optimization in real life situations.

REFERENCES

- Laurence A. Wolsey (1998. "*Integer programming*". Wiley. ISBN 978-0-471-28366-9.
- Andreas Antoniou. "Practical Optimization Algorithms and Engineering Applications".
- Edwin K.. P. Chong & Stanislaw h. Zak. "*An Introduction to Optimization*".
- Dimitris Bertsimas; Robert Weismantel (2005). "*Optimization over integers. Dynamic Ideas*". ISBN 978-0-9759146-2-5.
- John K. Karlof (2006). "*Integer programming: theory and practice*" .CRC Press. ISBN 978-0-8493-1914-3.
- H. Paul Williams (2009). "*Logic and Integer Programming*". Springer. ISBN 978-0-387-92279-9.
- 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.
- 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.

ELECTIVE –V

PEC-CS-409

GAME THEORY

NO OF CREDITS: 3

B.TECH 7[th] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL:	100

Pre-requisites: Mathematics (With applied calculus& Set theory)

Course Objectives:

1. To provide an introduction of game theory which has found wide applications in economics, political science, sociology, engineering apart from disciplines like mathematics and biology

2. To enable the students to choice different types and forms of the games depending upon the need and impact on the performance.

3. To enable the students to explore learning mechanisms in an environment of perfect/incomplete information and to understand the need of repeated game.

4. To enable the students to design mechanisms usinggame theory to understand and analyze real life situations such as market behavior, decentralized network model.

UNIT-1

INTRODUCTION TO GAME THEORY Games and solutions. Game theory and mechanism design.

STRATEGIC FORM GAMES Matrix and continuous games. Iterated strict dominance. Rationalizability. Nash Equilibrium: existence and uniqueness. Mixed and correlated equilibrium. Super-modular games. Potential/congestion games

UNIT-2

LEARNING, EVOLUTION, AND COMPUTATION Myopic learning: fictitious play, Bayesian learning, evolutionarily stable strategies. Computation of Nash equilibrium in matrix games.

UNIT-3

EXTENSIVE GAMES WITH PERFECT / INCOMPLETE INFORMATION Backward induction and sub-game perfect equilibrium. Applications in bargaining games. Nash bargaining solution: Mixed and behavioral strategies. Bayesian Nash equilibrium. Applications in auctions. Different auction formats. Revenue and efficiency properties of different auctions.

UNIT-4

REPEATED GAMES Infinitely/finitely repeated games. Trigger strategies. Folk theorems. Imperfect monitoring and perfect public equilibrium.

MECHANISM DESIGN Optimal auctions. revenue-equivalence theorem. Social choice viewpoint. Impossibility results. Revelation principle. Incentive compatibility. VCG mechanisms. Mechanisms in networking. decentralized mechanisms.

Course Outcomes:

After the successful completion of the course. student will be able to:

1. Understand the use of game theory in economics. political science. sociology. engineering apart from disciplines like mathematics and biology.

2. Use different types and forms of the games and choose the type depending upon the need.

3. Apply learning mechanisms in an environment of perfect/incomplete information and understand the need of repeated game.

4. Design mechanisms using game theory to understand and analyze real life situations such as market behaviour. decentralized network model.

REFERENCES

1. Osborne. M. J.. "An Introduction to Game Theory". Oxford University Press. 2004 2. Mas-Colell. A.. M.D. Whinston and J.R. Green ."Microeconomic Theory". Oxford University Press. 1995. 3. Gibbons. R. ."A Primer in Game Theory". Pearson Education. 1992.

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.

PEC-CS-411

AD-HOC AND SENSOR NETWORKS

NO OF CREDITS: 3

B.TECH 7TH SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Pre-requisites: Computer Network

Course Objectives:

- To make the students familiar with the basics of adhoc and wireless network along with the difference between the two.
- To make the student understand the concept of routing and different strategies/protocols available for efficient routing in adhoc network.
- To make the student aware about the quality of service in adhoc& wireless network.
- To make the student understand the need, limitations of secured routing in ad hoc networks and wireless networks.

UNIT-1

Introduction: Wireless Networks, Infrastructure and Infrastructure less Wireless Networks, Ad hoc Wireless Networks, Heterogeneity in Mobile Devices, Types of Adhoc Mobile Communications.

MANET & WSN: Concepts & architecture of MANET & WSN, Applications & Design Challenges of Adhoc& Sensor Networks.

UNIT-2

Routing Protocols in MANET : Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Cluster Switch Gateway Routing (CSGR) Ad hoc On-Demand Distance Vector Routing (AODV) , Dynamic Source Routing (DSR) ,Temporally Ordered Routing Algorithm (TORA) , Signal Stability Routing (SSR) , Location-Aided Routing (LAR)

Hybrid Routing Protocol: Zone Routing Protocol (ZRP).

QoS in Ad-hoc Networks: Introduction to QoS, Issues and Challenges in Providing QoS in Ad hoc Wireless Networks , classifications of QoS Solutions , Network Layer Solutions (Ticket Based QoS Routing, Predictive Location Based QoS Routing, QAODV) , QoS Frameworks for Ad hoc Wireless Networks (IntServ, DiffServ, FQMM, INSIGNIA,INORA)

UNIT-3

Wireless Sensor Networks (WSN) : Protocol Stack of WSN, Origin ,need and Enabling Technologies for WSN, WSN Middleware Principles, Middleware Architecture, Existing Middleware (Milan, IrisNET,CLMF,MLM),Operating systems Design Issues

MAC Protocols : Challenges for MAC, Classification of MAC Protocols , Contention free and Contection Based MAC Protocols.

UNIT-4

WSN Routing, Localization &QoS : Challenges for Routing,Classification of Protocols, Data–Centric and Flat Architecture Protocols (Flooding,Gossiping,SPIN) Heirarchical protocols (LEACH,PEGASIS,TEEN,APTEEN), Location Based(Unicast, Multicast, GeoCast) and QoS based(Sequential Assignment,SPEED) Routing Protocols.

Security in WSN : Challenges of Security in WSN, Security Attacks in WSN, Protocols and Mechanisms for Security, IEEE 802.15.4 and ZigBee Security

Course Outcomes:

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

- Understand the concept of ad-hoc network and differentiate between infrastructure based and infrastructure less networks.
- Classify different categories of ad-hoc and wireless network and to identify the advantages and limitations of different protocols available for efficient routing in ad hoc networks.
- Understand QoS and its parameters in ad-hoc and wireless networks.
- Identify the need of security in ad-hoc and wireless networks & understand different types of attacks and available protocols.

REFERENCES

- C. Siva Ram Murthy and B. S. Manoj, "Ad *Hoc Wireless Networks Architectures and Protocols*", Prentice Hall, PTR, 2004.
- C. K. Toh, "*Ad Hoc Mobile Wireless Networks Protocols and Systems*", Prentice Hall, PTR, 2001.
- Charles E. Perkins, "*Ad Hoc Networking*", Addison Wesley, 2000
- Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003, ISBN : 0-470-86736-1
- Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless SensorNetworks" , John Wiley, 2005, ISBN : 0-470-09510-5.
- Ian F. Akyildiz and Mehmet Can Varun " Wireless Sensor Networks" John Wiley ISBN 978-0-470-03601-3.
- KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks-Technology, Protocols, And Applications", John Wiley, 2007, ISBN :978-0-471-74300-2

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.

PEC-CS-413

INFORMATION RETRIEVAL

NO OF CREDITS:3

B.TECH 7[TH] SEMESTER		INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
3 0 0		TOTAL:	100

Course Objectives:

- To build an understanding of the fundamental concepts of Information Retrieval
- To understand the elements of Web Search Engines and Crawlers
- To familiarize students with the basic taxonomy and terminology of Indices and to understand Heap's Law for estimation and Zipf's law for modeling distribution of terms
- To understand dictionary compression and posting list compression and to introduce the scoring , tf-idf weighting and vector space model for scoring

UNIT-1

INTRODUCTION TO INFORMATION RETRIEVAL

Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes

SEARCH ENGINES

Basic Building Blocks and Architecture, Text Acquisition, Text Transformation, Index Creation, User Interaction, Ranking, Evaluation.

UNIT-2

CRAWL SAND FEEDS

Crawling the Web, Retrieving Web Pages, The Web Crawler, Freshness, Focused Crawling, Deep Web, Crawling Documents and Email, Storing the Documents, Detecting Duplicates

UNIT-3

INDEX CONSTRUCTION AND COMPRESSION

Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing

Index compression: Statistical properties of terms in information retrieval. Heaps' law: Estimating the number of terms. Zipf's law: Modeling the distribution of terms. Dictionary compression. Dictionary as a string. Blocked storage. Postings file compression

UNIT-4

SCORING, TERM WEIGHTING AND THE VECTOR SPACE MODEL

Parametric and zone indexes. Weighted zone scoring. Learning weights. The optimal weight. Term frequency and weighting. Inverse document frequency. Tf-idf weighting. The vector space model for scoring . Computing scores in a complete search system.

Course Outcomes:

After taking the course, students will be able to:

- Understand basic Information Retrieval Systems and learn how Boolean queries are processed.
- understand the basic concept of Search Engines their architecture and its various functional components and understand the basic concept of Web crawlers and their architecture
- identify the different types of indices: inverted index, positional index, bi-word index and be able make estimations and model distribution of terms and compressions
- enumerate various types of indices and also understand the concept of efficient storage of indices and learn tf-idf scoring and vector space model scoring for ranking

REFERENCES

- C.D.Manning, P. Raghavan and H.Schutze Introduction to Information Retrieval, Cambridge University Press. 2008(available at http://nlp.stanford.edu/IR-book).
- B.Croft, D.Metzler, T.Strohman, Search Engines : Information Retrieval in Practice, AddisionWesley, 2009(available at http://ciir.cs.umass.edu/irbook/).

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.

PEC-CS-415

WEB & INTERNET TECHNOLOGY

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Computer Networks

Course Objectives:

- 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.
- To familiarize the student with the fundamental language of internet i.e. HTML.
- To teach the student aware of the concepts of cascading style sheets
- 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.

UNTI-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.

Course Outcomes:

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

- Acquainted with the basics of internet &search engines.
- Have a hands on HTMl.
- Learned the need and basics of CSS
- Learned the concepts of client side and server side scripting.

REFERENCES

- Fundamentals of the Internet and the World Wide Web. Raymond Greenlaw and Ellen Hepp 2001. TMH .
- Internet & World Wide Programming. Deitel.Deitel& Nieto. 2000. Pearson Education
- Complete idiots guide to java script.. Aron Weiss. QUE. 1997.
- 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.

Open Elective –II

OE-CS-417

HUMAN RESOURCE MANAGEMENT

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	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.

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.

RERERENCES:
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

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.

OE-CS-419

ICT FOR DEVELOPMENT

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	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)

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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.

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.

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.

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.

OE-CS-421

INTELLECTUAL PROPERTY RIGHTS

NO OF CREDITS: 3

B.TECH 7TH SEMESTER

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. Sealing 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

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.

REFERENCES:

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.

OE-CS-423

INTERNATIONAL BUISNESS ENVIRONMENT

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	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 Financial institutions: 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

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

RERERENCES:
1. Lasserre, Philippe Global Strategic Management, Palgrave MacMillan.
2. John D Daniels, Lee H Radebaugh Daniel P Sullivan ,Prashant Salwan.

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International Business Environments and Operations. 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.

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Open elective –III

OE-CS-425

FINANCIAL MANAGEMENT

NO OF CREDITS: 3

B.TECH 7[III] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	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.

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.

RERERENCES:
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.

1149

OE-CS-427

E-COMMERCE AND ENTERPRNEURSHIP

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	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

1150

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.

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.

REFERENCES:
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.

OE-CS-429

R PROGRAMMING

NO OF CREDITS: 3

B.TECH 7TH SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Basic Programming

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

INTRODUCTION

Getting R, R Version. 32-bit versus 64-bit. The R Environment. Command Line Interface. RStudio. Revolution Analytics RPE

R Packages: Installing Packages. Loading Packages. Building a Package

R Basics: Basic Math. Variables. Data Types. Vectors. Calling Functions. Function Documentation. Missing Data Advanced Data Structures: data frames. Lists. Matrices. Arrays

R DATA

Reading Data into R: Reading CSVs. Excel Data. Reading from Databases. Data from Other Statistical Tools. R Binary Files. Data Included with R. Extract Data from Web Sites Statistical Graphics: Base Graphics. ggplot2

UNIT-2

R FUNCTIONS & STATEMENTS

Writing R Functions: Hello. World!. Function Arguments. Return Values. do.call Control Statements: if and else. switch. ifelse. Compound Tests Loops: for Loops. while Loops. Controlling Loops

DATA MANIPULATION

Group Manipulation: Apply Family. aggregate. plyr. data.table Data Reshaping: cbind and rbind. Joins. reshape2 Manipulating Strings: paste. sprint. Extracting Text. Regular

UNIT-3

R STATISTICS & LINEAR MODELING

Probability Distributions: Normal Distribution, Binomial Distribution, Poisson Basic Statistics: Summary Statistics, Correlation and Covariance, T-Tests 200, ANOVA Linear Models: Simple Linear Regression, Multiple Regression Generalized Linear Models: Logistic Regression, Poisson Model Diagnostics: Residuals, Comparing Models, Cross-Validation, Bootstrap, Stepwise Variable Selection

UNIT-4

NON-LINEAR MODELING

Nonlinear Models: Nonlinear Least Squares, Splines, Generalized Additive Models, Decision Trees, Random Forests Clustering: K-means, PAM, Hierarchical Clustering

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.

REFERENCES:

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.

OE-CS-431

RENEWABLE ENERGY SYSTEMS

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	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

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

REFERENCES:
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.

BSC-401

BIOLOGY

NO OF CREDITS: 2

B.TECH 7TH SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
2 1 0	TOTAL:	100

Pre-requisites: None

UNIT-I

MODULE 1: INTRODUCTION

Purpose: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry.

Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of observations in any scientific inquiry.

MODULE 2: CLASSIFICATION

Purpose: To convey that classification *per se* is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted.

Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilisation -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion - aminotelic, uricotelic, ureotelic (e) Habitata- aequatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. Musculus.

UNIT-2

MODULE 3: Genetics

Purpose: To convey that "Genetics is to biology what Newton's laws are to Physical Sciences"

Mendel's laws, Concept of segregation and independent assortment, Concept of allele, Gene mapping, Gene interaction, Epistasis, Meiosis and Mitosis be taught as a part of genetics, Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance, Concept of mapping of phenotype to genes, Discuss about the single gene disorders in humans, Discuss the concept of complementation using human genetics.

MODULE 4: BIOMOLECULES

Purpose: To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine

Molecules of life. In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.

UNIT-3

MODULE 5: ENZYMES

Purpose: To convey that without catalysis life would not have existed on earth.

Enzymology: How to monitor enzyme catalysed reactions. How does an enzyme catalyse reactions? Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis.

MODULE 6: INFORMATION TRANSFER

Purpose: The molecular basis of coding and decoding genetic information is universal

Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.

MODULE 7: MACROMOLECULAR ANALYSIS

Purpose: How to analyse biological processes at the reductionist level

Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

UNIT-4

MODULE 8: METABOLISM

Purpose: The fundamental principles of energy transactions are the same in physical and biological world.

Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO2 + H2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy Charge.

MODULE 9: MICROBIOLOGY

Concept of single celled organisms. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.

Course Outcomes:

After studying the course, the student will be able to:

- Describe how biological observations of 18th Century that lead to major discoveries.
- Convey that classification *per se* is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological

- Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
- Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
- Classify enzymes and distinguish between different mechanisms of enzyme action.
- Identify DNA as a genetic material in the molecular basis of information transfer.
- Analyse biological processes at the reductionistic level
- Apply thermodynamic principles to biological systems.
- Identify and classify microorganisms.

REFERENCES

- *"Biology: A global approach"* Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M. L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- *"Outlines of Biochemistry"* , Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
- *"Principles of Biochemistry(V Edition)"*, By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
- *"Molecular Genetics (Second edition)"*, Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
- *"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.

PROJ-IT-401-P

PROJECT- II

NO OF CREDITS: 3

B.TECH 7[III] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
0 0 8	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.

PROJ-IT-403-P

SEMINAR

NO OF CREDITS: 1

B.TECH 7[TH] SEMESTER	INTERNAL MARKS:	50
L T P	EXTERNAL MARKS:	-
0 0 2	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.

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ITP-405 -P

INDUSTRIAL PRACTICAL TRAINING- II

NO OF CREDITS: 2

B.TECH 7[III] SEMESTER	INTERNAL MARKS:	-
L T P	EXTERNAL MARKS:	100
0 0 0	TOTAL :	100

Industrial practical training conducted after sixth semester will be evaluated in the Seventh Semester based on Viva-Voce.

ELECTIVE -VI

PEC-CS-402

INFORMATION THEORY AND CODING

NO OF CREDITS: 3

B.TECH 8TH SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Course Objectives:

- Students will able to learn concept of information and entropy
- Understand Shannon's theorem for coding and Huffman coding
- Students will able to calculate channel capacity
- Able to apply various coding techniques

UNIT-1

Basics of information theory, entropy for discrete ensembles: Shannon's noiseless coding theorem

UNIT-2

Encoding of discrete sources. Markov sources: Shannon's noisy coding theorem and converse for discrete channels

UNIT-3

Calculation of channel capacity and bounds for discrete channels: Application to continuous channels.

UNIT-4

Techniques of coding and decoding: Huffman codes and uniquely detectable codes: Cyclic codes. Convolutional arithmetic codes.

Course Outcomes:

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

- Understand the concept of information and entropy
- Understand Shannon's theorem for coding
- Calculation of channel capacity
- Apply coding techniques

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REFERENCES:

- N. Abramson. Information and Coding. McGraw Hill. 1963.
- M. Mansurpur. Introduction to Information Theory. McGraw Hill. 1987.
- R.B. Ash. Information Theory. Prentice Hall. 1970.
- Shu Lin and D.J. Costello Jr.. Error Control Coding. Prentice Hall. 1983.

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.

PEC-CS-404

INTERNET OF THINGS

NO OF CREDITS: 3

B.TECH 8[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL:	100

Pre-requisites: Internet and web Technology, Computer Networks

Course Objectives:

- Student will be able to learn the basics of IOT.
- Student will be able to analyse basic protocols of wireless and MAC.
- Students will get familiar with web of things.
- 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.

Course Outcomes:

On successful completion of the course. the student will:

- Understand the concepts of Internet of Things
- Analyze basic protocols network
- Understand the concepts of Web of Things
- Design IoT applications in different domain and be able to analyze their performance

REFERENCES:

- Vijay Madisetti. ArshdeepBahga. "Internet of Things: A Hands-On Approach"
- 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 attempt five questions. selecting one question from each unit. Question No.1 is compulsory which is from entire syllabus.

PEC-CS-406

NEURAL NETWORKS AND DEEP LEARNING

NO OF CREDITS: 3

B.TECH 8[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Pre-requisites: Basics knowledge of Mathematics and Algorithms.

Course Objectives:

- To introduce neural networks concepts and associated techniques
- To design appropriate neural network based technique for a given scenario.
- To introduce the concept of associative memories and their capabilities in pattern completion and repair.
- 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.

Course Outcomes

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

- Use neural networks concepts and associated techniques for solving classification and regression problems.
- Design and Use neural networks for pattern recall. completion and repair.
- Design and Use neural networks for self learning and unsupervised classifications.
- Choose the appropriate classifier.

REFERENCES:

- Haykin S.. *"Neural Networks-A Comprehensive Foundations"*. Prentice-Hall International. New Jersey. 1999.
- Anderson J.A.. *"An Introduction to Neural Networks"*. PHI. 1999.
- Satish Kumar. *"Neural Networks: A Classroom Approach"*
- 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.

PEC-CS-408

CRYPTOGRAPHY & NETWORK SECURITY

NO OF CREDITS: 3

B.TECH 8[TH] SEMESTER	INTERNAL MARKS:	20
L T P	EXTERNAL MARKS:	80
3 0 0	TOTAL :	100

Course Objectives:

- Understand the basic concept of Cryptography and Network Security, their mathematical models.
- To impart knowledge of major issues in network and computer system security, focusing mainly on threats from malicious software and To understand common attacks on computer networks and methods to detect and remediate such attacks.
- To study various issues in security of MANETS and study various attacks.
- To provide the students with the competences required for understanding various issues in security of Wireless Security Networks and also various attacks against security mechanism and routing.

UNIT-1

Introduction What is security?, Need of security, Why is security so hard?, various goals of security, Difference between Vulnerability, Threats, Attacks and control, Security goals, aspects of security, security services, security attacks Encryption Techniques Terminology of encryption, Requirement of encryption, cryptography, cryptanalysis, cryptanalytic attacks, symmetric ciphers: Substitution ciphers, Transposition ciphers, Data Encryption Standard (DES, Advanced Encryption Standard (AES), location of encryption devices, key distribution, Public Key Cryptography and RSA, Diffie-Hellman Key Exchange, Message Authentication and Hash Functions, MD5, SHA

UNIT-2

Network Security Security services, Message confidentiality, Message integrity, message authentication, digital signature, entity authentication, Authentication applications: Kerberose 95, X.509 Authentication service, Public key infrastructure, Electronic mail Security: Preety Good Privacy (PGP), IP Security: IP security overview, IP security architecture, Authentication header, Encapsulating security Payload, Combining security associations, Key management.

UNIT-3

Security Attacks in MANET Security issues in MANET, Attacks in MANET: External Attack, Internal attack, Black hole attack, warm hole attack, grey hole attack, Byzantine attack, Sleep Deprivation attack, Flooding attack: RREQ flooding attack, Data flooding Attack.

UNIT-4

Security Attacks in Wireless Sensor Networks Security issues in WSN. Attacks in WSN : Attack against Security mechanism. Attack against basic mechanism like routing: Spoofed. altered. replayed routing. Information . Selective forwarding . Sinkhole attacks . Sybil attacks. Wormholes. HELLO flood attacks

Course Outcomes:

After the completion of this course the student will able to:

- Understand theory of fundamental cryptography. encryption and decryption algorithms.
- Build secure systems by use of block ciphers like AES. DES.
- To be familiar with network security designs using available secure solutions and advanced security issues and technologies.
- To develop basic security enhancements in MANETS.
- To know how authentication is implemented in wireless systems and understand authentication protocols and processes.

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.

Open elective –IV

OE-CS-410

ECONOMIC POLICIES IN INDIA

NO OF CREDITS: 3

B.TECH 7[th] SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	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

OE-CS-412

QUALITY ENGINEERING

NO OF CREDITS: 3

B.TECH	7[III] SEMESTER	INTERNAL MARKS:	20
L T P		EXTERNAL MARKS:	80
3 0 0		TOTAL :	100

UNIT -I

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 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
4. Fundamentals of quality control and improvement, A Mitra, Memillan pub, Company, NY

REFERENCE BOOKS:

1. 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.

OE-CS-414

OTICAL NETWORK DESIGN

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	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

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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.

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

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.

REFERENCES

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.

OE-CS-416

HIGH SPEED NETWORKS

NO OF CREDITS: 3

B.TECH 7[TH] SEMESTER	INTERNAL MARKS: 20
L T P	EXTERNAL MARKS: 80
3 0 0	TOTAL : 100

Course Objectives:
1. To make the students familiar with High Speed Network technologies.
2. To make students aware of advantages and disadvantages of high speed technologies.
3. Study of techniques available for congestion control traffic management.
4. How to make congestion control in TCP and ATM.
5. To study integrated and differentiated services architecture.
6. Protocols for high speed communication

UNIT-1

HIGH SPEED NETWORKS

Frame Relay Networks – Asynchronous transfer mode - ATM Protocol Architecture. ATM logical Connection. ATM Cell - ATM Service Categories – AAL.High Speed LANs: Fast Ethernet. Gigabit Ethernet. Fiber Channel – Wireless LANs: applications. requirements Architecture of 802.11

UNIT-2

CONGESTION AND TRAFFIC MANAGEMENT

Queuing Analysis- Queuing Models – Single Server Queues - Effects of Congestion Congestion Control – Traffic management – Congestion Control in Packet Switching Networks Frame Relay Congestion Control.

UNIT-3

TCP AND ATM CONGESTION CONTROL

TCP Flow control – TCP Congestion Control - Retransmission – Timer Management - Exponential RTO backoff – KARN's Algorithm – Window management - Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements - Attributes - Traffic Management Frame work. Traffic Control - ABR traffic Management – ABR rate control. RM cell formats. ABR Capacity allocations - GFR traffic management.

UNIT-4

INTEGRATED AND DIFFERENTIATED SERVICES
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services
PROTOCOLS FOR QOS SUPPORT
RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details - RTP - Protocol Architecture, Data Transfer Protocol, RTCP.

Course outcomes:
1. Students will be able to understand basic high speed networks like Frame relay and ATM.
2. Students will be familiar with advantages and disadvantages of high speed network.
3. Students will be aware of congestion control traffic management techniques.
4. Students will be aware of TCP and ATM congestion control techniques.
5. To learn the functionality of integrated and differentiated services architecture.
6. Familiarity with various high speed protocols currently available.

REFERENCES
1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Educatin, Second Edition, 2002.
2. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
3. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MLS and VPN architecture", Cisco Press, Volume1 and 2, 2003.

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.

PROJ-IT-402-P

PROJECT- III

NO OF CREDITS: 5

B.TECH 8TH SEMESTER	INTERNAL MARKS:	40
L T P	EXTERNAL MARKS:	160
0 0 12	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.

PROJ-IT-404-P

SEMINAR

NO OF CREDITS: 1

B.TECH 8[TH] SEMESTER	INTERNAL MARKS:	50
L T P	EXTERNAL MARKS:	--
0 0 2	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.