Department of Information Technology

School of Technology

North Eastern Hill University

Umshing, Shillong-22

Course Structure & Syllabus

for

B.Tech. (IT) Program

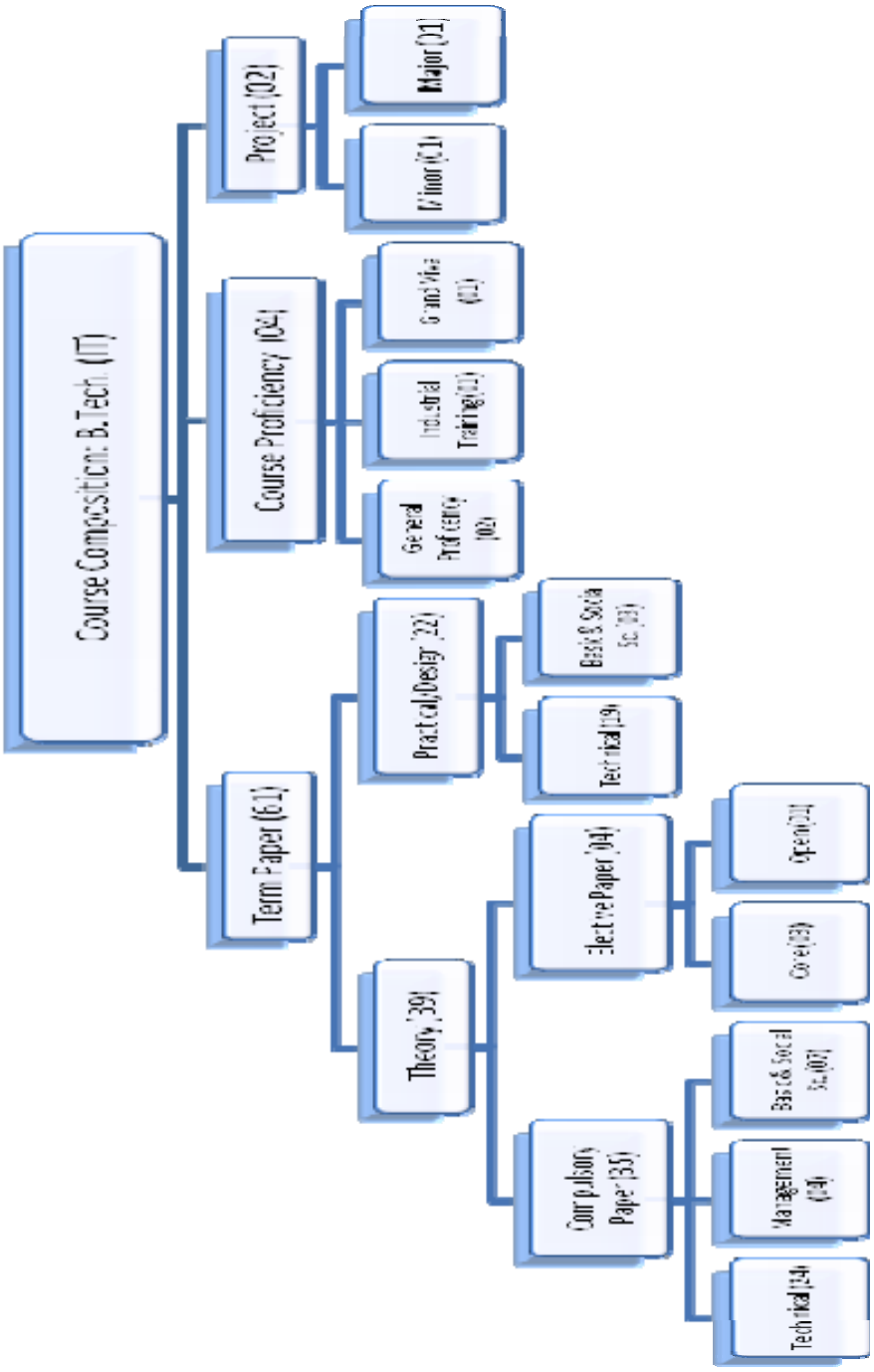
(Revised on 2011)

Objectives

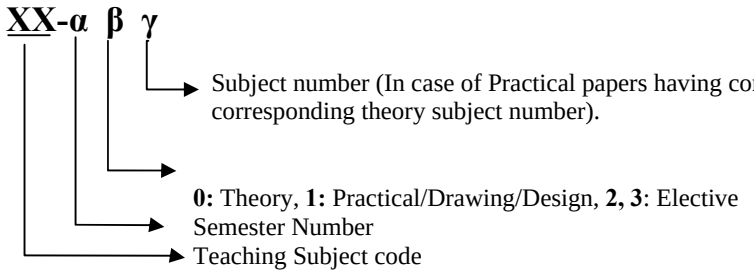
This four years B.Tech. (IT) program aims to prepare candidates for the I.T. industry. The core part of the curriculum embodies scientific and engineering knowledge basic to the profession. In addition to these core courses, the other ingredients of professional knowledge of both current and emerging technological processes have been added to it. Industrial Training is incorporated in the current syllabus, with an intention to provide real world industry exposure. To provide the students relevant professional knowledge and develop their capacity to tackle unknown engineering problems, the syllabus has balanced the core, specialized and elective subjects, integrating the practical and field exercises with challenging project activities. A number of management papers like Professional Ethics and IPR are also introduced in the curriculum to help the students to acquire basic managerial skills required for the corporate world. The throughout course proficiency of a student will be evaluated through general proficiency and grand viva to make them ready for the industry and academia.

Course Structure
&
Detailed Syllabus

Course Layout



Adopted Course Code (XX- αβγ)



Acronyms Used in Teaching Subject Code (XX):

ME - Mechanical Engineering

CE - Civil Engineering

CH - CHemistry

EC - Electronics and Communication Engineering

EE - Electrical Engineering

HU - HUmanities

IT - Information Technology

MA - MAthematics

ME - Mechanical Engineering

PH - PHysics

Example: *IT-205 implies that Teaching subject concern is Information Technology and, it is the 5th Theory paper of 2nd semester.*

Course Structure

Year: I **Semester I (Common to all branches)**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work			ESE	SUB TOTAL	
						TA	CT	TOT			
1	HU-101	Professional Communication Skills	2	1	-	20	20	40	60	100	3
2	MA-102	Engineering Mathematics-I	3	1	-	30	30	60	90	150	4
3	PH-103	Engineering Physics	3	1	-	30	30	60	90	150	4
4	ME 104	Engineering Mechanics	3	1	-	30	30	60	90	150	4
5	EE-105	Basic Electrical Engineering	3	1	-	30	30	60	90	150	4
PRACTICALS / DRAWING / DESIGN											
6	HU 111	Digital English Language Laboratory			3	20	-	20	30	50	2
7	PH-113	Engineering Physics Laboratory	-		3	20	-	20	30	50	2
8	EE-115	Basic Electrical Laboratory	-	-	3	20	-	20	30	50	2
9	ME 116	Workshop Practice	-	-	3	20	-	20	30	50	2
		Total	14	5	12					900	**27**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 900

L – Lecture **T** – Tutorial **P** – Practical Total Periods: 31 Total Credits: 27

Year: I **Semester II (Common to all branches)**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work			ESE	SUB TOTAL	
						TA	CT	TOT			
1	ES-201	Elements of Environmental Science	2	1	-	20	20	40	60	100	3
2	MA-202	Engineering Mathematics II	3	1		30	30	60	90	150	4
3	CH-203	Engineering Chemistry	3	1	-	30	30	60	90	150	4
4	IT-204	Computer Systems and Programming	3	1	-	30	30	60	90	150	4
5	EC-205	Basic Electronics	3	1	-	30	30	60	90	150	4
PRACTICALS / DRAWING / DESIGN											
6	CH-213	Engineering Chemistry Laboratory.	-		3	20	-	20	30	50	2
7	IT-214	Computer Programming Laboratory	-		3	20	-	20	30	50	2
8	EC-215	Basic Electronic Laboratory	-	-	3	20	-	20	30	50	2
9	CE -216	Engineering Graphics	-	-	3	20	-	20	30	50	2
10	GP-I	General Proficiency -I	-	-	-		-	-	50	50	2
		Total	14	5	12					950	**29**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 950
L – Lecture **T** – Tutorial **P** – Practical Total Periods: 31 Total Credits: 29

Year: II **Semester III**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work			ESE	SUB TOTAL	
						TA	CT	TOT			
1	HU-301	Engineering Economics and Financial Accounting	3	1	-	30	30	60	90	150	4
2	MA-302	Engineering Mathematics III	3	1	-	30	30	60	90	150	4
3	EC-303	Signals and Systems	3	1	-	30	30	60	90	150	4
4	IT-304	Computer Graphics and Multimedia	3	1	-	30	30	60	90	150	4
5	IT-305	Data Structures and Algorithms	3	1	-	30	30	60	90	150	4
6	IT-306	Discrete Mathematics	3	1	-	30	30	60	90	150	4
PRACTICALS / DRAWING / DESIGN											
7	IT-314	Computer Graphics and Multimedia Lab	-		3	20	-	20	30	50	2
8	IT-315	Data Structure Laboratory.	-		3	20	-	20	30	50	2
9	IT-317	Numerical Programming laboratory	-		3	20	-	20	30	50	2
		Total	18	6	9					1050	**30**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 1050
L – Lecture **T** – Tutorial **P** – Practical Total Periods: 33 Total Credits: 30

Year: II **Semester IV**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work			ESE	SUB TOTAL	
						TA	CT	TOT			
1	MA-401	Statistics and Random Processes	3	1	-	30	30	60	90	150	4
2	IT-402	Data Communication	3	1	-	30	30	60	90	150	4
3	EC-403	Digital Electronics	3	1	-	30	30	60	90	150	4
4	IT-404	Formal Language and Automata Theory	3	1	-	30	30	60	90	150	4
5	IT-405	System Programming	3	1	-	30	30	60	90	150	4
6	IT-406	Computer Organization and Architecture	3	1	-	30	30	60	90	150	4
PRACTICALS / DRAWING / DESIGN											
7	EC-413	Digital Electronics laboratory	-		3	20	-	20	30	50	2
8	IT-415	Systems Programming Laboratory	-		3	20	-	20	30	50	2
9	IT-417	General Proficiency -II	-		-	-	-	-	50	50	2
		Total	18	6	6					1050	**30**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 1050
L – Lecture **T** – Tutorial **P** – Practical Total Periods: 30 Total Credits: 30

Year: III **Semester V**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work			ESE	SUB TOTAL	
						TA	CT	TOT			
1	HU-501	Management Information System	3	1	-	30	30	60	90	150	4
2	EC-502	Microprocessor	3	1	-	30	30	60	90	150	4
3	IT-503	Information Theory and Coding	3	1	-	30	30	60	90	150	4
4	IT-504	Object Oriented Programming and Methodology	3	1	-	30	30	60	90	150	4
5	IT-505	Algorithm Analysis and Design	3	1	-	30	30	60	90	150	4
6	IT-506	Computer Networks	3	1	-	30	30	60	90	150	4
PRACTICALS / DRAWING / DESIGN											
7	EC -512	Microprocessor Laboratory	-	-	3	20	-	20	30	50	2
8	IT-514	Object Oriented Programming Laboratory	-	-	3	20		20	30	50	2
9	IT-516	Computer Networks Laboratory	-	-	3	20	-	20	30	50	2
		Total	18	6	9					1050	**30**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 1050

L – Lecture **T** – Tutorial **P** – Practical Total Periods: 33 Total Credits: 30

Year: III **Semester VI**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work			ESE	SUB TOTAL	
						TA	CT	TOT			
1	IT-601	Operating System	3	1	-	30	30	60	90	150	4
2	IT-602	Software Engineering	3	1	-	30	30	60	90	150	4
3	IT-603	Relational Data Base Management System	3	1	-	30	30	60	90	150	4
4	IT-604	Compiler Design	3	1	-	30	30	60	90	150	4
5	IT-62X	Elective-I	3	1	-	30	30	60	90	150	4
6	IT-63X	Elective-II	3	1	-	30	30	60	90	150	4
PRACTICALS / DRAWING / DESIGN											
7	IT-611	Operating System Lab	-	-	3	20		20	30	50	2
8	IT-613	Database Management System Laboratory	-	-	3	20	-	20	30	50	2
9	IT-614	Compiler Design Lab.	-	-	3	20	-	20	30	50	2
10	IT-615	General Proficiency -III (Industrial Training)	-	-	-	-	-	-	50	50	2
		Total	18	6	9					1100	**32**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 1100
L – Lecture **T** – Tutorial **P** – Practical Total Periods- 33 Total Credits: 32

Electives-I:
1. Mobile Computing (IT 621)
2. Data Mining (IT-622)
3. Data Compression (IT-623)
4. Embedded System (IT-624)
5. Human Computer Interaction (IT-625)

Electives-II:
1. Cryptography and Network Security (IT-631)
2. E- Commerce (IT-632)
3. Simulation & Modeling (IT-633)
4. Artificial Intelligence (IT-634)
5. Distributed Systems (IT-635)

Year: IV **Semester VII**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work				SUB TOTAL	
						TA	CT	TOT			
1	HU -701	Professional Ethics and IPR	3	1	-	30	30	60	90	150	4
2	IT-702	System Administration	3	1	-	30	30	60	90	150	4
3	IT-703	Web Technology	3	1	-	30	30	60	90	150	4
4	IT-72X	Elective-III	3	1	-	30	30	60	90	150	4
5	IT-73X	Elective –IV (Open)	3	1	-	30	30	60	90	150	4
PRACTICALS / DRAWING / DESIGN											
6	IT-712	System Administration Lab	-	-	3	20		20	30	50	2
7	IT-713	Web Technology Lab			3	20		20	30	50	2
8	IT-714	Visual programming. Lab			3	20		20	30	50	2
9	IT-715	Minor Project	-	-	6	50		50	100	150	4
		Total	15	5	15					1050	**30**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 1050

L – Lecture **T** – Tutorial **P** – Practical; Total Periods: 35 Total Credits: 30

Electives-III:

1. Bioinformatics (IT- 721)
2. Natural Language Processing (IT 722)
3. Internet and Its Application Technologies (IT-723)
4. Fuzzy Logic & Neural Networks (IT-724)
5. Computer Vision (IT-725)

Electives – IV: (Open)

1. Pattern Recognition (IT 731)
2. Wireless Communication (IT-732)
3. Digital Image Processing (IT-733)
4. Robotics (IT-734)
5. Advance Computer Architecture (IT-735)

Year: IV **Semester VIII**

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME					Credits
(THEORY)			L	T	P	Sessional Work			ESE	SUB TOTAL	
						TA	CT	TOT			
1	IT-811	Major Project	-	-	24	200	-	200	300	500	12
2	IT - 812	General Proficiency – IV (Grand Viva)	-	-	-	-	-	-	-	100	2
		Total			24					600	**14**

TA-Teachers Assessment **CT**-Class Test **ESE**-End Semester Examination Total Marks: 600

L – Lecture **T** – Tutorial **P** – Practical Total Periods: 24 Total Credits: 14

Table of Contents

		Page No.
	Semester –I	
HU-101	Professional Communication Skills	1
MA-102	Engineering Mathematics-I	2
PH-103	Engineering Physics	3
ME 104	Engineering Mechanics	4
EE-105	Basic Electrical Engineering	5
HU 111	Digital English Language Laboratory	6
PH-113	Engineering Physics Laboratory	7
EE-115	Basic Electrical Laboratory	8
ME 116	Workshop Practice	9
	Semester – II	
ES-201	Elements of Environmental Science	10
MA-202	Engineering Mathematics II	11
CH-203	Engineering Chemistry	12
IT-204	Computer Systems and Programming	13
EC-205	Basic Electronics	14
CH-213	Engineering Chemistry Laboratory.	15
IT-214	Computer Programming Laboratory	16
EC-215	Basic Electronic Laboratory	17
CE -216	Engineering Graphics	18
GP-I	General Proficiency -I	19
	Semester – III	
HU-301	Engineering Economics and Financial Accounting	20
MA-302	Engineering Mathematics III	21
EC-303	Signals and Systems	22
IT-304	Computer Graphics and Multimedia	23
IT-305	Data Structures and Algorithms	24
IT-306	Discrete Mathematics	25
IT-314	Computer Graphics and Multimedia Lab	26
IT-315	Data Structure Laboratory.	27
IT-317	Numerical Programming laboratory	28
	Semester – IV	
MA-401	Statistics and Random Processes	29
IT-402	Data Communication	30
EC-403	Digital Electronics	31
IT-404	Formal Language and Automata Theory	32
IT-405	System Programming	33
IT-406	Computer Organization and Architecture	34
EC-413	Digital Electronics laboratory	35
IT-415	Systems Programming Laboratory	36
IT-417	General Proficiency -II	37

		Page No.
	Semester –V	
HU-501	Management Information System	38
EC-502	Microprocessor	39
IT-503	Information Theory and Coding	40
IT-504	Object Oriented Programming and Methodology	41
IT-505	Algorithm Analysis and Design	42
IT-506	Computer Networks	43
EC -512	Microprocessor Laboratory	44
IT-514	Object Oriented Programming Laboratory	45
IT-516	Computer Networks Laboratory	46
	Semester –VI	
IT-601	Operating System	47
IT-602	Software Engineering	48
IT-603	Relational Data Base Management System	49
IT-604	Compiler Design	50
IT-62X	Elective-I	51
IT-63X	Elective-II	51
IT-611	Operating System Lab	52
IT-613	Database Management System Laboratory	53
IT-614	Compiler Design Lab	54
IT-615	General Proficiency -III (Industrial Training) .	54
	Semester –VII	
HU -701	Professional Ethics and IPR	55
IT-702	System Administration	56
IT-703	Web Technology	57
IT-72X	Elective-III	58
IT-73X	Elective –IV (Open)	58
IT-712	System Administration Lab	59
IT-713	Web Technology Lab	60
IT-714	Visual programming. Lab	61
IT-715	Minor Project	61
	Semester –VIII	
IT-811	Major Project	62
IT - 812	General Proficiency –IV (Grand Viva)	62

Detailed Syllabus

Semester-I

HU - 101PROFESSIONAL COMMUNICATION SKILLS **2-1-0 - 3**

Subject Code:*HU - 101.*
Subject Name:*Professional Communication Skills.*
No. of Hours Per Week:*Lectures-2, Tutorial-1*
Marks Distribution:*Sessional Works = 40, End Semester Examination = 60.*
Questions to be set:*Six (one from each unit and remaining three from the combination of more than one unit).*
Questions to be answered:*Any four.*
Duration of End Semester Examination: *Two and half Hours.*

UNIT I

General Principles of Communication and Oral Communication:

The Process of Communication, Principles of Communication (communication barriers, levels of Communication, Communication network, verbal, non-verbal) and Professional Communication.The Speech Mechanism, IPA symbols (vowel and consonant sounds), minimal pairs, word transcription, stress and intonation , active listening, types of listening, traits of a good listener, active versus passive listening,

UNIT II

Constituents of Effective Writing and Vocabulary:

The sentence and its parts, articles, the verb phrase, tense and aspect, the active and passive, the adjective, interrogative and negative sentences, concord, preposition. Paragraph development, summary writing and reading comprehension.word formation processes: affixation, compounding, converting, use of words in different parts of speech, idioms and phrases.

UNIT III

Business Correspondence and Communication Strategies:

Characteristics of Business Letters, Drafting: Bio-data/ Resume/Curriculum vitae (theory). Report Writing**:** Structure, Types of Reports (theory). Presentation Skills, public speaking and group discussion (theory) and Soft Skills (theory).

Text Books:

1. Das, B. K., Samantray K., et.al., *An Introduction to Professional English and Soft Skills,* CUP, New Delhi, 2009.
2. Sharma R.C, Mohan K., *Business correspondence and Report Writing*, Tata Mcgraw Hill, New Delhi, 2002.
3. Doff, A., Jones, C.,*Language In Use, Upper- Intermediate Classroom Book, Classroom Book,*CUP, New Delhi, 2004.

Reference Books:

1. O'Connor, J. D.,*Better English Pronunciation*, CUP, London, 2006.
2. Patnaik, P.,*Group Discussion and Interview Skills*, CUP, New Delhi, 2011.
3. Greenbaum, Sidney,*Oxford English Grammar*, OUP, 1996.
4. Seely, John,*Oxford Guide to Effective Writing and Speaking*, OUP, India, 2000.
5. Eastwood, John, *Oxford guide to English Grammar,* OUP, India, 1994.

MA - 102 ENGINEERING MATHEMATICS – I **3-1-0 - 4**

Subject Code:*MA - 102.*
Subject Name:*Engineering Mathematics - I.*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *ThreeHours.*

UNIT -I

Functions, continuity and differentiability**,** graphs of f(x) = |x| + |x-1| + |x-2|; |x| - |y| = n. Properties of continuous functions on closed intervals.Intermediate value theorem and Uniform continuity in [a, b]. Functions of Bounded Variation,L'HospitalRule (statements only with applications)and indetermediate forms; Leibnitz's theorem.

UNIT-II

Mean value theorems and Taylor's theorem with Lagrange's form and Cauchy's form of remainders.Taylor's and Maclaurin's series of functions $\log_e(1+x)$, e^x, sin x, cos x; curvature, radius of curvature and centre of curvature of plane curves,Fundamental theorem of integral calculus. Reduction formulae.

UNIT-III

Convergence of sequences, series and improper integral:Convergence of real sequences; monotone sequences, Cauchy'scriterion, convergence of infinite series of real numbers. Cauchy's criterion. Convergence of improper integrals. Beta and Gamma functions and their properties.

UNIT-IV

*Ordinary Differential Equations***:** Order and degree, exactness and integrating factors. Solutions of first order and first degree O.D.E. of types- variable separable, homogeneous , linear, Bernoulli; and Second order L.D.E. $a_0y'' + a_1y' + a_1y = 0$ where a_i's are constants. Nonlinear equations and Clairaut's equations.

Text Books:

1. Mendelson,E.,*CALCULUS with 3000 examples*, TMH, reprint 2010.
2. Kreyszig,E., *Advanced Engineering Mathematics*, 9/e, J.Wiley & Co., 2009.
3. S.C. Malik and SavitaArora, *Mathematical Analysis*, 6/e, Wiley Eastern Ltd., 2002.
4. B.S. Grewal,*Higher Engineering Mathematics*, 40/e,Khanna Publication, 2008.

Reference Books:

1. B. K. Pal and K.Das,*Engineering Mathematics-1&2*,3/e, U.N.Dhur& Sons Pvt. Ltd., 2010.
2. H.K. Dass, *Advance Engineering Mathematics*,12/e, S. Chand & Co., 2010.
3. M. C. Potter, J.L Goldberg and E.F. Aboufadel, *Advance Engineering Mathematics*, 3/e, Oxford University Press, 2008.
4. B.S.Grewal, *Engineering Mathematics*, 12/e, Khanna Publications, 2009.

PH - 103 ENGINEERING PHYSICS **3-1-0 - 4**

Subject Code:*PH - 103.*
Subject Name:*Engineering Physics.*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *ThreeHours.*

UNIT – I

Classical mechanics-I, Acoustic and General Properties of matter: Component of velocity and acceleration in two dimension in Cartesian and polar coordinates. Moment of inertia, theorems of parallel and perpendicular axes (proof) for both laminar and three dimensional bodies.Compound pendulum and its theory.Free and forced vibration, resonance and sharpness of resonance, Reverberation, Sabine's law of reverberation.Ultrasonic, production and applications.Problems.
Interrelation of elastic constants.Torsion of a cylinder.Bending of beams- cantilever and beam supporting at both ends.Problems.

UNIT – II

*Electromagnetism and Physical optics:*Gradient, divergence, curl; Electrostatic field **E** and potential φ, their relation. Short electric dipole, Gauss law and its applications for finding **E** for various symmetric charge distribution, Maxwell's equations (statement and significance).
Interference: Newton rings: theory and wavelength determination
Diffraction: Fraunhofer diffractions at a single slit, Fresnel half period zone, zone plate. Polarization, half and quarter wave plates.Problems.

UNIT – III

Quantum Mechanics and Solid State Physics: De Broglie's hypothesis, Uncertainty principle, Schrödinger's equations, particle in a one dimensional box of rigid walls. Problems.
Free electron gas in one and three dimensions, F-D distribution function- its variation with energy at different temperatures: Band theory of solids (a qualitative treatment), distinction of metals, semi-metals and insulators. Preliminary ideas of superconductivity.Problems.

UNIT – IV

Atomic, molecular and nuclear Physics: Compton effect and Compton shift, vector atom model; one electron atomic spectra, molecular spectra and selection rules. Brief theory of laser, Spontaneous emission, stimulated emission and absorption, Applications of Laser.Problems.
Nuclear reaction and Q value, Nuclear fission, chain reaction, nuclear fusion and stellar energy. Problems.

Text Books:

1. Hugh D. Young and Lewis Ford, *University Physics with Modern Physics*, 12/e, Pearson, 2008.
2. P K Chakrabarthy, *Mechanics and General Properties of Matter*, Books & Allied Ltd., 2001.
3. G S Raghuvanshi, *Engineering Physics*, Prentice Hall of India Pvt Ltd., 2008.
4.H K Malik and A K Singh, *Engineering Physics*, Tata McGraw Hill, New Delhi, 2010.

Reference Books:

1. H J Pain, *The Physics of Vibrations and Waves*, 6/e, Wiley Student Edition, 2005.
2.G R Fowles and G L Cassiday, *Analytical Mechanics*, 7/e, Ceingage Learning, Indian Edition,2005.
3. P V Naik, *Principles of Physics*, Prentice Hall of India Pvt Ltd., 2000.
4. A Beiser, *Perspective of Modern Physics*, McGraw- Hill, 1969.

ME - 104 ENGINEERING MECHANICS **3-1-0 - 4**

Subject Code:*ME - 104.*
Subject Name:*Engineering Mechanics.*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *ThreeHours.*

UNIT-I

Force Systems: Moment of a force about a point and about an axis; couple moment; reduction of a force system to a force and a couple. Equilibrium: Free body diagram; equations of equilibrium; problems in two and three dimensions; plane frames and trusses.

UNIT–II

Friction: Laws of Coulomb friction., problems involving large and small contact surfaces; square threaded screws; belt friction; rolling resistance. *Properties of Areas*: Moments of inertia and product of inertia of areas, polar moment of inertia, principal axes and principal moments of inertia.

UNIT–III

Kinematics and Kinetics of particles: Particle dynamics in rectangular coordinates cylindrical coordinates and in terms of path variables; central force motion.

UNIT–IV

Rigid Body Dynamics: Relative velocity, Translation, Pure rotation and plane motion of rigid bodies, D'Alembert's principle, linear momentum, principle of conservation of momentum, Impact of solid bodies, work, energy, power, principle of conservation of energy.

Text Books:

1. R. K. Bansal, *A textbook of Engineering Mechanics,* Laxmi Publication, 1992.
2. I. H. Shames, *Engineering Mechanics: Statics and Dynamics*, 4/e, PHI, 1996.
3. F. P. Beer and F. R. Johnston, *Mechanics for Engineering*, TMH, 1987.
4. S. Ramamurtham, *Engineering Mechanics*, Dhanpatrai Publishing Company, YP.

Reference Books:

1. R.C. Hibbler, *Engineering Mechanics: Static*, McMillan, 1998.
2. R.C. Hibbler, *Engineering Mechanics: Dynamic*, PHI, 1997.
3. K.L. Kumar, *Engineering Mechanics*, S. Chand. 1997.
4. Timoshenko and Young, *Engineering Mechanics*, McGraw Hill, 1956.
5. A.Nelson, Engineering Mechanics-Statics & Dynamics, McGraw Hill Publications, YP.

EE – 105 BASIC ELECTRICAL ENGINEERING **3-1-0 - 4**

Subject Code:*EE - 105.*
Subject Name:*Basic Electrical Engineering.*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *Three Hours.*

UNIT – I

Engineering Circuit Analysis: Circuit elements, Ohm's law, Kirchoff's law, Nodal Analysis, Mesh Analysis, Source transformations. Linearity and Superposition, Thevenin and Norton Theorems, Maximum power transfer theorem, Star-Delta and Delta-Star Conversion.

UNIT – II

Simple RL and RC Circuits, Unit Step Forcing Function, source free RLC Circuits, Sinusoidal Forcing Function, Complex Forcing Function, Phasor Concept, Impedance and Admittance, Phasor diagrams, Response as a Function of , Instantaneous Power, Average Power, RMS values of Current and Voltage, Apparent Power and Power Factor, Complex Power, Introduction to Three Phase Circuits.

UNIT – III

DC Machines: Principle of DC Generator, Methods of excitation, Characteristics and Applications, Principle of DC Motor, Types, Speed – Torque Characteristic, Speed Control. Transformers: Working principle of Transformers, Equivalent Circuit, Transformer tests.

UNIT –IV

Three Phase Induction Motor: Construction, Production of rotating field, Slip, Torque and Slip. Single Phase Induction Motor: Double field revolving theory, Shaded Pole single phase induction motor. Stepper Motors.

Text Books:

1. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, *Engineering Circuit Analysis*, 6/e, TMH, 2006.
2. V. Del Toro, *Electrical Engineering Fundamentals*, PHI, 1994.
3. D.P. Kothari, I. J. Nagrath, *Theory and Problems of Basic Electrical Engineering*, PHI, 2004.
4. B.L. Thereja and A.K. Thereja, *Electrical Technology,* Vol-II, S. Chand, Reprint 2006.

Reference Books:

1. Van Valkenburg, *Network Analysis*, 3/e, PHI, 2005.
2. J.A. Edminister, *Electric circuits*, 2/e, Eleventh reprint, TMH, 1997.
3. D. Roy Choudhury, *Networks and Systems*, New Age Publishers, 1998.

HU - 111DIGITAL ENGLISH LANGUAGE LABORATORY **0-0-3 - 2**

Subject Code:*HU - 111.*
Subject Name:*Digital English Language Laboratory.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered*:One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of Practical Exercises:

1. Articulation and practice of Vowel sounds and Diphthongs.

2. Articulation and practice of consonant sounds.

3. Practice word and sentence stress with intonation.

4. Practice Oral Presentation skills.

5. Handling telephone calls.

6. Vocabulary practice through situational dialogues.

7. Reporting.

8. Debating.

9. Appearing for personal interview.

10. Writing E-mails.

11. Writing business letter.

12. Drafting Curriculum Vitae/ Resume/Biodata.

13. Using situational dialogues in situations like requests, asking and giving directions,

leaving a message.

Resource Materials:–

A. ***Books*:**

1. Jones, Daniel, *CambridgeEnglish Pronouncing Dictionary with CD*, New Delhi, 2009.
2. Roach, Peter, *English Phonetics and Phonology with CD*, CUP, India, 1983.
3. *Cambridge Learners Dictionary with CD*, CUP, New Delhi, 2009.
4. Rajeevan, Dutt, Sasikumar, *A course in Listening and Speaking I & II with CD,* CUP, New Delhi, 2007.
5. RajeevanandDutt, *Basic Communication Skills,*CUP, New Delhi, 2007.

B. ***Software*:** *Orell Digital Language Lab Software.*

PH - 113ENGINEERING PHYSICS LABORATORY **0-0-3 - 2**

Subject Code:*PH - 113.*
Subject Name:*Engineering Physics Laboratory.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered*:One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of Experiments:

1. To determine the acceleration due to gravity by bar pendulum/Kater's pendulum.
2. To determine the Young's modulus of a wire by micrometer method/ of a bar by flexural method.
3. To determine rigidity modulus of a wire by statical method/dynamical method.
4. To determine the focal length & power of a concave lens by combination with auxiliary convex lens by the displacement method.
5. To find the wavelength of monochromatic light by using Newton's ring method.
6. To determine the wavelength of sodium light by Michelson's interferometer.
7. To determine the wavelength of prominent lines of mercury by plane diffraction grating.
8. To determine he specific rotation of sugar solution by polarimeter.
9. To determine the magnetic moment of a bar magnet (M) and the earth's horizontal intensity (H) (by deflection and vibration magnetometers).
10. To determine the resistance per unit length of a meter bridge wire by Carey- Foster Method.
11. To study decay of current in RC circuit.
12. To determine frequency of a tuning fork by Melde's method.
13. To determine the thermal conductivity of a bad conductor Lee's method.
14. To obtain the hysteresiscurves (B-H) for a ferromagnetic material (thin rod or wire) on a CRO using solenoid and then to determine the related magnetic constants.
15. To study the Hall Effect and determine the Hall Coefficient.
16. To determine the Planck's constant by a Photocell.
17. To determine the e/m value of an electron by any method.

Text Books:

1. Samir Kumar Ghosh, *A Text book of Practical Physics*, New Central Book Agency, Kolkata, 2006.
2. Gupta and Kumar, *Practical Physics*, ProgatiPrakashan, Meerut, U.P.,2005.
3.Harnam Singh, *B.Sc. Practical Physics*, S Chand & Company, 2004.
4. C.L. Arora, *Advance B.Sc. Practical Physics*, S. Chand, 2004.

EE - 115BASIC ELECTRICAL ENGINEERING LABORATORY **0-0-3 - 2**

Subject Code:*EE - 115.*
Subject Name:*Basic Electrical Engineering Laboratory.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered:*One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of Experiments:

1. To verify Thevenin's theorem.

2. To verify Norton's theorem.

3. To verify Maximum Power Transfer theorem.

4. To verify that the phasor sum of currents at any junction in an A.C. circuit is zero.

5. To measure Power and power factor of the load by three ammeters method.

6. To measure Power and power factor of the load by three voltmeters method.

7. To perform Open circuit and Short Circuit Tests on a single phase transformer.

8. To determine the Open Circuit Characteristic of D.C.Generator

9. To measure and control the Speed of D.C. motors using Tachometer.

10. To calibrate an ammeter as voltmeter.

Text Books:

1. W.H. Hayt, J.E. Kemmerly and S.M. Durbin, *Engineering Circuit Analysis*, 6/e, TMH, 2006.
2. B.L. Thereja and A.K. Thereja, *Electrical Technology,* Vol-II, S. Chand & Co., Reprint 2006.

ME - 116WORKSHOP PRACTICE **0-0-3 - 2**

Subject Code:*ME - 116.*
Subject Name:*Workshop Practice.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered*:One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

I. Theory (*about various components involved in Workshop Practice)*

(a) Carpentry: Timber, definition, Engineering applications, seasoning and preservation, plywood and ply-boards

(b) Metal Joining Definitions of welding, brazing and soldering processes, and their applications. Oxy-acetylene glass welding process, equipmentand techniques, types of flames and their applications. Manual metal arc welding technique and equipment, AC and DC welding,electrodes, constituents and functions of electrode coating. Welding positions. Types of weld joint. Common welding defects suchas cracks , undercutting , slag inclusion, porosity.

(c) Metal Cutting: Introduction to machining and common machining operations. Cutting tool materials. Definition of machine tools , specificationand block diagram of lathe, shaper, milling, drilling machine and grinder. Common lathe operations such as turning, parting,chamfering and facing. Quick return mechanism of shaper. Difference between drilling and boring. Files-material andclassification.

II. Experiments : *At least eight (8) experiments need to be conducted*
List of Jobs to be made in the Workshop

(a) Carpentry:
1. T-Lap & L-joints
2. Bridle joint

(b) Metal Joining: Welding Practice.
1. Gas welding practice on mild steel flat
2. Lap joint by Gas welding
3. MMA welding practice by students
4. Square butt joint by MMA Welding
5. Lap joint by MMA Welding
6. Demonstration of brazing
7. Tin smithy for making mechanical joints and soldering of joints

(c) Metal Cutting:
1. Job on lathe with one step turning and chamfering operations
2. Job on shaper and milling machine for finishing two sides of a job
3. Drilling two holes of size 5 and 12 mm diameter on job used / to be used for shaping
4. Grinding a corner of above job on bench grinder
5. Finishing of two sides of a square piece by filing.

Text Books:

1. HajraChoudhary, *Elements of Workshop Technology*, Vol.I& II, Media Promoters & Publishers, 2002.
2. M.L. Begeman and B.H. Amstead, *Manufacturing Process*, John Wiley, 1968.
3. W.A.J. Chapman and E.Arnold, *Workshop Technology*, Vol. I & III, Viva Low Priced Student Ed., 1998.
4. B.S. Raghuwanshi, *Workshop Technology*, Vol. I & II, DhanpatRai and Sons, 1998.
5. Khanna , O.P., *Workshop Technology*,DhanpatRai Publications, 1998.
6. S.Crawford, *Basic Engineering Processes*, Hodder& Stoughton, 1985.
7. T. Jeyapoovan,*Workshop Practics*, Vikas Publication, 2001.
8. Juneja B.L., *Fundamentals of Metal Cutting & Machine Tools*, New Age International, 1995.
9. Kuppuswamy, G., *Principle of Metal Cutting*, Universities Press/Orient Longman, YP.

Semester-II

ES - 201 ELEMENTS OF ENVIRONMENTAL SCIENCE **2-1-0 - 3**

Subject Code:*ES - 201.*
Subject Name:*Elements of Environmental Science.*
No. of Hours Per Week:*Lectures-2, Tutorial-1*
Marks Distribution:*Sessional Works = 40, End Semester Examination = 60.*
Questions to be set:*Six (one from each unit and remaining three from the combination of more than one unit).*
Questions to be answered:*Any four.*
Duration of End Semester Examination: *Two and half Hours.*

UNIT-I

*Environment,ecosystems and biodiversity:*Concept of environment*:* components of environment and their interactions; abiotic and biotic factors; Ecosystems: characteristic feature and structure and function of forest, grassland, desert and aquatic ecosystem (Ponds, streams, lakes, rivers, oceans, estuaries); Ecological pyramid; energy flow and nutrient cycling; Biodiversity: value of biodiversity; loss and conservation of biodiversity

UNIT-II

*Environmental problems and issues:*Environmental problems and issues: green house effect, ozone depletion, acid rain; Renewable and non renewable resources; natural resources, associated problem and its conservation: forest, water, mineral, food, energy and land resources; environmental impact assessment; environment protection act.

UNIT-III

*Environmental pollution and management:*Environmental pollution: sources and types of air, water, soil, radioactive and noise pollution; Industrial pollutants and their impact on environment and human health; Toxicants and toxicity; toxic chemicals: heavy metals and pesticides; Safety and prevention of industrial pollution; bio-transformation and bio-remediation; Aerobic and anaerobic treatment of waste water; waste management and cleaner production.

Text Books:

1. W.P. Cunningham, and W.B. Saigo, *Environmental Science,* McGraw Hill, New York, 1999.
2. E.P. Odum, and G. W. Barrett, *Fundamentals of Ecology*, Thomson Asia Pvt. Ltd., Singapore, 2005.
3. E. Bacci, *Contaminants in the Environment*, CRC Press, 1994.
4. T. Ingold, *The Perceptions of Environment*, Routledge (Taylor and Francis Group), UK, 2000.

Reference Books:

1. N. J. Sell, *Industrial Pollution Control: Issues and Techniques*, Wiley Pub., 1992.
2. Gilbert M. Masters, *Introduction to Environmental Engineering and Science*, 2/e, PHI, 1997.
3. VenugopalRao, *Textbook of Environmental Engineering*, PHI, 2003.
4. S. S.Dara, *A Text Book of Environmental Chemistry and Pollution Control*, 7/e (revised), S. Chand and Co. Ltd., 2006.
5. C. Park, *The Environment: Principles and Applications*, Routledge (Taylor & Francis Group), UK, 2001.

MA - 202 ENGINEERING MATHEMATICS - II **3-1-0 - 4**

Subject Code:*MA - 202.*
Subject Name:*Engineering Mathematics - II.*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *Three Hours.*

UNIT-I

*Functions of several variables***:** Partial derivatives. Chain rule, Standard Jacobians for change of variables. Gradient and directionalderivatives.Tangent planes and normal.Exact differentials.Euler's theorem on homogeneous functions. Repeated and multiple integrals, maxima and minima for several variables, method of Lagranges multipliers.

UNIT-II

*Vector Calculus***:** Vector valued function of one or more variables (up to 3), derivatives of such a function of one variable. Gradient of a scalar valued function. Geometrical and physical properties of gradient. Divergence and Curl of vector valued functions. Line, surface, and volume integrals. Green's theorem, Gauss's divergence theorem and Stoke's theorem in Cartesian coordinates ,Spherical and Cylindrical polar coordinates (statements only with applications).

UNIT-III

*Complex Analysis:*Analytic functions, Cauchy-Riemann equations, Laplace equations. Elementary functions, Conformalmappings.Cauchy's integral theorem, Cauchy's integral formula, Taylor series and Laurent series. Residues and its applications to evaluating real integrals.

UNIT- IV

Laplace and Fourier Transforms: Laplace transforms. Inverse transform.Shifting on the s and t axes, convolutions, partialfractions. Fourier series and Fourier transforms. Solutions of ordinary as well as partial differential equations by Laplace andFourier transforms.

Text Books:

1. Mersden,J.E., *Basic Complex Analysis*,4/e, W.H.Freeman, Houndmills,Hampshire, 2008.
2. Spiegel, *Fourier Analysis with application and Laplace Transforms*, TMH, reprint, 2010.
3. E. Kreyszig, *Advance Engineering Mathematics*, 9/e, J. Willey & Co, 2009.
4. B. C. Das and B.N. Mukherjee, *Differential Calculus*, 5/e,U.N.Dhur& Sons Pvt. Ltd., 2010.

Reference Books:

1. S. Narayan, *Vector Calculus*, S. Chand & Co, 1974.
2. T. M. Apostol, *Calculus*, 2/e, J. Willey, 1969.
3. *Schuams outline:Complex Variable*,TMH, 2009.
4.B. K. Pal and K.Das, *Engineering Mathematics*, Vol. 1 &2,3/e, U.N.Dhur& SonsPvt. Ltd., 2010.

CH - 203 ENGINEERING CHEMISTRY **3-1-0 - 4**

Subject Code: *CH - 203.*
Subject Name: *Engineering Chemistry.*
No. of Hours Per Week: *Lectures-3, Tutorial-1*
Marks Distribution: *Sessional Works = 60, End Semester Examination = 90.*
Questions to be set: *Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered: *Any five.*
Duration of End Semester Examination: *Three Hours.*

UNIT - I

Chemical Thermodynamics: Second law of thermodynamics, entropy and its physical significance, entropy change of ideal gases, free energy (Gibbs and Helmholtz), thermodynamic properties for reversible and irreversible processes, equilibrium constant from thermodynamic considerations, Maxwell's relationships, Gibbs-Helmholtz equation, Clapeyron-Clausius equation, concept of chemical potential with examples, Van't Hoff reaction isotherm, third law of thermodynamics and its applications.
Fundamentals of Instrumental analysis: UV-VIS, IR and Fluorescence spectrophotometry.

UNIT - II

Organic Chemistry: Structures and functions of biologically important molecules (Carbohydrates, Amino acids, Proteins and Nucleic acids), E-Z and R-S systems of nomenclature of organic molecules, conformation and conformation analysis for certain organic systems.
Polymers: Classification and structures of polymers, commercially important polymers like teflon, bakelite, nylon, polyester, polyurethane, Silicon resins, etc.).

UNIT - III

*Electrochemistry:*Behaviour of strong electrolytes with concentration, electrochemical cells, EMF and applications of EMF measurements, commercially important cells and corrosion (its chemistry and remedial methods).
Chemical Kinetics: General discussion on the reactions of different orders including their rate laws with examples, problems based on first and second order reactions, pseudo-uniorder reactions, theories of reaction rates (collision and transition state theories), activation energy and catalytic reactions. Lasers in chemistry and its applications.

UNIT-IV

Coordination Chemistry: Structure of coordination compounds corresponding to coordination no. up to 6, types of ligands, EAN, isomerisms, bonding in coordination compounds (VBT and MOT), Application of organometallic chemistry in biomolecules (Vitamin B_{12} and Heamoglobin).
Water and its hazard in industry – Hard and soft waters, disadvantages of hard water in industries, estimation of hardness of water, treatment of industrial water (external and internal methods).

Text Books:

1. Prakash, Tuli, Basu andMadan, *Advanced Inorganic Chemistry*, Vol. I & II, (Diamond Ed), S. Chand, reprinted, 2006.
2. Morrison and Boyd, *Organic Chemistry*, 6/e, Prentice Hall of India, reprinted, 2006.
3. Jain and Jain, *Engineering Chemistry*, DhanpatRai Publishing Co., 2008.
4. Levine, *Physical Chemistry*, 5/e (7th reprint), Tata McGraw Hill, 2006.

Reference Books:

1. Shriver, Atkins and Langford, *Inorganic Chemistry*, 2/e, ELBS, 1994.
2. S.H.Pine, *Organic Chemistry*, 5/e (special Indian ed.), TMH, 2007.
3. BanwellandMcCash, *Fundamentals of Molecular Spectroscopy*, 4/e, Tata Mc-Graw Hill, 1962.
4. Cotton, Wilkinson andGaus, *Basic Inorganic Chemistry*, 3/e, John Wiley & Sons, Inc., 1996.
5. I.L.Finar, *A Textbook of Organic Chemistry*, 6/e, Vol. I & II, ELBS, 2006.

IT - 204 COMPUTER SYSTEMS AND PROGRAMMING **3-1-0 - 4**

Subject Code:*IT - 204.*
Subject Name:*Computer Systems and Programming.*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *Three Hours.*

UNIT-I

*Digital computer fundamentals***:** Functional components of computer, Von Newman Architecture, Algorithm and flowcharts, Datarepresentation, Programming languages, Function of system software.

UNIT-II

*Imperative programming (Using C)***:** Overview of C, Constants, Variables and Data Types, Operators and Expressions, Input andOutput Operations, Branching and looping operation.

UNIT-III

*Functions***:** Defining a function, accessing a function, passing arguments to a function, specifying argument data types, functionprototypes and recursion, storage classes. *Arrays***:** Defining an array, processing an array, passing arrays to a function,multidimensional arrays, strings, string handling functions.

UNIT-IV

*Structures and Unions***:** Defining and processing of structure and union, Array of structure, array within structure, passing ofstructure as argument.
*Pointers***:** Fundamentals, pointer declarations, passing pointers to a function, pointer and one dimensionalarrays, pointer as function arguments, Functions returning Pointer, Pointer to functions, pointers and structures.

UNIT - V

*File Management***:** Introduction, Defining and Opening a File, Closing a File, Input/Output Operations on Files, Error Handling during I/O Operations, Random Access to Files, *Command Line Arguments*.

Text Books:

1. V. Rajraman, *Fundamental of Computer*, 4/e, PHI, 2006.
2. E. Balaguruswami, *Programming in ANSI C*, 2/e, Tata McGraw Hill, 2004

Reference Books:

1. Y. Kanetkar, *Let us C*, BPB Publication, 2004.
2. A. Kelley and I. Pohl, *A Book on C*, 4/e, Pearson Education, 1998.
3. B. W. Kernighan and D. Ritchie, *The C Programming Language*, 2/e, PHI, 2005.

EC - 205 BASIC ELECTRONICS **3-1-0 - 4**

Subject Code:*EC - 205.*
Subject Name:*Basic Electronics.*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *Three Hours.*

UNIT – I

Passive components: Resistors, capacitors and inductors: types and characteristics and their applications.
Semiconductors: Energy bands in silicon, intrinsic and extrinsic, carriers transport in silicon: diffusion current, drift current, mobility and resistivity. Generation and recombination of carriers, Semiconductor materials.
PN junction diode: General idea of a PN junction diode, Reverse and forward biased characteristics, Transition capacitance and diffusion capacitance.

UNIT –II

PN Junction diode applications: Half wave rectifier, full wave center- tapped and bridge rectifier Clipping and clamping circuits.
*Introduction to Special purpose diode characteristics and applications:*Zener diode, Photo diode, Varactor diode, Light emitting diode, Schottky diode, Tunnel diode.

UNIT – III

BJT, FET (JFET & MOSFET) andUJT: Construction, symbols, principle of operation, different configurations, study of characteristics, limitations and applications, Application of BJT as amplifiers.
Biasing and stabilization of BJT: Q point, Graphical analysis (DC and AC load line), fixed bias, collector bias, self bias.

UNIT – IV

Digital Electronics: Number systems and codes, logic gates, Boolean theorems, De-morgan's theorems, Boolean algebra, minimization of Boolean functions; Karnaugh map up to four variables.

Text Books:

1. Boylestead and Nashelsky, *Electronic Devices and Circuits Theory*, 9/e, PHI, 2006.
2. Bernard Grob and Mitchel Schultz, *Basic Electronics*, 9/e, TMH, 2003.
3**.** Morris Mano, *Digital Design*, 3/e, PHI, 2006.
4. J. Millman and C. C. Halkias, *Integrated Electronics, 42nd Reprint,* TMH, 2006.

Reference Books:

1. A.P.Malvino, *Electronic Principles*, 6/e, TMH, 1998.
2. R.P.Jain, *Modern Digital Electronics*, 3/e, TMH,2003.
3. R.J. Tocci, *Digital Systems,* 6/e, PHI,2001.

CH - 213ENGINEERING CHEMISTRY LABORATORY **0-0-3 - 2**

Subject Code:*CH - 213.*
Subject Name:*Engineering Chemistry Laboratory.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination - 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered*:One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of Experiments:

1. Volumetric estimation of Mg^{2+} and Ca^{2+} ions by EDTA titration (Hardness of water).
2. Volumetric estimation of Fe^{2+} ions by permanganatometry.
3. Preparation of an inorganic complex like, potassium chlorochromate, sodium cobaltinitrate, $Fe(acac)_3$, etc.
4. Determination of concentration of the given liquid mixture by viscosity measurement.
5. Determination of partition-coefficient of iodine between carbon tetrachloride and water.
6. Determination of integral heats of dilution of the sulphuric acid solutions, and to determine the strength of the given unknown acid solution.
7. Standardisation of a strong acid by conductometric titration with a strong base.
8. Experimental verification of Hasselbach-Henderson equation by pH measurement for a buffer mixture.
9. Determination of rate constant of the acid-catalysed hydrolysis of methyl acetate.
10. Verification of Beer-Lambert's law with potassium permanganate and the estimation of potassium present in the given solution.
11. Systematic qualitative analysis of organic compounds containing one functional group :
    a. Detection of element out of N, S, Cl, Br, I

b. Detection of a functional group out of -COOH, $-NO_2$, -OH (alcoholic or phenolic), >CO carbonyl, $-NH_2$ group.

12. Synthesis and characterization (by m.p. method) of para-nitro acetanilide.

Text Books:

1. Pandey, Bajpai andGiri, *Practical Chemistry*, 8/e (reprinted), S.Chand & Co. Ltd., 2006.
2. Gurtu&Kapoor,*Advanced Experimental Chemistry*, Vol. I – III, 4/e (reprinted), S.Chand & Co. Ltd., 1989.

Reference Books:

1. *Vogel's Textbook of Quantitative Chemical Analysis*, 5/e, ELBS, 1991.
2. *Vogel's Textbook of Practical Organic Chemistry*, 5/e, ELBS, 1996.

IT - 214COMPUTER PROGRAMMING LABORATORY **0-0-3 - 2**

Subject Code:*IT - 214.*
Subject Name:*Computer Programming Laboratory.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered:*One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of Programs:

1. Assignments on Operators and Expressions: At least three C programs using operators and expressions.

2. Assignments on Branching: At least five C programs using if, switch-case construct of C.

3. Assignments on Looping: At least three C programs (each), incorporating for loop, while loop and do-while loop.

4. Assignments on Array: At least three C programs using array (1D and 2D)

5. Assignments on String: string manipulation and use of standard library functions in C.

6. Assignments on Function: At least three C programs using function, Demonstration call-by-value and call-by-address, passingarray (1D and 2D) to a function, at least two C programs related to recursive function.

7. Assignments on Pointer: At least three C programs using pointer, function and array.

8. Assignments on Structure & Union: At least one C program using structure, demonstration of difference between structureand union.

9. Assignments on File handling and Commands line arguments: C programs involving opening, closing, reading/writing a file.Copy content of one file to another file using commands line arguments.

Text Books:

1. B.S.Gotfried, *Programming in C*, Schuam Outline Series, TMH, 2005.

EC - 215 BASIC ELECTRONICS LABORATORY **0-0-3 - 2**

Subject Code:*EC - 215.*
Subject Name:*Basic Electronics Laboratory.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered:*One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of Experiments:

1. To Study the VI Characteristics of Silicon Diode.

2. To Study the VI Characteristics ofZener Diode.

3. Design and Analysis of a Half wave Rectifier using Diode.

4. Design and Analysis of a center-tap Full wave Rectifier using Diodes

5. Design and Analysis of a Bridge Rectifier Circuit.

6. Design and Analysis of a Clipping Circuit with one voltage source.
(*Different possible configurations*)

7. Design and Analysis of a Clipping Circuit with two voltage source.
(*Different possible configurations*)

8. Design and Analysis of a Clamper Circuit.

9. Analysis of the characteristics of BJT (CE and CB mode)

10. Design and Analysis of fixed bias circuit using NPN transistor (DC)

11. Design and Analysis of emitter bias circuit using NPN transistor (DC)

12. Study of the characteristics of JFET.

13. Study of the characteristics of MOSFET.

14. Verification of truth tables of logic gates.

Text Books:

1. Boylestead and Nashelsky, *Electronic Devices and Circuits Theory*, 9/e, PHI, 2006.
2.R.P.Jain, *Modern Digital Electronics*, 3/e, TMH,2003.

CE - 216ENGINEERING GRAPHICS **0-0-3 - 2**

Subject Code:*CE - 216.*
Subject Name:*Engineering Graphics.*
No. of Hours Per Week:*Practicals-3.*
Marks Distribution:*Sessional Works = 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered:*One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of Drawing Plates/Sheets:

1. Introduction of Drawing (*Sheet layout and Sketching, Lines, Lettering and Dimensioning).*

2. Geometrical Constructions (*Bisecting a lines, Perpendicular lines, divide a lines,*

Construction of Polygons).

3. Conics and Engineering Curves (*Ellipse, Parabola, Hyperbola*).

4. Conics and Engineering Curves (*Cycloid, Epicycloid, Hypocycloid, Trochoid, Involute*).

5. Projection of Points.

6. Projection of Lines.

7. Projection of Planes.

8. Projection of Solid (*Cube, Prism, Pyramids*).

9. Projection of Solid (*Cylinder, Cone and Sphere*).

10. Isometric projection of solids (*Prisms, Pyramids, Cylinders, Cone and Sphere*).

11. Development of Surfaces (*Truncated Cylinder, Square Prism, Pyramid, Truncated Cone*).

12. Introduction to CAD Tools (*Scale, Units, Draw, Modifying, Dimension, Sheet Layout, Plotting*).

Text Books:

1. T. E. French, C.J. Vierck and R. J. Foster, *Engineering Drawing and Graphics Technology***,** TMH, 1987.
2. N. D. Bhatt and V.M. Panchal, *Elementary Engineering Drawing*, Charotar Publishing House, 1996.

Reference Books:

1. K.Venugopal, *Engineering Drawing and Graphics*, New Age, 2005.
2. DhananjanJohle, *Engineering Drawings*, McGraw Hill Education Pvt. Ltd.,

GP-I General Proficiency-I **0-0-0 - 2**

Subject Code : *GP-I*
Subject Name : General Proficiency-I
Marks Distribution : *End Semester Exams*: 50

Proficiency will be evaluated through viva/seminar covering the subjects studied during Semester-I and Semester-II.

Semester-III

HU – 301 Engineering Economics and Financial Accounting 3-1-0 - 4

Subject Code	: *HU - 301*
Subject Name	: *Engineering Economics and Financial Accounting*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I

*Introduction***:** Managerial Economics - Relationship with other disciplines - Firms: Types, objectives and goals - Managerial decisions - Decision analysis.

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UNIT-II

DEMAND & SUPPLY ANALYSIS: Demand - Types of demand - Determinants of demand - Demand function – Demand Elasticity - Demand forecasting - Supply - Determinants of Supply - Supply function - Supply elasticity.

UNIT-III

PRODUCTION AND COST ANALYSIS function - Returns to scale - Production optimization - Least cost input - Isoquants - Managerial uses of production function.

Cost Concepts - Cost function – Types of Cost - Determinants of cost - Short run and Long run cost curves - Cost Output Decision

- Estimation of Cost.

UNIT-IV

PRICING: Determinants of Price - Pricing under different objectives and different market structures - Price discrimination - Pricing methods in practice – role of Government in control.

UNIT- V

FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT): Balance sheet and related concepts - Profit & Loss Statement and related concepts - Financial Ratio Analysis - Cash flow analysis - Funds flow analysis – Comparative financial statements - Analysis & Interpretation of financial statements.

Investments - Risks and return evaluation of investment decision - Average rate of return - Payback Period - Net Present Value -

Internal rate of return**.**

TEXT BOOKS:

1. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.

2. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

REFERENCES:

1. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.

MA – 302 ENGINEERING MATHEMATICS – III **3-1-0 - 4**

Subject Code: *MA - 302.*
Subject Name:*Engineering Mathematics - III.*
No. of Hours Per Week:*Lectures-3, Tutorial-1.*
Marks Distribution:*Sessional Works = 60, End Semester Examination =90.*
Questions to be set: *Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five*

UNIT-I

Introductory Linear Algebra: Vector spaces (over the field of real and complex numbers). Matrices and determinants, linear transformation. Rank of system of linear equations and their solutions. Inverse of matrix. Equivalent, Elementary, Echelon, normal matrices,Similar matrices,Bilinear forms,Diagonalisation of matrices.Rotational,Pauli spin,Dirac matrices.

UNIT-II

Numerical Methods I: Bisection method, Newton Raphsons and secant methods for roots of nonlinear equations. Polynomial interpolation, divided differences, Numerical Differentiation and Integration,Trapezoidal and Simpson's Rule.

Numerical Methods II: Solution of linear systems, Gaussian elimination, LU factorization, I11-conditioning and error bounds, Eigen value problem, inverse iterations.

UNIT-III

Applied Linear Algebra: Classification of quadrics in space. Variation of Parameters for second order linear O.D.E. with variable
coefficients. ordinary linear differential equations of n-th order, solutions of homogeneous equations. Operator method. Methods
of undetermined coefficients and variation of parameters (simple problems only). Applications to physical sciences and engineering problems. Frobenius method.

UNIT-IV

Number Theory: Divisility,Primes,Congruences,The Totient Function ø(n),Quadratic Residues,The Legendre symbol,The Jacobi symbol.
Brief reviews of the Number Theoretic Groups.

Text Books:

1. K.E. Atkinson, "Introduction of Numerical Analysis", 2nd Ed, John Wiley, 1989.
2. G.Strang:Linear Algebra & its applications 4th e/2007 Thomson BROOKS/COLE
3. I.Niven,H.S.Zuckerman & L.Montegoomry: An Introduction to the Theory of Numbers 4th e/2004,Wiley pvt ltd
4.Krishnamurty,Mainra &Arora : An Introduction to Linear Algebra e/2006,Affiliated East-West Press Pvt Ltd

Reference Books:

1. Ramanna "Higher EngineeringMaths.", Tata Mcgraw Hill.
2. T.M. Apostol, "Calculus, Volume II", 2nd Edition, Wiley, 1969. 3.David M.Burton :Elementary Number Theory ,6th e/2006,TMH,5.k.k.jha:Linear Algebra,e/2009,Navbharat Pub.

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EC – 303 SIGNALS AND SYSTEMS **3-1-0 - 4**

Subject Code: *EC- 303.*
Subject Name: *Signals and Systems.*
No. of Hours Per Week: *Lectures-3, Tutorial-1.*
Marks Distribution: *Sessional Works =60, End Semester Examination = 90.*
Questions to be set: *Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered: *Any Five.*
Duration of End Semester Examination: *Three Hours.*

UNIT– I

Introduction: signals and systems, examples of signals and systems; signal types: energy and power signals, continuous and discrete time signals, analog and digital signals, deterministic and random signals; signal properties: Symmetry, periodicity, and absolute integrability. Systems and system properties: linearity, shift-invariance, causality, stability, realizability; Continuous time and discrete time linear shift-invariant (LSI) systems: the impulse response and step response; response to arbitrary inputs: convolution, interconnections; characterization of causality and stability of linear shift-invariant systems;

UNIT– II

Signal representation: signal space and orthogonal bases of signals, Fourier series representation; Fourier Transform and properties, Parseval's Theorem, time-bandwidth product; Phase and group delays; Hilbert transform, pre- envelope. Spectral Analysis: Energy, power, Parseval's theorem, Energy, Power Spectral density functions (PSDF), the autocorrelation function, Cross correlation function, relationship between PSD function and the auto correlation function.

UNIT– III

Complex Frequency, Laplace Transforms, Shifting theorems, initial value theorem, final value theorem, effects of differentiation and integration in time domain. System transfer function, poles and zeroes, impulse response convolution, transient and steady state analysis (R-L-C circuit), solution of linear differential equations.

UNIT– IV

Discrete signals, z-transform and Inverse z-transforms, relation between s–plane and z–plane. Shifting theorem.Initial value theorem and final value theorem, Transfer function of delay unit, realization of z-domain transfer function, unit sample response convolution.Solution of difference equations.

TextBooks:

1. A.V.Opponheim, A.S.WillskyandNawab, *SignalsandSystems*, 2/e, PHI, 2006.
2. RobertA. Grabel and RichardA.Roberts, *Signalsand Linear System*, JohnWilley and Sons, 1987.

Reference Books:

1. R.F. Ziemer,W.H. Tranterand D.R. Fannin,*Signalsand Systems – Continuousand Discrete*, 4/e, PHI,2005.
2. I. J.Nagrath, S.N. Saran, R.RanjanandS. Kumar,*Signals and Systems*, TMH,2001.
3. Roberts,*SignalandSystems:Analysis usingTransformed Methodand MATLAB*, TMH, 2003.
4. RonaldBracewell,*TheFourierTransformand Its Applications*,3/e,TMH, 2003

IT – 304 Computer Graphics and Multimedia **3-1-0 - 4**

Subject Code	: *IT - 304*
Subject Name	: *Computer Graphics and Multimedia*
No. of Hours Per Week	: *Lecture –3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	*: 3 hours*

UNIT-I

*Introduction***:** organization of an interactive graphics system, Scan conversion-DDA and Brasenham's line drawing algorithms, Brasenham's circle generation algorithm, Algorithm for ellipse generation, aliasing and anti-aliasing.

UNIT-II

*Filling***:** Polygon filling algorithms, clipping-line clipping, polygon cliping, *2D transformations*: Scaling, rotation, translation, homogeneous co-ordinates, rotation about arbitrary points.

UNIT-III

*3D Graphics***:** 3D primitives, projections (parallel and prospective), isometric viewing transmissions, hidden surface and line removal techniques: Painters algorithms, Z-buffers algorithms, Warnock's algorithms, 3D clipping.

UNIT-IV

*Introduction to multimedia***:** Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications. Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption, Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI

UNIT-V

*Image***:** Formats, Image Color Scheme, Image Enhancement,Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation, Synchronization: Temporal relationships, synchronization accuracy specification factors, quality of service

Text Books:

1. D. Hearn and M. P. Baker, "Computer Graphics", 3rd Ed, Prentice Hall, 2004.
2. Ralf Steinmetz and Klara Nahrstedt , "Multimedia: Computing, Communications & Applications" , Pearson Ed

Reference Books:

1. J. D. Foley, A. van Dam, S. Feiner, and J. F. Hughes, "Computer Graphics: Principles and Practice", 2nd Ed, Addison-Wesley, 1996.
2.V. Neuman and Sproul, "Interactive Computer Graphics", TMH 2004
3. Prabhat K. Andleigh & Kiran Thakrar , "Multimedia Systems Design" , PHI
4. Fred Halsall , "Multimedia Communications" , Pearson Edition.
5. J. Hill: Computer graphics using open GL, 2nd Edition 2004.

IT – 305 Data Structure and Algorithms **3-1-0 - 4**

Subject Code	: *IT - 305*
Subject Name	: *Data Structure and Algorithms.*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I

Introduction to Data structure, Time and Space analysis of Algorithms, Order Notations, *Linear Data Structures***:** *List:* array and link list representation, insertion, deletion and searching elements in a list, traversing a list, Sparse matrices, doubly link lists-traversing, inserting, deleting, searching in a doubly link list, *Stack:*- Array and Link list representation, operations on stacks, its application in prefix, postfix and infix expression, *Queue***:** array and link list representation, insertion and deletion operations on queue, Dequeues, and Circular queue implementation and operations associated.

UNIT-II

*Non-linear Data Structure***:** Introduction to Tree, Representation of Tree, Binary Trees, Tree traversals, Introduction and representation of binary search tree.

UNIT-III

*Binary Search Tree***:** Searching, insertion and deletion operation in a Binary Search Tree. *AVL tree***:** representation, searching, inserting and deleting in AVL tree, B-trees- representation, searching, insertion and deletion in a B Tree

UNIT-IV

*Graphs***:** Introduction to graph theory, array and link list representations, Breadth-first and Depth-first Search. Minimum Spanning tree algorithms-Kruskal's algorithms, shortest path algorithms- Warshall's algorithms.

UNIT-V

*Sorting and Searching Algorithms***:** Bubble sort, Selection Sort, Insertion Sort, Quick sort, Merge Sort, Heap sort. Linear Search, Binary Search, *Hashing:* Hashing functions, searching using hash technique, Collision avoidance techniques- linear probing, separate chaining.

Text Books:

1. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., "Data Structures and Algorithms",Addison Wesley**.**
2. S Lipschutz, "Data Structures", 4th Ed, TMH-2006.
3. Horowitz Ellis & Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Publ.

Reference Books:

1. Y Langsum, M J Augenstein, A M Tenenbaum, "Data Structures using C and C++", 2nd Ed, PHI.
2. M.Radhakrishnan, V.Srinivasan, "Data Structure Using C " , ISTE/EXCEL BOOKS

IT-306 Discrete Mathematics **3-1-0 - 4**

Subject Code	: *IT- 306*
Subject Name	: *Discrete Mathematics*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: 8 *(One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I

Relations: Types of relations; Matrix representation of relations,Representation of relations as graphs; Ordering; Partial Ordering; Functions; Composition of Functions, Binary and n-ary Operations,Characteristic Functions of a set-Hashing functions,Recursion: Primitive recursive functions, Recursive functions. Lattices as Partially Ordered Sets-Properties of Lattices, Sublattices, Direct Product and Homomorphisms, Isomorphisms, Modular Lattices, Distributive lattices, Complimented lattices & their Properties

UNIT-II

*Logic***:** propositional logic (formulae, truth tables, proof systems, soundness and completeness of proof systems), predicate logic (formulae, interpretations, proof systems, soundness and completeness of proof systems).

UNIT-III

*Combinatorics***:** permutations, combinations, partitions, Stirling numbers. Recurrences, summations, generating functions, asymptotic.

UNIT-IV

*Graph Theory***:** paths, connectivity, sub graphs, isomorphic and homeomorphic graphs, trees, complete graphs, bipartite graphs, matching, colourability, planarity, digraphs.

UNIT-V

*Algebraic Structures***:** semigroups, groups, subgroups, homomorphisms, rings, integral domains, fields. The application of residue arithmetic to Computers- Group Codes.

Text Books:

1. J. P. Tremblay and R. P. Manohar, "Discrete Mathematics with Applications to Computer Science", Tata McGraw-Hill, 1997.
2. S. Lipschutz and M. L. Lipson, "Schaum's Outline of Theory and Problems of Discrete Mathematics", 2nd Ed, Tata McGraw Hill, 1999.

Reference Books:

1. C. L. Liu, "Elements of Discrete Mathematics", 2nd Ed, Tata McGraw-Hill, 2000.
2. R. L. Graham, D. E. Knuth, and O. Patashnik, "Concrete Mathematics", 2nd Ed, Addison-Wesley, 1994.
3. N. Deo, "Graph Theory with Applications to Engineering and Computer Science", Prentice Hall of India, 1974.

Practical:

IT– 314 Computer Graphics & Multimedia Laboratory **0-0-3 - 2**

Subject Code : *IT - 314*
Subject Name : *Computer Graphics & Multimedia Laboratory*
No. of Hours Per Week : *3 hours.*
Marks Distribution : *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered : *One will be allotted to a student on lottery basis*
Examination duration : *3 hours*

List of Programs:

1. Programs (in C) for line drawing using DDA and Breshnam's algorithms.
2. Programs (in C) for circle generations using Breshnam's algorithms.
3. Program (in C) for ellipse generations.
4. Program (in C) for implementing 2D transformations.
5. Animation using motion tween, shape tween & guided motion tween.
6. Construct a scenario with help of three given object. Theme is one background scene, flying birds(Add different color) and rising sun.
7. Create an animated text & give color changing effects on the text..
8. Write your animated name. Give different type of effect in each character of your text using Movie-clip.
9. Create a golf playground .Where a man strikes the ball (add a sound) and it is drop in the hole (with help of motion guide layer).Incorporate sound on this.
10. Create a masking text. Text is your own name.
11. Create an animated button, when we press the button its open a web page.
12. Create a clock in flash (both digital and analog), and incorporate sound

Text Books:

1. D. Hearn and M. P. Baker, "Computer Graphics", 3rd Ed, Prentice Hall, 2004.
2. Ralf Steinmetz and Klara Nahrstedt, "Multimedia: Computing, Communications & Applications" , Pearson Edn.

IT – 315 Data Structure Laboratory **0-0-3 - 2**

Subject Code	: *IT - 315*
Subject Name	: *Data Structure using C Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3hours*

List of Programs:

1. Array implementation of Stacks, Queue, and Circular queue and dequeue data structures.
2. Link List implementation of Stacks, Queue, Circular queue and dequeue data structures.
3. Implementation on conversion of infix expression to prefix and postfix using Stack,
4. Implementation on evaluation of expression using Stack.
5. Link list representation of binary tree and perform insertion, deletion operation on it.
6. Implementation of tree traversals techniques (in order, preorder and post order traversals).
7. Implementation of binary search tree and perform searching on it.
8. Implementation of Breath first search in a graph.
9. Implementation of Depth first search in a graph.
10. Implementation of Kruskal's algorithms.
11. Implementation of Warshall's algorithms.
12. Implementation of Insertion sort techniques.
13. Implementation of Bubble sort techniques.
14. Implementation of Selection sort techniques.
15. Implementation of Heap sort techniques.
16. Implementation of Binary search techniques.
17. Implementation of Hashing using chaining and linear probing technique.

Text book:

1. S Lipschutz, "Data Structures", 4th Ed, TMH-2006.

IT-317 Numerical Programming Laboratory **0-0-3 - 2**

Subject Code	: *IT –317*
Subject Name	: *Numerical Programming Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3 hours*

List of Programs:

1. Implementation of Newton forward & backward Interpolation methods.
2. Implementation of Lagrange methods.
3. Implementation (at least two) of Numerical Integration: Trapezoidal Rule, Simson's 1/3 Rule, Weddle's Rule.
4. Implementation (at least two) of Gauss elimination, Gauss Jacobi, Matrix Inversion, Gauss Seidal for solving linear equation.
5. Implementation (at least two) of Bisection methods, Secant method, Regular-falsi method, Newton Raphson methods.
6. Implementation (at least one)of Equation: Taylor Series, Euler's method, Runga-Kutta
7. Implementation of Statistical Problems: Mean, Median, Mode, Standard deviation (for simple & frequency type data)
8. Implementation of Correlation & Regression techniques.

Text Books:

1. P. Ghosh, "Numerical methods with Computer Programming in C++", PHI, 2006.

Semester IV

MA–401 Statistics and Random Processes

Subject Code: *MA - 401.*
Subject Name: *Statistics and Random Processes*
No. of Hours Per Week:*Lectures-3, Tutorial-1*
Marks Distribution:*Sessional Works = 60, End Semester Examination = 90.*
Questions to be set:*Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any five.*
Duration of End Semester Examination: *ThreeHours.*

UNIT - I

Introduction to probability: Events, Set, set operations, sigma and Borel fields, classical and relative frequency based definitions of probability, axiomatic definition of probability, conditional probabilities, independence, total probability, Baye's rules and applications, Repeated trails. *Random variables*: Continuous and discrete random variables, cumulative distribution function (cdf), probability mass function(pmf), probability density functions(pdf) and properties. *Some special distributions*: Binomial and Poisson discrete distributions, Uniform, exponential, Gaussian and Raleigh continuous distributions.

UNIT - II

Two dimensional random variables: joint distribution and density functions, marginal probability distribution, conditional probability distribution, independence. Functions of random variable, functions of two random variables, n - varaite random variables. Expected value of a random variable(s), mean, variances and moments of random variables, Joint moments, conditional expectation, covariance and correlations, independence, uncorrelated and. Random vector: mean vector, covariance matrix and properties, Multivariate Gaussians distributions, vector- space representation of random variables, linear independence, inner product, Schwarz inequality.

UNIT - III

Sequence of random variables: almost sure and mean square convergence, convergence in probability and distribution, law of large numbers, central limit theorem. *Elements of estimation theory* orthogonal random variables - Linear minimum mean-square error and orthogonality principle in estimation, Bounds and approximations- Chebyshev's inequality and chernoff bounds. Hypothesis testing, Moment generating and characteristic functions and their applications.

UNIT - IV

Random Proccess: Discrete and continuous time processes, probabilistic description of random process, mean, auto correlation and auto covariance functions. *Stationarity*: strict sense stationary (SSS), wide sense stationary (WSS) processes, auto correlation functions of a WSS process and its properties, Cross correlation functions. Ergodicity, spectral representation of a real WSS process, Spectral factorization theorem. White noise process and white noise sequence. Gaussian process, Poison process and Markov processes.

Text Books:

1. A, Papoulis and S.U. Pillai, *Probability, Random Variables and Stochastic Process*, 4/e, McGraw Hill, 2002.
2. H. Stark and J.W. Woods, *Probability and Random Processes with Applications to Signal Processing*, Prentice Hall, 2002.

Reference Books:

1. P.Z, Pebbles, *Probability, Random Variables and Random Signals Principles*, 4/e, McGraw Hill, 2000.

2. T, Veerarajan, *Probability, Statistics and Random Processes*, 2/e, McGraw Hill, 2003.

IT–402 Data Communication **3-1-0 - 4**

Subject Code	: *IT – 402*
Subject Name	: *Data Communication*
No. of Hours Per Week	: *Lecture– 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I
*Overview of Data Communications and Networking***:** Introduction, Network Models, Signals, Digital Transmission, Analog Transmission, Multiplexing, Transmission Media, Circuit Switching and Telephone Network.

UNIT-II
*Basics of Digital Communications***:** Signals, noise, Nyquist's rate, Fourier transforms of signals, harmonics, Baseband and broadband transmission: modulation techniques; fundamentals of modems; local loop implementation.

UNIT-III
*Digital transmission of voice***:** PCM, ADPCM, time division multiplexing; T1, T3 formats. Fibre optics: basic principles; SONET; technologies. VSAT technology: TDMA, DAMA; point-to-point wireless communication (microwave).

UNIT-IV
*Local Area Networks***:** Ethernet (CSMA/CD operation; parameters, specifications, limitations); cabling (Ethernet, Fast-Ethernet, Gigabit Ethernet; hubs, patch panels, wiring closets).

UNIT-V
Bridges; switches; virtual LANs; 100BaseT; 100BaseVGANY; gigabit Ethernet; FDDI; token ring; wireless networks; ISDN, B-ISDN.

Text Books:
1. W. Stallings, "Data and Computer Communications", 7th Ed, Prentice Hall of India, 2004, 7th ed.
2. B. A. Forouzan, "Data Communications and Networking", 3rd Ed, McGraw Hill, 2004.

Reference Books:
1. J. F. Kurose and K. W. Ross, "Computer networking: A Top-down Approach Featuring the Internet", 3rd Ed, Addison-Wesley, 2005.
1. G. Held, "Ethernet Networks: Design, Implementation, Operation, Management", 4th Ed, John Wiley & Sons, 2002

EC – 403 DIGITAL ELECTRONIC **3-1-0 - 4**

Subject Code:*EC- 403.*
SubjectName: *Digital Electronic Circuits.*
No.of HoursPer Week:*Lectures-3, Tutorial-1.*
MarksDistribution: *Sessional Works =60, End Semester Examination = 90.*
Questions to be set: *Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered: *Any Five.*
Duration ofEnd Semester Examination: *Three Hours.*

UNIT – I

Signed numbers; Cannonical representations-minterm, maxterm;Karnaugh map simplification up to six variables, Quine-McCluskey minimization, r's and r-1's complement arithmetics, binary coded decimal codes; Gray codes; error detection and correction codes – parity check codes.

UNIT – II

Combinational circuits: adders: half and full; ripple carry adder, carry-look-ahead adder; subtractors: half and full; comparators; parity circuits; decoders, encoders, multiplexers, de-multiplexers and their applications; code converter.

UNIT – III

Sequential logic devices and circuits: latches; flip-flops, SR, JK, D and T flip-flops; shift-registers; synchronous andasynchronous counter, Semiconductor Memory: Read Only Memory (ROM) - PROM, EPROM, EEPROM, Random Access Memory (RAM)-static, dynamic, and PLAs.

UNIT – IV

Digital IC families (DTL, TTL, ECL, MOS, CMOS). Logic families: TTL inverter – circuit description and operation; CMOS inverter–circuit description and operation; other TTL and CMOS gates; electrical behaviour of logic circuits – noise margins, fan-in, fan-out, propagation delay, power dissipation.
Microprocessor (8085): architecture, instruction sets and addressing modes.

Text Books:

1. R. P. Jain, *Modern Digital Electronics,* 3/e, TMH, 2009.
2. M. Mano, *Digital Logic and Computer Design*, PHI, 1996
3. Tocci and Widmer, *Digital Systems: Principles and Applications*, 8/e, PHI, 2006.
4. Ramesh S. Gaonkar, *Microprocessor architecture, programming and applications with 8085*, 5/e,
Penram International Publishing (India) Pvt. Ltd., 2005.

Reference Books:

1. A. Anand Kumar, *Fundamental of Digital Circuits*, 2/e, PHI, 2009.
2. V. Rajaraman and T. Radhakrishnan, *Digital Logic and Computer Organization*, PHI, 2006.
3. M. Mano, *Digital Design*, 3/e, PHI, 2006.
4. Donald P. Leach, *Digital Principles and Applications*, 6/e, TMH, 2006.
5. D. D. Gajski, *Principles of Digital Design,* Prentice Hall, 1996.
6. P. K. Lala, *Practical Digital Logic Design and Testing,* Prentice-Hall, 1996.

IT– 404 Formal Language and Automata Theory **3-1-0 - 4**

Subject Code	: *IT - 403*
Subject Name	: *Formal Language and Automata Theory*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8(One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	*: 3 hours*

UNIT-I

*Basic concepts***:** alphabets, languages, and grammars. *Deterministic and nondeterministic finite automata (DFAs and NFAs)***:** equivalence of DFAs and NFAs, minimization of DFAs. Regular Languages: regular expressions.

UNIT-II

Myhill-Nerode theorem, regular grammars, closure properties of regular languages, Pumping lemma, decidable properties of regular languages.

UNIT-III

*Context free languages***:** context free grammars (CFGs): derivations, derivation trees, ambiguous grammars, inherently ambiguous languages, normal forms of CFGs: Chomsky Normal Form and Greibach Normal Form.

UNIT-IV

*Pushdown automata (PDAs)***:** deterministic and nondeterministic PDAs (DPDAs and NPDAs), deterministic CFLs, LL (k) and LALR grammars, closure properties of CFLs, Pumping lemma and Ogden's Lemma, decidable properties of CFLs, Context sensitive languages: context sensitive grammars, linear bounded automata.

UNIT-V

*Turing machines***:** Definition, Designing of Turing machine, computable function, Church's hypothesis, Recursively enumerable languages: unrestricted grammars.

Text Books:

1. J. E. Hopcroft, and J. D. Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publications
2. J. C. Martin, "Introduction to Languages and the Theory of Computation", 3rd Ed, Tata McGraw-Hill, 2002

Reference Books:

1. D. I. A. Cohen, "Introduction to Computer Theory", John Wiley & Sons, 1997.
2. H. R. Lewis and C. H. Papadimitriou, "Elements of the Theory of Computation", Prentice Hall, 2002 (2nd Edition).
3. K.L.P. Mishra & N. Chandrasekharan ,"Automata Languages and Computation", PHI (3rd Edition) 2006.
4. Peter Linz, "An introduction to Formal Language & Automata", PHI, 2005.

IT– 405 System Programming **3-1-0 - 4**

Subject Code	: *IT - 405*
Subject Name	: *System Programming*
No. of Hours Per Week	: *Lecture –3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: 8 *(One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	*: 3 hours*

UNIT-I

Introduction to Systems Programming, Introduction to Assembly Language Programming - Introduction to Instruction Formats, Data formats - Role of Base Register, Index Register. Introduction to Assembler, databases used in assembler design, Design of Assembler - Single Pass & Double Pass.

UNIT-II

Introduction to Macros, various types of Macros, Design of Macro Processor : Single Pass & Double Pass. Introduction to linkers.

UNIT-III

Introduction to Loaders, functions of a loader, types of Loaders, databases used in Loaders, Design of Loaders - Absolute & DLL. *Linux System Calls*: Process creation with fork, Running programs with exec, Waiting for processes; Pipes: Description, creation, use for process communication, creating, opening, reading and writing and closing a pipe; Signals: Normal usage, Controlling signals, use of alarm, IPC: Message passing, Shared memory, Semaphores.

UNIT-IV

Introduction to Shell Scripting: System variables, login time script using .profile, interactive programming using read statement, command line arguments, Control Flow: if,case, while, unitil, for-statemets, logical operators|, relational operator, use of cat,echo, grep, kill, exit-statement,set and shift statement, interrupting a program using trap statement, Shell functions.

UNIT-V

Introduction to Software Tools, Interpreters, Program Generators, Debug Monitors of LaTeX: Importance of LaTeX, Preparing of input file and PDF file, sentence and paragraphs, footnotes, Sectioning, mathematical symbols and formula, arrays, Theorem, pictures, figures, tasks, preparation of slides, letters, reports, bibliography database prepared.

Text Books:

1. Donovan, “systems Programming”, Tata Mc Grawhill
2. W. W. Gay, “Advanced UNIX Programming”, Techmedia.
3. S. Das, “Unix System V.4 Concepts and Applications”, 3rd Ed, Tata Mcgraw-Hill, 2003.
1. L. Lamport, “Latex”, Addition Wisley, 2000.

Reference Books:

1. B. Kauler, “Windows assembly language & Systems Programming: 16- And 32-Bit Low-Level Programming for the PC and Windows”, 2nd Ed, CMP Books; August 1997.
2. D. Curry, “UNIX Systems Programming for SVR4”, O’Reilly, 1996.
3. S. Kochan and P. Wood, “Unix Shell programming”, 3rd Ed, SAMS, 2003.
4. Linux Manuals.
5. Stevens, “UNIX Programming”, Pearson Education.

IT- 406 Computer Organization and Architecture **3-1-0 - 4**

Subject Code	: *IT - 406*
Subject Name	: *Computer Organization and Architecture*
No. of Hours Per Week	: *Lecture –3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: 8 *(One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	*: 3 hours*

UNIT-I

Instruction and Addressing Modes: Instruction formats, Reduced Instruction Set computers (RISC), Complex Instruction Set Computers (CISC), RISC vs. CISC, Addressing modes and instruction set , PDP-11- a case study, Push down stacks and subroutines.

UNIT-II

Basic ALU Organization, Fixed Point Arithmetic (addition and subtraction), Integer multiplication and division algorithms, Peripheral arithmetic processors and co processors, Floating point numbers and operations- IEEE floating point standard. *Instruction Execution inside the CPU:* Data paths inside a CPU- Signal bus, two bus, and three bus structures, Execution of a complete instruction.

UNIT-III

Control Unit: Hardwired Control, Micro program control, *Input-output Organization:* Addressing of I/O devices, Data transfer and synchronization, DMA & interrupts, I/O interfaces and standards, I/O channels

UNIT-IV

Memory Organization: A review of random access and serial access memories, Static & Dynamic Memories, Memory hierarchies, Main memory, Memory Allocation Algorithms, Segments, Pages and Files, Virtual Memories, *High Speed Memories:* interleaved memories, caches, associative memories

UNIT-V

Advanced Architectures: Parallel Processing, Basic Concepts, Flynn's classification and structural classification, Performance considerations, Principles of pipelining, Pipeline structure, Introduction to multiprocessing, Introduction to fault tolerant computers

Text Books:

1. V.C. Hamacher, Z.G. Vranesic and S.G. Zaky, Computer Organization, Fourth Edn. McGraw Hill,1996.
2. K. Hwang and F.A. Briggs, Computer Architecture and parallel processing, McGraw Hill, 1984.

Reference Books:

1. J.P. Hayes, Computer Architecture and organization, Third Edn, McGraw Hill.
2. M. Morris Mano, Computer system architecture, Prentice Hall of India, 1986.
3. J. P. Heys, "Computer System and Architecture", Tata Mcgraw Hill
4. W. Stallings, "Computer Organization and Architecture: Designing for Performance", 7th Ed, Prentice Hall, 2005.

Practical

EC – 413 DIGITAL ELECTRONICS LABORATORY **0-0-3 - 2**

Subject Code: *EC - 413.*
Subject Name: *Digital Electronics Laboratory.*
No. of Hours Per Week: *Practicals-3.*
Marks Distribution: *Sessional Works - 20, End Semester Examination = 30.*
Minimum number of Experiments to be carried out: *Eight.*
Question to be answered:*One experiment will be allotted to a student on lottery basis.*
Duration of End Semester Examination: *Four Hours.*

List of experiments:

1. Conversion of Binary to Excess-3 Code and Excess-3 to Binary
2. Conversion of Binary to Gray Code and Gray to Binary
3. Design of a Half Adder and a Full Adder
4. Design of a Half Subtractor and a Full Subtractor
5. Design of Parity Checker and Parity Generator
6. Design of 4 X 1 Multiplexer and 1 X 4 Demultiplexer
7. Design of 3-bit comparator circuit;
8. Design of priority encoder;
9. Design of 8-bit Decoder circuits using IC.
10. Design of Shift-register (all types).
11. Design of asynchronous Mod-5 and Mod-6 counters.
12. Design of synchronous Mod-5 and Mod-6 counters.
13. Design of a PLA circuit.

Text Books:

1. J. F. Wakerly, *Digital Design – Principles and Practices*, 4/e, PHI, 2006.
2. M. Mano, *Digital Design*, 3/e, PHI, 2006.

IT – 415 System Programming Laboratory **0-0-3 - 2**

Subject Code	: *IT - 415*
Subject Name	: *System Programming Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3 hours*

List of Programs:

1. At least 3 program on File handling,
2. At least 10 program using on UNIX system calls.
3. Program using (at least 5) shell programming.
4. Designing of simple single pass assemblers,
5. Creating of source files and generating PDF (at least 3) documents using LaTeX.

Text Books:

1. Linux Manuals.
2. Stevens, "UNIX Programming", Pearson Education.
3. L. Lamport, "Latex", Addition Wisley, 2000.
4. Y. Kenetkar, "Introduction to shell programming", BPB Publcations

IT - 417 General Proficiency-II **0-0-0 - 2**

Subject Code : *IT - 417*
Subject Name : General Proficiency-II
Marks Distribution : *End Semester Exams*: 50

Proficiency will be evaluated through viva/seminar covering the subjects studied during Semester-III and Semester-IV.

Semester-V

HU – 501 Management Information System **3-1-0 - 4**

Subject Code	: *HU - 501*
Subject Name	: *Management Information System*
No. of Hours Per Week	: *Lecture –3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I

*Introduction***:** Definition of management, its definition, purpose, elements of science, patterns of management analysis, functions of managers. *People*: psychological factors, worker's skill & abilities. *Organization*: Organizational characteristics, Organizational behavior, corporate culture, power inter-group conflict, intra-group dynamics, the MIS function in organization, MIS personal, computer operation personal, MIS management. System: components of a system, environment, open Vs Closed systems.Models: modeling systems general vs specific models, levels of models, types of models. Models of organizational systems. A general model of organization and its internal environment. Strategic planning models.

UNIT- II

*Management***:** labels of management, managerial role, planning & control, Managerial styles, Managerial decision making: characteristics of types of decision. Intelligence, design, sol^{n} evaluation & choice. Effectiveness vs efficiency. MIS Planning, Design and control.

UNIT-III

Transaction processing & management reporting systems: A management information systems frame work: Transaction processing framework,Management reporting system, Decision support system. Knowledge based systems,Office systems Transaction processing: nature, function, role of IT in transaction processing, processing cycles, Transaction processing, subsystem. Management reporting system: Evaluation of management reporting system, types of reports, structuring report content.

UNIT- IV

*Decision support system (DSS)***:** Component of DSS, DSS development, DSS products, DSS development tools, User interfaces, Executive information system (EIS), Executive roles & decision making, Executive decision making environment, *MIS in the functional areas of business***:** Financial information system, Marketing MIS, Manufacturing MIS

UNIT-V

*Enterprise resource planning***:** Materials Requirement planning (MRP), Closed loop MRP, Manufacturing Resource Planning (MRP – II), *Enterprise resource planning***:** Functional architecture of ERP, Benefits of ERP, Business Process, Reengineering and ERP, ERP implementation., *Supply chain management***:** Introduction, Definition of SCM, Features of SCM, SCM Stages, *Cases in MIS***:** Case study method, Analytical Case, Issue Case, Written Case Analysis, Illustrations

Text Books:

1. Davis, "MIS", TMH
2. Murthy C.S.V, "Management Information System: Text & Application", Himalaya Publishing House, Mumbai, 2004
3. Charles Parker, Thomas Cage, "MIS strategy & action (Management Info System)", McGraw-Hill.

Reference Books:

1. Laudon & Laudon, "Management Information" Systems: Managing the digital firm (9th Edition) 2006, PHI.
2. Leon, "Enterprise Resource Planning", TMH.
3. Kelkar, "Management Information Systems- A concise study", PHI.

EC –502 MICROPROCESSOR **3-1-0 - 4**

Subject Code:*EC- 502.*
Subject Name: *Microprocessor.*
No.of HoursPer Week:*Lectures-3, Tutorial-1.*
MarksDistribution: *Sessional Works =60, End Semester Examination = 90.*
Questions to be set: *Eight (one from each unit and remaining four from the combination of more than one unit).*
Questions to be answered:*Any Five.*
Duration ofEnd Semester Examination: *Three Hours.*

UNIT – I

8085 Programming. Stacks and subroutines, counters, time delays, Interrupts,Instruction cycle, machine cycle, timing diagrams. Memory Interfacing with 8085, Interfacing I/O, memory mapped I/O and I/O mapped I/O. Interfacing A/D and D/A converters. Stepper motor interface with 8085

UNIT – II

8155-Programmable I/O; 8255-Programmable Peripheral Interface;8355-ROM ; 8253 – Timer; 8251 – USART; 8257 – DMAC, 8259 – PIC.

UNIT – III

8086/8088 architecture, instruction sets, addressing mode. Assembler directives and Advanced programming. Min and Max mode of operation.

UNIT – IV

8086 Programming, Interrupts and DOS interrupt 21H functions. Interfacing A/D converters, data acquisition.Interfacing D/A converters, wave form generation.

Text Books:

1. Ramesh S. Gaonkar, *Microprocessor architecture, programming and applications with 8085*, 5/e, Penram International Publishing (India) Pvt. Ltd., 2002.
2. B. Ram, *Fundamentals of microprocessors and microcomputers*, 3/e, DhanpatRai Publication, 1989.
3. Douglas V.Hall, *Microprocessor and interfacing*, McGraw Hill International Ed.,2/e, 2006.

Reference Books:

1. Rajasree,*Advanced Microprocessors*, 2/e, New Age Publishers, 2005.
2. Intel Corp., *The 8080/8085 Microprocessor Book: Intel marketing communications*, Wiley Inter science publications, 1980.
3. Adam Osborne and O. Kane, *An introduction to microcomputers, Vol. 2 – Some real microprocessors,* Galgotia Book source, New Delhi, 1980.
4.Triebel and Singh,*The 8088 and 8086 Microprocessors*, 4/e, Pearson Education, 2003

IT – 503 Information Theory and Coding **3-1-0 - 4**

Subject Code	: *IT -503*
Subject Name	: *Information Theory and Coding*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*

UNIT-1

*Entropy***:** information source and entropy, mutual information, information measures for continuous random variables;
*Source coding***:** the source coding theorem, Kraft inequality, Shannon-Fano codes, Huffman codes, Arithmatic Codes, Lempel-Ziv-Welch algorithm, universal source codes; channel capacity: channel capacity; noisy channel coding theorem for discrete memoryless channels; channel capacity with feedback; continuous and Gaussian channels;

UNIT- II

*Error control coding***:** linear block codes and their properties, hard-decision decoding, convolution codes and the Viterbi decoding algorithm, iterative decoding; turbo codes and low-density-parity-check codes;
*Rate distortion theory***:** rate distortion function, random source codes; joint source-channel coding and the separation theorem;

UNIT-III

*Cryptography***:** basic concepts on cryptography and cryptoanalysis, security issues; private-key encryption algorithms- stream ciphers, block ciphers, Shannon's theory;

UNIT-IV

Introduction to number theory: modular arithmetic, exponentiation and discrete logarithms in Galois field;

UNIT-V

Public-key encryption algorithms: Diffie-Hellman public-key distribution scheme, RSA public-key cryptosystem; Message authentication, hashing functions, digital signatures**.**

Text Books:

1. R. Bose," Information Theory, Coding and Cryptography", Tata Mcgraw-Hill, 2002
2. J.A Buchman, "Introduction to cryptographs", 2nd Edition Spinger.

Reference Books

1. W. Stalling, "Cryptography and Network security ", PHI.
2. T. M. Cover and J. A. Thomas, "Elements of Information Theory", John Wiley & Sons, New York, 1991.
3. R. Hill, "A First Course in Coding Theory", Oxford University Press, 1986.
4. L. Hanzo, T.H. Liew and B.L. "Yeap,Turbo coding, turbo equalisation and spacetime coding for transmission over fading channels" , John Wiley and Sons, 2002.
5. M. Y. Rhee, "Cryptography and sceure communication", McGraw-Hill, 1994.

IT– 504 Object Oriented Programming and Methodology **3-1-0 - 4**

Subject Code	: *IT - 504*
Subject Name	: *Object Oriented Programming and Methodology*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I

*Introduction to Object-Oriented Programming***:** Basic concepts of OOP (Abstraction, Encapsulation, Inheritance, Polymorphism), comparison of procedural programming and OOP; code reusability, creating new data types.

Objects and Classes: Concepts of class and objects, member access operators, static members, arrays of objects, returning objects from functions, Friend functions, Friend classes, Pointers to members of the classes,.

UNIT-II

*Inheritance***:** Types of inheritance, Defining derived class, Access specifiers: public, private and protected; public and private inheritance, accessing base class members, ambiguity in multiple inheritance, virtual base classes, abstract classes, Derived class constructor with arguments, Initialization lists in constructors, classes within classes.

UNIT-III

*Polymorphism***:** Compile time polymorphism-operator overloading, function overloading, Run-time polymorphism- Virtual function, and pure virtual function.

UNIT-IV

*Templates***:** string template, instantiation, template parameters, type-checking, class template, function templates, template argument deduction, specifying template arguments, function template overloading, default template arguments, specialization, conversions.

*Exception handling***:** Error handling, grouping of exceptions, catching exceptions, catch all, re-throw, resource management.

UNIT –V

*Object Modeling Techniques***:** Object Modeling, Dynamic Modeling, Functional Modeling.

Text Books:

1. E. Balaguruswamy, “Object oriented programming with C++”, TMH
2. Rumbaugh, James Michael, Blaha , “Object Oriented Modeling and Design with UML” , Prentice Hall of India 2004.

Reference Books:

1. Bjarne Stroustrup, “The C++ Programming Language”, Addison Wesley
2. Grady Booch, “Object Oriented Analysis and Design”, Pearson Education.

IT – 505 Algorithm Analysis and Design **3-1-0 - 4**

Subject Code	: *IT – 505*
Subject Name	: *Algorithm Analysis and Design*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*

UNIT-I

*Introduction***:** Roll of algorithms in computing, Designing Algorithms, Analyzing Algorithms, Asymptotic notations, Recurrences. *Sorting and order statistics***:** Heap Sort, Quick Sort, Sorting in linear time, Medians and order statistics

UNIT-II:

*Data Structures for Set Manipulation Problems***:** Fundamental operations on set, Hashing, Binary search, Binary search trees, Optimal binary search trees, A simple-disjoint-set union algorithm, Tree structures for UNION-FIND problem, Application and extensions of the UNION-FIND algorithm, Balanced tree schemes, Dictionaries and priority queues, Mergeable heaps, Concatanable queues, Partitioning. *Algorithms on Graphs***:** Minimum-cost spanning trees, Depth-first search, Biconnectivity, Depth-first search of a directed graph, Strong connectivity, Path-finding problems, A transitive closure algorithm, A shortest-path algorithm, Path problems and matrix multiplication, Single –source problems, Dominators in a directed acyclic graph.

UNIT – III

Data Structures and Algorithms for External Storage: A model for External computation, external sorting, Storing information in files, External search trees. *Memory Management*: The issues in memory management, Managing equal-sized blocks, Garbage collection algorithms for equal-sized blocks, Storage allocation for objects with mixed sizes, Buddy systems, Storage compaction

UNIT- IV

*Design and Analysis Techniques***:** Greedy Algorithm: An activity-selection problem, Elements of the greedy strategy, Huffman codes, Theoretical foundations for greedy methods, task-scheduling problem. *Dynamic Programming***:** Assembly-line scheduling, Matrix-chain multiplication, Elements of dynamic programming, longest common subsequence, optimal binary search tree. *Amortized Analysis***:** Aggregate analysis, accounting method, potential method, Dynamic tables.

UNIT- V

*NP- Problems***:** The classes *P* and *NP* problems, NP-completeness of the satisfiability problem, Additional NP-complete problems, NP-hard Problems.

Text Books

1. Cormen, Leiserson & Rivest "Introduction to Algorithms", Prentice Hall of India (2nd Edition) 2004.
2. Aho, Hopcroft & Ullman "The design and Analysis of Algorithms", Addition-Welsley.

Reference Books:

1. E. Horowitz & S. Sahani, "Fundamentals of Algorithms", Galgothia Publications.
   Udi Manber, "Introduction to Algorithms", Addison-Wesley.

IT – 506 Computer Networks **3-1-0 - 4**

Subject Code	: *IT- 506*
Subject Name	: *Computer Networks*
No. of Hours Per Week	: *Lecture– 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	*: 3 hours*

UNIT-I

*Reference Models***:** ISO/OSI Model, TCP/IP Model, and Comparison of the models. Data Link Layer: DLL design issues, error detection & correction, elementary data link protocols, sliding window protocols, HDLC, DLL in ATM .

UNIT-II

*Medium Access Sublayer***:** Channel allocation problems, Multiple access protocols- ALOHA,CSMA/CD, Limited-Contention protocols, IEEE 802.X LANs and MANs- Ethernet, Token Ring, Token Bus, DQDB, Bridges; High-Speed LANs.- FDDI, Fast Ethernet.

UNIT-III

*Network Layer***:** Service provided to the transport layer, Virtual Circuit & Datagram subnet, Routing algorithms- Shortest Path, Flooding, Flow-Based, Distance vector, Link State, Hierarchical, Broadcast, Multicasting routing, Congestion Control Algorithms- Flow pecification, Choke packet, load shedding, Jitter Control, integrated services, Internetworking- Tunneling, Internetwork routing, Fragmentation, Firewalls; IP protocols, Subnets, OSPF, BGP, Mobile IP.

UNIT-IV

*Transport Layer***:** Addressing, establishing & releasing connections, Flow control and buffering, TCP- service model, protocol, connection management, transmission policy and congestion control, UDP; sockets interface, socket programming.

UNIT- V:

*Application Layer***:** Network Security- traditional cryptography, Secret-key & Public key algorithms, Authentication Protocols, Digital signature, DNS, SNMP, electronic mail; WWW basics: http, to web Tech, firewalls.

Text Books:

1. A. S. Tanenbaum, " Computer Networks", 4th Ed, Prentice Hall of India,

Reference Books:

1. J. F. Kurose and K. W. Ross, "Computer networking: A Top-down Approach Featuring the Internet', 3rd Ed, Addison-Wesley, 2005.
2. B. A. Forouzan, "Data Communications and Networking", 3rd Ed, McGraw Hill, 2004.

W. Stevens and G. Wright, "TCP/IP Illustrated", Volumes 1-3, 2002.

Practical:

EC – 512 Microprocessor Laboratory

0-0-3 - 2

Subject Code : *EC - 512.*
Subject Name *: Microprocessor Laboratory.*
No. of Hours Per Week : *3 hours.*
Marks Distribution : *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered : *One will be allotted to a student on lottery basis*
Examination duration : *4 hours*

(At least 8 experiments to be performed)

List of Experiments:

1. Binary /BCD addition between two bytes stored in consecutive / different location (Generated Carry)
2. Binary / BCD addition of more than two bytes stored in consecutive locations using loop method.
3. Binary / BCD subtraction between two bytes stored in consecutive / different locations with sign of the result taken into account.
4. To find out whether the no. is

   (a) Even or Odd (b) Even parity or Odd parity.
5. Generation of Fibonnaci Series
6. Block Transfer from one location to another.
7. Reverse a string .The string is either a binary byte or a bunch of data bytes stored in consecutive locations.
8. To arrange the bytes (stored in consecutive locations) in sorted order either ascending or descending order.
9. Binary multiplication of two bytes using left or right shifting of multiplier.
10. Binary division as word divided by byte using left shifting of the dividend.
11. Conversion of binary to BCD and BCD to binary.
12. Generation of 2 and 4 digit decimal display UP/DOWN continuous counter at address and data field of the Microprocessor kit.
13. Verification of incoming and outgoing data using LEDS and a PPI chip.
14. Generation of a square wave of a certain frequency using PPI chip and a CRO display.

Text Books:

1. Ramesh S. Gaonkar, “Microprocessor architecture, programming and applications with 8085”, 5/e, Penram International Publishing (India) Pvt. Ltd., 2005.

IT–514 Object Oriented Programming Laboratory

0-0-3 - 2

Subject Code	: *IT-514*
Subject Name	: *Object Oriented Programming Laboratory (C++ & Java)*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3 hours*

List of Programs:

1. Define a class Complex and overload operators +, - , *, <<, >> for complex numbers.
2. Define a class Matrix and overload operators +, - , *, <<, >>.
3. Define a class String and write a C++ program to overload + for concatenation, >= , <= , == for comparison of two strings.
4. Programs illustrating overloading and overriding methods in C++ and JAVA.
5. Programs illustrating the implementation of various forms of inheritance (Ex. Single Hierarchical, Multilevel inheritance Etc.) in C++ and JAVA
6. Program, which illustrates the implementation of multiple inheritances in C++ and using interfaces in JAVA.
7. Define a basic two-dimensional Shape class from which objects such as rectangle, circle which can be derived. Let the user specify the position, size, of drawing 2-D object.
8. Implement ‘static class member function’ using class Item which has a static member count.
9. Implement insertion and deletion in Stack with exception handling and templates.
10. Implement Queue operations insertion, deletion with exception handling and templates.

Text books:

1. E. Balaguruswamy, “Object oriented programming with C++”, TMH-2005.
2. H Schildt, “The Complete Reference to Java”,J2SE5 Ed. TMH- 2005

IT – 516 Computer Networks Laboratory

0-0-3 - 2

Subject Code	: *IT - 516*
Subject Name	: *Computer Networks Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3 hours*

List of Programs (using NS2 simulator):

1. Implementation of the data link layer framing methods character stuffing and bit stuffing.
2. Implementation of CRC polynomials – CRC 12, CRC 16 and CRC CCIP (at least one).
3. Implementation of Sliding Window (selective repeat) protocol.
4. Implementation of Sliding Window (go back end) protocol.
5. Implementation of Binary Exponential Backoff algorithm.
6. Implementation of Echo Server, Date & Time extraction, simple ftp server, ping using Network (socket) programming in UNIX (at least three).

Text Books:

1. W. Stevens, "UNIX Network programming", PHI.
2. R. S. Stone, "Beginning LINUX programming", WROX publication.
1. NS-2 Tutorial (on-line available)

Semester VI

IT – 601 Operating Systems **3-1-0 - 4**

Subject Code	: *IT - 601*
Subject Name	: *Operating System*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT – I

*Computer system and operating system overview***:** Overview of computer system hardware, Instructions execution, I/O functions-interrupt, memory hierarchy, I/O communication technique. Operating systems objectives and functions, evaluations of operating system, Example systems. *Process description and control***:** Process states, Process description, Process control , Process and threads, Examples of process description and control.

UNIT – II

*Concurrency***:** Principles of concurrency, mutual exclusion, Software and Hardware approaches, Semaphores, Monitors, Message passing, readers/ writers problem. Principles of deadlock, Deadlock prevention, Detection and avoidance, Dining philosophers problem, Example systems.

UNIT – III

*Memory Management***:** Memory management requirements, Loading program into main memory, Virtual memory, Hardware and control structures, OS software, Examples of memory management.

UNIT – IV

*Uniprocessor scheduling***:** Types of scheduling, Scheduling algorithms, I/O management and disk scheduling, I/O devices, Organization of I/O function, OS design issues, I/O buffering, disk I/O, disk scheduling policies, Examples system.

UNIT – V

*File management and security***:** Overview of file management, File organization and access, File directories, File sharing, Record blocking, Secondary storage management, Example systems. *Security***:** Security threats, Protection, Intrusion, Viruses, Trusted systems.

Text Books:

1. A. Silbershatz, P.B. Galvin & Gagne, “Operating System Concepts”, Addison- Wesley,2005.

Reference Books:

1. M Milenkovie , “Operating System : Concept & Design”, McGraw Hill.
2. A.S Tanenbaum “Operating System Design & Implementation”, Practice Hall of India (3rd Edition) 2004.
3. W. Stalling, “Operating Systems”, Prentice Hall of India (5th Edition)
1. H. N. Dietel “An Introduction to Operating Systems”, Addison Wesley.

IT – 602 Software Engineering **3-1-0 - 4**

Subject Code	: *IT – 602*
Subject Name	: *Software Engineering*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I
*Introduction***:** Software life-cycle models, Software requirements specification, formal requirements specification---axiomatic and algebraic specifications. Function-oriented software design

UNIT-II
*Information Systems and Software Engineering***:** Information gathering, requirement and feasibility analysis, data flow diagrams, semantic modeling, process specifications, input/output design, process life cycle, planning and managing the project, design, coding, testing, implementation, maintenance, Reverse Engineering

UNIT-III
*Object-oriented design***:** UML, User interface design, coding and unit testing, integration and systems testing, Software quality---SEI CMM and ISO-9001.

UNIT-IV
Software reliability and fault-tolerance, Software maintenance. Computer-aided software engineering (CASE), Software reuse, Component model of software development.

UNIT-V
*Project Management***:** Issues in Project Management, Management Functions, Software Project Management Plan, Software Management Structure, Personnel Productivity, Software Project Complexity, Software Metrics – Basic Consideration, Size Oriented and Function Point Oriented; Software Cost Estimation Techniques, Algorithmic Cost Modeling, The COCOMO Model, Project Scheduling, Software Project Planning, Scheduling Risk Management

Text book:
1. Roger S. Pressman, "Software Engineering A Practitioner's Approach" , McGraw-Hill International Edition.

Reference Books:
1. P.Jalote, " Integrated Approach to Software Engineering", Narosha Publ.
2. Rajib Mall-, "Funcdamentals of Software Engineering", Prentice- Hall of India, Pvt LTD.
3. Sommerville, " Software Engineering", 7th Ed, Addison-Wesley, 2005.
3. 4. C. Ghezzi, M. Jazayeri and D. Mandrioli, "Fundamentals of Software Engineering", 2nd Ed, Prentice Hall of India, 2003.

IT – 603 Relational Database Management System **3-1-0 - 4**

Subject Code	: *IT - 603*
Subject Name	: *Relational Database Management System*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*

UNIT-I

*Introduction to database systems***:** Overview, File systems Vs. DBMS, Various data models, Levels of abstraction, Structures of DBMS, Relational Model, Relations and Integrity Constrains, Relational Algebra and Calculus.

UNIT-II

*Database Design***:** Overview of data design, ER Model, Features of ER model, Conceptional design using model, Schema Refinement, Normal Forms; Use of decompositions, Functional dependencies, Multivalued Dependencies.

UNIT-III

*Query optimization and evaluation***:** Introduction to query processing, Selection operation, Project operation, Join operation, Set operation and aggregate operation, Relational Query optimization, *SQL*: Basic SQL Query, Nested Queries, Aggregate operators, Embedded SQL, Dynamic SQL, Security: Views.

UNIT-IV

*File Organization***:** Storage media, Buffer management, Record and page formats, File Organizations, Various kinds of indexes and external storing.

UNIT-V

*Concurrency control and recovery***:** Concepts of transactions ,Transactions and schedules , Lock based concurrency control , Lock management , Specialized locking techniques , Concurrency control without locking , Crash recovery , Introduction to crash recovery , Log recovery , Check pointing , Media recovery.

Text Books:

1. Henry F. Korth , Silberschatz Abraham & Sudarshan, "Database System Concepts", Mc.Graw Hill,2005
2**.** Raghu Rama Khrishnan, "Database Management Systems", TMH, 1998.

Reference Books:

1. G.W. Hansen and J.V. Hansen, "Database Management and design", PHI, 1999 (2nd Edition).
2. Bipin C.Desai, "An Introduction to Database System",Galgotia Publishing, 1998.
1. 3. R. Elmasri & .B.Navathe, "Fundamental of database Systems", Benjamin Cummings Publishing Co.

IT–604 Compiler Design **3-1-0 - 4**

Subject Code	: *IT - 604*
Subject Name	: *Compiler Design*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	*: 3 hours*

UNIT-I
Overview of phases of a compiler, Languages and grammar, a simple one-pass compiler, incorporating symbol table, abstract Stack machines.

UNIT-II
*Lexical analysis***:** Finite automata, from a regular expression to an NFA, *Lexical analyzer*: Design of Lexical analyzer generator.

UNIT-III
*Parsing***:** Top-down and Bottom-up parsers, shift-reduce parser, recursive descent (operator precedence) parser, LL (1); LR(0), SLR, LALR parsers, Syntax-directed translation, parser generator, Error handling and recovery

UNIT-IV
*Semantic Analysis***:** Declaration processing, Type checking. Symbol tables. *Intermediate Code Generation*: Intermediate languages, assignment statements, Boolean expression, case statements back patching.

UNIT-V
Code generation: Run-time environments, translation of language constructs, Flow-graphs; Register allocation, simple code generator; *Code optimization*: An introduction to the optimization techniques, sources of optimization, optimization of basic blocks.

Text Books:
1. A.V Aho, R. Sethi, and J.D. Ullman, “Compiler Design”. Pearson Edn, 2003.

Reference Book:
1. Jean-Paul Tremblay and Paul G. Sorrenson, “The Theory and Practice of Compiler Writing”, McGraw Hill.
2. S. Chattopadhyaya, “Compiler Design”, PHI, 2005.

IT – 61X Elective – I **3-1-0 - 4**

Subject Code	: *IT – 61X*
Subject Name	: *Elective – I*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

To be chosen by students from available papers in consultation with the faculty members of the department.

IT – 62X Elective – II **3-1-0 = 4**

Subject Code	: *IT – 62X*
Subject Name	: *Elective - II*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

To be chosen by students from available papers in consultation with the faculty members of the department.

Practical:

IT – 611 Operating Systems Laboratory **0-0-3 - 2**

Subject Code	: *IT - 611*
Subject Name	: *Operating Systems Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3 hours*

List of Programs:

1. Simple Unix-C (at least two) programs using system calls to read and write strings on standard I/O devices and files.
2. Implementation of Dining Philosopher problem using shared memory and semaphore.
3. Implementation (at least one) of FCFS, Shortest Job First and Round Robin process scheduling techniques.
4. Programs (at least one) to simulate page replacement algorithms like FIFO, Optimal and LRU.
5. Implementation of threads using POSIX or using thread class in Java.
6. Implementation of free space management techniques.
7. Implementation of (at least one) deadlock avoidance techniques.

Text Books:

2. Stevens, “UNIX programming”, Pearson Education.
3. Yashwanth Kanetkar, “Shell programming”, BPB publication

IT – 613 Database Management System Laboratory **0-0-3 - 2**

Subject Code	: *IT - 613*
Subject Name	: *Database Management System Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3hours*

List of Programs:

1. Program for creating, altering and dropping tables with integrity constraints.
2. Program for retrieving and modifying data from a database.
3. Program for retrieving data from database using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING clause.
4. Program using of scalar and aggregate functions.
5. Program for retrieving data from a database using Equi, Non Equi, Outer and Self Join.
6. Program using subqueriesp, rowid and rownum for retrieving data.
7. Program use of views, indexes and sequences.
8. Program using of implicit & explicit cursors in data handling.
9. Program using exception handling – Oracle defined and User defined.
10. Program using stored procedures & functions in data manipulation.
11. Program using trigger in data manipulation.

Text Books:

1. Ivan Bayross, “SQL, PL /SQL – The Programming Language of Oracle”, BPB Press.
2. Steven Feuerstein, “Oracle PL/SQL Programming”, Shroff Publishers, Calcutta.
3. Kevin Loney & George Koch, “Oracle 9i – The Complete Reference” , Oracle Press .

IT – 614 Compiler Design Laboratory **0-0-3 - 2**

Subject Code	: *IT - 614*
Subject Name	: *Compiler Design Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3hours*

List of Programs (using Lex and Yacc tools):

1. Develop a Lexical Analyzer to recognize given patterns in Pascal and C (identifier, constants, comments, operators, keywords).
2. Develop a LL1 parser.
3. Develop an operator precedence parser (construct parse table).
4. Develop an LR parser.
5. Program for generating various intermediate codes form- Three address code & Polish notation forms.
6. Implement code optimization technique for a given intermediate code form.

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Text Books:

1. J. Peter, "Introduction to compiling techniques: A first course using ANSI C, Lex & Yacc", McGraw Hill, 1990.
2. A.V Aho, R. Sethi, and J.D. Ullman, "Compiler Design". Pearson Edn, 2003.

D. Brown & T. Mason, "Lex & Yacc", O'Reilly publication

IT-615 General Proficiency-III (Industrial Training) **0-0-0 = 2**

Subject Code	: *IT - 615*
Subject Name	: General Proficiency-III (Industrial Training)
Marks Distribution	: *End Semester Exams*: 50

Proficiency will be evaluated through viva/seminar covering the subjects studied during Semester-V and Semester-VI and/or report on Industrial Training.

Semester VII

HU – 701 Professional Ethics and IPR **3-1-0 - 4**

Subject Code	: *HU -701*
Subject Name	: *Professional Ethics and IPR*
No. of Hours Per Week	: *Lecture – 2, Tutorial -1*
Marks Distribution	: *Sessional work*: 40, *End Semester Exams*: 60
Question to be set	: *8 (One question from each unit and rest three questions covering more than one unit)*
Question to be answered	: *Any 5 (five)*

UNIT-I
Engineering as a profession, historical and social context, Ethics in Engineering, Codes of Engineering Ethics, history and purpose, consequentialism and utilitarianism, Deontological approaches, duties, rights and respect for a person, responsibility, virtue Ethics, honesty, moral autonomy, obligations of Engineering profession and moral propriety.

UNIT-II
Engineer's moral responsibility for safety and human right, risk assessment and communication, product liability, development ethics, engineers and employer relationship, whistle blowing and its moral justifications.

UNIT-III
Computer Ethics: Social impact of computers, Computer and gender issues, privacy, cyber crime, ethical use of software's, intrinsic value of nature.

UNIT- IV
IPR I: Intellectual property, definition, types, rights and functions, patents, trademark, software design, industrial designs, semi-conductor and integrated circuits layout design, grant of patent in India, authority and procedure, patent forms, surrender and revocation of patents and compulsory licensing, acquision of inventions by the Government.

UNIT- V
IPR II: Contents of draft application for patents, Drafting patent specification and claims, WTO and drafting patent specification and claims, IPR in fringement and piracy under Indian Laws.

Text Books:
1. Vinod V. Sople- Managing Intellectual Property: The Strategic Imperative. PHI, 2006.
2. Charles & Harri Michael S Pritchard and Michael J Robins, "Engineering Ethics: Concepts and cases", Wordsworth/ Thompson Leaaring, Belmont Calif, 2000.

Reference Books:
1. Huff & Finholt, "Social Issues in Computing: Putting Computing in Place", McGraw Hill.
2. Govindarajan, Natarajan & Senthil Kumar – Engineering Ethics. PHI.
3. Jones & Bartlett,"Cyber Ethics: Morality and Law in Cyber Space".
4. Schinzinger Roland Mike & Martin, "Introduction to Engineering Ethics", Boston MA: TMH, 2000.
5. Robin Attfield, "A theory of value and obligation", London, CroomHelm, 1987.

IT–702 System Administration **3-1-0 - 4**

Subject Code	: *IT - 702*
Subject Name	: *System Administration*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering more than one unit)*
Question to be answered	: *Any 5 (five)*
Examination duration	*: 3 hours*

UNIT-I

Introduction: Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The scheduler, init and the inittab file, Run-levels, Run level scripts.

Managing User Accounts: Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users..

UNIT-II

Managing Unix File Systems: Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making filesystems, Superblock, I-nodes, Filesystem checker, Mounting filesystems, Logical Volumes, Network Filesystems, Boot disks.

Configuring the TCP/IP Networking : Kernel Configuration; Mounting the /proc Filesystem, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

UNIT-III

TCP/IP Firewall : Methods of Attack, What Is a Firewall? What Is IP Filtering? Setting Up Linux for Firewalling Testing a Firewall
Configuration; A Sample Firewall Configuration:
IP Accounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IP Accounting Results

UNIT-IV

IP Masquerade and Network Address Translation : Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade.
The Network Information System : Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security

UNIT-V

Network file system: Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.
System Backup & Recovery: Log files for system and applications; Backup schedules and methods (manual and automated).

Text Books:

1. Michel Ticher – "PC System Programming" , Abacus.
2. Kirch – " Linux network Administrator's guide (2nd Ed.)" – O'Rielly
3. Maxwell – "Unix system administration" - TMH

Reference Book:

1. W. R. Stevens – "TCP/IP illustrated, vol. 1" – PHI/Pearson Education
2. Comer – "Internetworking with TCP/IP, vol. 1(4th Ed.)" – Pearson Education/PHI
3. Limoncelli –"The Practice of System & Network Administration"-Pearson

IT –703 Web Technology **3-1-0 - 4**

Subject Code	: *IT - 703*
Subject Name	: *Web Technology*
No. of Hours Per Week	: *Lecture– 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

UNIT-I

Introduction: Java, Distributed computing and J2EE: Requirements of web architecture, web application lifecycle, XML and J2EE, the package of J2EE Applications, Java Script. *The Design and Development of a J2EE Application* : J2EE Layers, J2EE Application Components, J2EE Architecture, Development Methodology and process, sample applications introduced; Task list for building J2EE Applications: Completing prerequisite Tasks, designing the database, creating tables and columns, defining the application, creating a backend interface, creating the interface, building pages, creating data access objects, validating your code, refining your code.

UNIT- II

*Java Servlet***:** Introduction, introduction to CGI, Advantages of Java servlet over CGI, Servlet life cycle, Servlet API (Different interfaces & classes of generic servlet & HTTP servlet), Accessing user information by means of Request & Response, Servlet session management techniques and relative comparison. *JSP***:** Introduction, Comparison between JSP & servlet, Architecture/Life cycle, Different types of JSP architectures and relative comparison; JSP tags, Directives, Scripting elements, Actions; JSP implicit objects, accessing user information using implicit objects.

UNIT-III

JDBC: Introduction; JDBC Architecture: API and Drives, The JDBC API, Retrieving and updating Data, SQL-to-Java Data Types, JDBC Execution Types, Metadata, Scrollable Resultsets, updating rows, transaction support, Batch Statements, JDBC 2.1 New Data Types, JDBC 2.0 Optional package API. *RMI***:** Introduction and applications, Architecture, Use of RMI Registry. *JNDI***:** Introduction and applications, Comparison between LDAP and JNDI, *JDO (Java Data Objects)***:** Introduction, Integration of EJB and JDO, JDO & RMI, *JINI***:** Introduction, Applications

UNIT-IV

Enterprise JavaBeans: Introduction; Enterprise JavaBeans overview, distributed programming overview, EJB framework, Session and entity Beans, Attributes of a Bean, Parts of a Bean, container-managed persistence(CMP) and bean managed, the lifecycle of enterprise JavaBeans, java message service (JMS) and message driven beans (MDB), distributed programming services, common object request broker architecture (CORBA) and remote method invocation (RMI), Transaction and transaction management, Security, deployment, personal roles for EJB Development, building session beans: creating session beans, Entity beans.

UNIT-V

*Introduction to HTML, XML***:** Java & XML, XML syntax, Document type definition. Parsers, SAX parsers, DOM parsers, SAX vs. Dom, JAXP and JAXB. *JAVA SECURITY***:** Java Cryptographic architecture, Java Authentication and Authorization Service (JAAS), Java Generic Security Services (Java GSS-API), Java Cryptography Extension (JCE), Java Secure Socket Extension (JSSE), Java Simple Authentication and Security Layer (SASL) API Programming and Deployment.

Text Books:

1. Allamaraju and Buest , “Professional JAVA Server Programming”, SPD Publication,2003
2. Ivor Horton, “Beginning J2EE 1.4”, SPD Publication,2005
3. Scott Oaks, “Java Security”, O’reilly, 2005

Reference Books

1. C.Xavier, “Web Technology & Design”, New Age Publication, 2003
2. Austin and Pawlan, “Advanced Programming for JAVA2 Platform”, Pearson, 2000
3. A. S. Godbole & A.Kahate, “Web Technologies”, TMH, 2003
4. Joseph J. Bambara et.al. “J2EE UNLEASHED”, SAMS Techmedia
5. Stepahnie Bodoff, Dale Green, Kim Hasse, Eric Jendrock, Monica Pawlan, Beth Stearns” The J2EE Tutorial “, Pearson Education

IT – 73X Elective – III **3-1-0 - 4**

Subject Code	: *IT – 73X*
Subject Name	: *Elective – I*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

To be chosen by students from available papers in consultation with the faculty members of the department.

IT – 74X Elective (Open) **3-1-0 - 4**

Subject Code	: *IT – 73X*
Subject Name	: *Elective (Open)*
No. of Hours Per Week	: *Lecture – 3, Tutorial -1*
Marks Distribution	: *Sessional work*: 60, *End Semester Exams*: 90
Question to be set	: *8 (One question from each unit and rest three questions covering all units)*
Question to be answered	: *Any 5 (five)*
Examination duration	: *3 hours*

To be chosen by students from available papers in consultation with the faculty members of the department.

Practical:

IT – 712 System Administration Laboratory **0-0-3 - 2**

Subject Code	: *IT - 712*
Subject Name	: *System Administration Laboratory*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *One will be allotted to a student on lottery basis*
Examination duration	: *3 hours*

List of Programs :

1. User creation and maintenance.
2. Packet Monitoring software (tcpdump, snort, ethereal)
3. Trace route, Ping, Finger, Nmap
4. Server configuration (FTP, SMTP, DNS, TELNET)
5. NFS Configuration.
6. Firewall Configuration using iptables/ipchains (Linux only)
7. Configuration of Squid and Squirrel mail.

Note: All the above experiments may be performed in both Unix /Linux & Windows.

Text Books:

3. W. R. Stevens – "Unix network programming, vol. 1(2nd Ed.)" – Pearson Education/PHIA.
4. Wells, LINUX Installation & Administration, Vikas

IT – 713 Web Technology Laboratory **0-0-3 - 2**

Subject Code	: *IT - 713*
Subject Name	: *Web Technology Lab*
No. of Hours Per Week	: *3 hours.*
Marks Distribution	: *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered	: *As per the project work done by the student.*
Examination duration	: *3 hours*

Each student should develop at least two projects out of the followings using JSP, JDBC, J2EE

1. Design Airlines Ticket Reservation System
2. Design ONLINE Banking system.
3. Design Library Information system
4. Design Gram Panchayat Information system for House tax, water tax, wealth tax, Library tax collection, phone bill, Electricity bill collection.
5. Design student information system portal which maintain attendance, marks etc.
6. Design online examination system.

Text Books:

1. Hans Bergstein, "JAVA Server Pages", O'Reilly, 2003

IT – 714 Visual Programming Laboratory **0-0-3 - 2**

Subject Code : *IT - 714*
Subject Name : *Visual Programming Laboratory*
No. of Hours Per Week : *3 hours.*
Marks Distribution : *Sessional work*: 20, *End Semester Exams*: 30
Question to be answered : *One will be allotted to a student on lottery basis*
Examination duration : *3 hours*

List of Programs:

1. Creating the look, communication via messages, windows resources and functions, adding multimedia and sound resources.
2. Writing windows applications, taking control of windows, adding menus, dialog boxes,
3. Special controls. Concepts of X-Windows System & programming.
4. Program to illustrate the concept of form Project, Application, Tools, Toolbox, Controls & Properties. Idea about labels, Buttons, Text Boxes (at least two).
5. Program to illustrate the different type variables in VB, sub-functions & Procedure details, Input box () & Msgbox (). Making decisions, looping (at least two).
6. Program using List boxes & Data lists, List Box control, Combo Boxes, data Arrays.
7. Program using Frames, buttons, check boxes, timer control, Programming with data, built in functions, ODBC data base connectivity. Data form Wizard, query, and menus in VB Applications, Graphics (at least two).

Text Books:

1. Roman, "Win32 API Programming with VB", SPD/O'REILLY, 2001
2. Cornell, "Visual Basic 6 from the Ground up", TMH, 2000
3. Dietel, "Visual Basic 6", Pearson, 2003

IT - 715 Minor Project **0-0-6 - 4**

Subject Code : *IT – 715*
Subject Name : *Minor Project*
No. of Hours Per Week : *6 hours.*
Marks Distribution : *Sessional work*: 50, *End Semester Exams*: 100

Each student will undertake a sizeable project involving survey of literature, development of new techniques and/or implementation of systems, writing of reports etc. under the guidance of one or more faculty member. End semester examination will be evaluated through a seminar on his/her work and the report.

Semester-VIII

IT - 811 Major Project **0-0-24 - 12**

Subject Code : *IT - 811*
Subject Name : *Major Project*
No. of Hours Per Week : *24 hours.*
Marks Distribution : *Sessional work*: 200, *End Semester Exams*: 300

Each student will undertake a sizeable project involving survey of literature, development of new techniques and/or implementation of systems, writing of reports etc. under the guidance of one or more faculty member. End semester examination will be evaluated through a seminar on his/her work and the report.

IT - 812 General Proficiency-IV (Grand Viva) **0-0-0 - 2**

Subject Code : *IT - 812*
Subject Name : General Proficiency (*Grand Viva)*
Marks Distribution : *End Semester Exams*: 100

Overall course proficiency will be evaluated through a grand viva/seminar covering all the subjects studied during entire B.Tech (IT) course.

ELECTIVES

A list of electives and their syllabi are given below. Depending on the specialization of teaching faculty, at least two options shall be offered to the students under Electives I & II (in the 6th semester) and Electives III & Open (in the 7th semester).

IT-621 Mobile Computing

UNIT- I

Introduction: Ubiquitous computing versus virtual reality, Software models for mobile computing. Data Management Issues. Distributed Algorithms & Mobility. Publishing & Accessing Data in Air: Pull and Push Based Data Transfers, Data Dissemination by Broadcast, Treating Air as Cache, Energy Efficient Indexing in Air.

UNIT- II

Handoff Management: detection, failures, channel assignments. Location Management: Two-tier HLR-VLR scheme, Mobile IP, hierarchical tree based scheme, regional directories, distributed location management.

UNIT- III

*The Approximate Query Processing Concept***:** hierarchy, summary database, updates and view maintenance.

UNIT- IV

Mobile Transaction Models. Technological Perspectives: 1-G, 2-G and 3-G network and services, the Internet, mobile computing and cellular telephony, voice and data services on 3G networks, battery problem and power dissipation, low energy processors.

UNIT- V

File System Support for Mobile Computing: Coda, Bayou Ad hoc Network Routing Protocols: DSDV, GSR, FSR, DSR, AODV

Text Books:

1. T Imielinski. (Ed.) Mobile Computing. Kluwer Academic Publishers, Boston.1996.
2. C E Perkins. Ad Hoc Networking. Addison Wesley. 2000.
3. Research papers

IT-622 Data Mining

UNIT-I

Introduction: Basic Data Mining Tasks, Data Mining Issues, Data Mining Metrics, Data Mining from a Database Perspective. Data Mining Techniques: A Statistical Perspective on Data Mining, Similarity Measures.

UNIT-II

Decision Trees, Neural Networks, Genetic Algorithms. Classification: Distance-Based Algorithms, Decision Tree-Based Algorithms.

UNIT-III

Clustering: Similarity and Distance Measures, Partitional Techniques, Hierarchical Techniques, Density based Techniques, Clustering Large Databases, Clustering with Categorical Attributes.

UNIT-IV

Association Rules: Basic Algorithms, Parallel and Distributed Algorithms, Incremental Rules, Advanced Association Rule Techniques.

UNIT-V

Advanced Techniques: Web Mining, Spatial Mining, Temporal Mining, Text Mining, and Applications of Data mining.

Text Books:

1. J. Han and M. Kamber. Data Mining: Concepts and Techniques. 2nd ed. Elsiver-2006.
2. M. H. Dunham. Data Mining: Introductory and Advanced Topics. Pearson Education. 2001.

Reference Books:

1. I. H. Witten and E. Frank. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2000.
2. D. Hand, H. Mannila and P. Smyth. Principles of Data Mining. Prentice-Hall. 2001.
3. A K Pujari. Data Mining Techniques, University Press

IT-623 Data Compression

Unit - I: Compression Techniques: Loss less compression, Lossy Compression, Measures of prefonnance, Modeling and coding, Mathematical *Preliminaries* for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

Unit – II: The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.

Unit-III: Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits,
Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows- Wheeler Transform: Move-to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.

Unit – IV: Distortion criteria, Models, Scalar Ouantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

Unit-V: Advantages of Vector Quantization *over* Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers. Structured *Vector* Quantizers.

Books:

1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

IT-624 Embedded Systems

Unit I: Introduction to 8085A CPU architecture-register organization, addressing modes and their features. Software instruction set and Assembly Language Programming. Pin description and features.

Unit II: Instruction cycle, machine cycle, Timing diagram. Hardware Interfacing: Interfacing memory, peripheral chips (IO mapped IO & Memory mapped IO).

Unit III: Interrupts and DMA. Peripherals: 8279, 8255, 8251, 8253, 8237, 8259, A/D and D/A converters and interfacing of the same. Typical applications of a microprocessor.

Unit IV: Introduction to embedded systems design & RTOS: Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.

Unit V: Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

Textbooks:

1. Raj Kamal, Embedded Systems, TMH, 2004.
2. M.A. Mazidi and J. G. Mazidi, The 8051 Microcontroller and Embedded Systems, PHI, 2004.
3. Ramesh S. Gaonkar, Microprocessor architecture, programming and applications with 085/8085A, Wiley Eastern Ltd.
4. Intel Corp: The 8085 / 8085A. Microprocessor Book – Intel marketing communication, Wiley inter science publications.
5. Adam Osborne and J. Kane, An introduction to micro computers Vol. 2 – some real Microprocessor – Galgotia Book Source, New Delhi

Text Books/Reference

1. David E. Simon, An Embedded Software Primer, Pearson Education, 1999.
2. K.J. Ayala, The 8051 Microcontroller, Penram International, 1991.
3. Dr. Rajiv Kapadia, 8051 Microcontroller & Embedded Systems, Jaico Press
4. Dr. Prasad, Embedded Real Time System, Wiley Dreamtech, 2004.
5. Ray and Bhurchandi, Advanced Microprocessors, TMH
6. Intel Corp. Micro Controller Handbook – Intel Publications.
7. Douglas V. Hall, Microprocessors and Interfacing, McGraw Hill International Ed.
8. Alan R. Miller, Assembly Language Programming the IBM PC, Subex Inc, 1987
9. Bary B. Brey, The Intel Microprocessors: 8086/8088, 80186, 80286, 80386 & 80486, Prentice Hall, India.

IT-625 Human Computer Interaction

Unit-I: Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design,

Unit-II: The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface. Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Unit-III: Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

Unit-IV: Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

Unit-V: Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

Text Books:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia

Reference Books:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.

IT- 631 Cryptography and Network Security

UNIT- I

*Introduction***:** The need for security-security approaches-principles of security-Plain Text and Cipher Text-substitution and Transposition Techniques-Encryption and Decryption-Symmetric and Asymmetric Cryptography-Stenography-key range and key size-types of attacks, *Symmetric key cryptographic algorithms***:** Algorithm types and modes, overview of symmetric key cryptography-DES-IDEA-RC5-BLOWFISH-AES-Differential and Linear Cryptanalysis.

UNIT- II

*Asymmetric key cryptographic algorithms***:** Overview of asymmetric key cryptography-RSA algorithm-symmetric and asymmetric key cryptography together-digital signatures-knapsack algorithm-some other algorithms.

UNIT- III

*Public key infrastructure***:** Introduction-Digital certificates- Private Key management-The PKIX model-Public Key Cryptography Standards- XML, PKI and Security, *Internet security protocols***:** Basic concepts-SSL-SHTTP-TSP-SET-SSL versus SET- 3D secure protocol-Electronic money-Email security-WAP security-security in GSM

UNIT- IV

*User authentication mechanisms***:** Introduction-Authentication basics-passwords-authentication tokens-certificate based authentication-biometrics authentication-kerberos-SSO approaches, *Practical implementations of cryptography/security***:** Cryptographic solutions using Java-Cryptographic solutions using Microsoft-cryptographic toolkits-security and operating systems

UNIT- V

*Network security***:** Brief Introduction to TCP/IP- firewalls-IP security-Virtual Private Networks- case studies on cryptography and security.

Text books:

1. Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., New Delhi

Reference books:

1. Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., New Delhi
2. Network Security Essentials Applications and Standards, William Stallings, Pearson Education, New Delhi
3. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes-Ousley, Keith Strassberg Tata Mcgraw-Hill

IT-632 E-Commerce

UNIT- I

*Electronic commerce environment and opportunities***:** Back ground, The Electronic commerce Environment, Electronic Market Place Technologies.

UNIT- II

*Modes of electronic commerce***:** Overview, EDI, Migration to open EDI, E commerce with WWW/ Internet , Commerce Net Advocacy – Web commerce going forward.

UNIT- III

Approaches to safe electronic Commerce: Overview, Source, Transport Protocols, Secure Transactions, Secure Electronic Payment Protocol, Secure Electronic Transaction, Certificates for Authentication, Security on Web Servers and enterprise networks, Electronic cash and electronic payment schemes, Internet Monitory Payment and Security requirements, payment and purchase order process – online electronic cash.

UNIT- IV

*Master card/ Visa Secure electronic transaction***:** Introduction – Business requirements - Concepts - Payment Processing. Email and Secure Email Technologies for Electronic Commerce: Introduction – The means of Distribution – A model for Message Handling – How Does a Email Work.

UNIT- V

*Internet Resources for Commerce***:** Introduction – Technologies for Web Servers – Internet Applications for commerce – Internet Charges – Internet Access and Architecture – Searching the Internet.

Text books:

1. Web Commerce Technology Hand Book, Daniel Minoli, Emma Minoli, McGraw Hill

Reference books:

1. Frontiers of Electronic Commerce, Ravi Kalakotar, Andrew B.Whinston, Addison-Wesley

IT-633 Simulation and Modeling

Unit-I: Nature of Simulation. Systems , Models and Simulation, Continuous and Discrete Systems, system modeling, concept of simulation, Components of a simulation study, Principles used in modeling ,Static and Dynamic physical models, Static and Dynamic Mathematical models Introduction to Static and Dynamic System simulation , Advantages ,Disadvantages and pitfalls of Simulation.

Unit-II: Types of System Simulation, Monte Carlo Method, Comparision of analytical and Simulation methods, Numerical Computation techniques for Continuous and Discrete Models, Distributed Lag Models, Cobweb Model. Continuous System models, Analog and Hybrid computers, Digital-Analog Simulators, Continuous system simulation languages ,Hybrid simulation ,Real Time simulations.

Unit –III: Exponential growth and decay models, logistic curves ,Generalization of growth models ,System dynamics diagrams, Multi segment models , Representation of Time Delays. Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

Unit-IV: Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue. Application of queuing theory in computer system . Discrete Events ,Generation of arrival patterns ,Simulation programming tasks , Gathering statistics, Measuring occupancy and Utilization , Recording Distributions and Transit times .

Unit-V: GPSS: Action times, Succession of events, Choice of paths, Conditional transfers ,program control statements . IMSCRIPT: Organization of SIMSCRIPT Program, Names & Labels, SIMSCRIPT statements . Estimation methods , Relication of Runs , Batch Means , Regenerative techniques , Time Series Analysis , Spectral Analysis and Autoregressive Processes.

Text Books/ Reference :

1. Gorden G., System simulation, Prentice Hall.
2. Seila, Simulation Modeling, Cengage Learning
3. Law .,Simulation Modeling And Analysis, McGraw Hill
4. Deo, System Simulation with Digital Computer, PHI
5. Harrington, Simulation Modeling methods, McGraw Hill
6. Severance, " System Modeling & Simulation, Willey Pub

IT-634 Artificial Intelligence

UNIT- I

*Introduction to AI***:** The AI Problems, the Underlying Assumption, AI Techniques, the Level of the Model, Criteria for Success, AI Applications, *Problem solving, Search and Control Strategies***:** Defining the Problem as a State Space Search, Production Systems, Control Strategies, Breadth-First Search, Depth-First Search, Problem Characteristics, Production System Characteristics, Issues in the design of Search Programs.

UNIT- II

Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Simple Hill Climbing, Steepest-Ascent Hill Climbing, Simulated Annealing, Best-First Search, OR-Graphs, the A* Algorithm, Problem Reduction, AND-OR Graphs, The AO* Algorithm, Constraint Satisfaction, Means-End Analysis.

UNIT- III

Game Playing: Overview, the Minimax Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening, *Knowledge Representation Issues***:** Representations and Mappings, Representing Simple Facts in Logic, Knowledge Representation Attributes, Computable Functions and Predicates, Resolution, Conversion to Clause Form, the Basics of Resolution, Resolution in Propositional Logic, Procedural vs. Declarative Knowledge, Logic Programming, Forward vs. Backward Reasoning, Matching, Control Knowledge.

UNIT- IV

*Statistical Reasoning***:** probability and Bayes' theorem, Certainty factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic, *Natural Language Processing***:** Overview, Morphological Analysis, Syntactic Analysis, Semantic Analysis, Discourse Integration, Pragmatic Analysis, Parsing Techniques, Top-Down Parsing, Bottom-Up Parsing, Augmented Transition Networks (ATN).

UNIT- V

*Learning***:** Rote Learning, Learning by Taking Advice, Learning by Induction, Explanation-Based Learning.*Expert System***:** Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

Text Books:

1. Nils J. Nelson, "Principle of Artificial Intelligence", Naroba Publishing House, 2002.
2. E. Rich and K. Knight, Artificial Intelligence, McGraw Hill, 1991.

Reference Books:

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 2nd Ed, Prentice Hall, 2003.
2. P. H. Winston and B. K. P. Horn, Lisp, 3rd Ed, Addison-Wesley, 1989.
3. P. Norvig, Paradigms of Artificial Intelligence Programming: Case studies in Common Lisp, Morgan Kauffman, 1991.
4. Bratko, Prolog Programming for Artificial Intelligence, 3rd Ed, Addison-Wesley, 2001.

IT-635 Distributed Systems

UNIT- I
Introduction to Distributed Systems: Goals of distributed system, hardware and software concepts, design issues. *Communication in distributed systems*: Layered protocols, ATM networks, the Client – Server model, remote procedure call and group communications.

UNIT- II
Synchronization in Distributed Systems: Clocks synchronization, Mutual exclusion, Election algorithms, the Bully algorithm, a ring algorithm, atomic transactions, dead lock in distributed systems, Distributed dead lock prevention, and distributed system, fault tolerance and real time distributed system.

UNIT- III
Processes and Processors in Distributed Systems: Thread, systems models, Processor allocation, Scheduling in distributed system, fault tolerance and real time distributed system.

UNIT- IV
Distributed file system: Distributed file system design, distributed file system implementation, trends in distributed file system. *Distributed shared memory*: What is shared memory, consistency models, page based shared memory, shared variable distributed shared memory, Object based DSM.

UNIT- V
Case study MACH: Introduction to MACH, process management in MACH, memory management in MACH, Communication in MACH, UNIX emulation in MACH. *Case study DCE*: Introduction to DCE, Threads, RPC's, Time service, directory service, security service, distributed file system.

Text Books:
1. Andrew S. Tanenbaum, "Distributed Operating System", PHI.
2. G. F. Coulouris & J. Dollimore, "Distributed Systems: Concepts and Design", Addison-Wesley.
3. S. Mullender (Ed), "Distributed Systems", Addison-Wesley.
4. M. Singhal & N. Shivratri, "Advanced Concepts in Operating Systems", TMH.

IT-721 Bio-informatics

UNIT-I
Introduction to Bioinformatics: Objective of bioinformatics, kind of data used, data integration and analysis, *Biological Database*: Nucleotide databases (Gen Bank, DDBJ), Protein databases (Swiss Prot, TrEMBL), Derived databases (Pfam, PRINTS, Motif databases), NCBI, EMBL; *Molecular Biology*: Central dogma of molecular biology.

UNIT-II
Pair wise and Multiple Sequence Alignment: Dot Matrix methods, Scoring matrices, Dynamic Programming, SP Method, Progressive Alignment, Similarity search: BLAST and FASTA-Comparisons.

UNIT-III
Phylogenetic Analysis: Concepts, Phylogenetic Tree, Tree building methods (UPGMA, NJ maximum livelihood maximum parsimony), *Tree evaluation methods*: Bootstrapping, *Gene prediction*: Prediction in prokaryotic organism, prediction in Eukaryotic organism, Homology based methods; *Abinitio methods*: Search by content, search by signal, patterns, Methods-Distance based Maximum parsimony. Gene Prediction: Basics, Prediction Methods-Statistical and HMM approach, by ORF prediction.

UNIT-IV
Micro arrays and Gene Expression data analysis: Concepts of Micro array, Gene Array experiments, Clustering Gene expression Profiles- Hierarchical Clustering, k-means clustering, PCA based.

UNIT-V

Protein Classification and Structure Prediction: Overview of Protein Structure, Protein structure databases, Protein classification approaches, Primary structure analysis and prediction.

Text Books:

1. S C Rastogi et.al., "Bioinformatics Methods and Applications", PHI-2004
2. D.W. Mount, "Bioinformatics: Sequence and Genome Analysis", 2nd ed., CBS, 2004.

IT-722 Natural Language Processing

Unit I: Introduction: Knowledge in speech and language processing – Ambiguity – Models and Algorithms – Language, Thought and Understanding. Regular Expressions and automata: Regular expressions – Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology – Finite-State Morphological parsing – Combining FST lexicon and rules – Lexicon-Free FSTs: The porter stammer – Human morphological processing

Unit II: Word classes and part-of-speech tagging: English word classes – Tagsets for English – Part-of-speech tagging – Rule-based part-of-speech tagging – Stochastic part-of-speech tagging – Transformation-based tagging – Other issues. Context-Free Grammars for English: Constituency – Context-Free rules and trees – Sentence-level constructions – The noun phrase – Coordination – Agreement – The verb phase and sub categorization – Auxiliaries – Spoken language syntax – Grammars equivalence and normal form – Finite-State and Context-Free grammars – Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search – A Basic Top-Down parser – Problems with the basic Top-Down parser – The early algorithm – Finite-State parsing methods.

Unit III: Features and Unification: Feature structures – Unification of feature structures – Features structures in the grammar – Implementing unification – Parsing with unification constraints – Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar – problems with PCFGs – Probabilistic lexicalized CFGs – Dependency Grammars – Human parsing.

Unit IV: Representing Meaning: Computational desiderata for representations – Meaning structure of language – First order predicate calculus – Some linguistically relevant concepts – Related representational approaches – Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis – Attachments for a fragment of English – Integrating semantic analysis into the early parser – Idioms and compositionality – Robust semantic analysis. Lexical semantics: relational among lexemes and their senses – WordNet: A database of lexical relations – The Internal structure of words – Creativity and the lexicon.

Unit V: Word Sense Disambiguation and Information Retrieval: Selectional restriction-based disambiguation – Robust word sense disambiguation – Information retrieval – other information retrieval tasks. Natural Language Generation: Introduction to language generation – Architecture for generation – Surface realization – Discourse planning – Other issues. Machine Translation: Language similarities and differences – The transfer metaphor – The interlingua idea: Using meaning – Direct translation – Using statistical techniques – Usability and system development.

TEXT BOOK

1. Daniel Jurafsky & James H.Martin, " Speech and Language Processing", Pearson Education (Singapore) Pte. Ltd., 2002.

REFERENCE

1. James Allen, "Natural Language Understanding", Pearson Education, 2003.

IT- 723 Internet and its Application Technologies

UNIT- I
Introducing ASP.NET: Problems with older versions of Active Server Pages, The Benefits of ASP.NET, Choosing the Appropriate Development Environment, Setting up the Development Environment, *Solutions, Projects, and the Visual Studio .NET IDE*: Planning and Creating the Visual Studio .NET, Adding the Solution to Visual SourceSafe, The Visual Studio .NET integrated.

UNIT- II
Exploring ASP.NET and Web Forms: Web Forms, Two ASP.NET Programming Models, Simple ASP.NET Page, Server Controls, View State, Post back, Responding to Events, Event Handler Procedure Arguments, Code-Behind page, life cycle of a web form and its controls, page layout, *The .NET Framework and Visual Basic .NET Object Programming*: Definitions, The .NET Framework, Visual Basic .NET Object-Oriented Programming, Structures, Interfaces, Enumerations, Working with Collections, Referencing External Code Libraries.

UNIT- III
Working with Web Server Controls: The Web server control hierarchy, Label Control, TextBox Control, Button and LinkButton Control, Hyperlink control, Image and ImageButton Control, CheckBox and RadioButton Controls, DropDownList and LIstBOx Controls, Validation Controls.

UNIT- IV
Using Data Bound Web Controls: Data-Binding Basics, Single Value Data Binding, Repeating Binding Control Methods, Repeating Bindin Control Events, Mapping Fields to the Control, Data Bound Controls.*Data Access with ADO.NET*: Connected versus Disconnected Data, ADO.NET Data Provides, ADO. NET data Namespaces, Primary Data Objects, Modified Table Data, Using the DataGrid to modify Data, Updating the Data store, Paging the Datagrid, Storing data with the DataGrid.

UNIT- V
Working with XML Data: XML in the .NET Framework, The XML Document Object Model, XML Namespace, XML Objects, Working with XML Documents, Validating XML Documents. *Streams, File Access and Serialization*: Stream Classes, File Classes, Directory Classes, Serialization.

Text Book:
1. ASP.NET BIBLE – Glenn Johnson- Wiley Dreamtech publications

IT-724 Fuzzy Logic And Neural Networks

Unit I: Fuzzy Systems:Fuzzy sets and Fuzzy reasoning-Fuzzy matrices-Fuzzy functions-decomposition-Fuzzy automata and languages-

Unit II: Fuzzy control methods-Fuzzy decision making, Adaptive Control, Applications;

Unit III: Artificial Neural Networks Basic-concepts-single layer perception-Multi layer perception-

Unit IV Supervised and un supervised learning back propagation networks, Application;

Unit V: Neuro-Fuzzy Modelling: Adaptive networks based Fuzzy interfaces-Classification and Representation trees- algorithms – Rule base structure identification-Neuro-Fuzzy controls;

Books/References
1. Neural Fuzzy Systems, Chin-Teng Lin & C. S. George Lee, Prentice Hall PTR.
2. Fuzzy Sets and Fuzzy Logic, Klir & Yuan, PHI, 1997.
3. Neural Networks, S. Haykin, Pearson Education, 2ed, 2001.
4. Neural Networks, Fuzzy logic, and Genetic Algorithms, S. Rajasekaran & G. A. V. Pai, PHI.
5. Neuro-Fuzzy and Soft Computing, Jang, Sun, & Mizutani, PHI.
6. Intelligent Hybrid Systems, D. Ruan, Kluwer Academic Publisher, 1997.

IT-725 Computer Vision

Unit I: Camera- Pinhole and Lens Types; Human Eye; Sensing; geometric Camera Models; Geometric Camera Calibrations; Radiometry; Projections; Transforms- Fourier, Hough and Radon; Sources, Shadows and Shading; Colour- Generation, Human Perception, Representation, Model for an Image Colour; Surface Colour;

Unit II: Scene Segmentation and Labeling; Counting Objects; Perimeter Measurements; Following and Representing Boundaries; B-Splines; Least Squares and Eigen Vector Line Fitting; Shapes of Regions;

Unit III: Shape Representation and Description :Introduction; Statistical Decision Theory; Pattern Recognition Principles; Clustering Approach- K- Means Clustering; Parametric Approach- Bayes' Classifier; Relaxation Approach; Shape Similarity Based Recognition; Expert System;

Unit IV: Image Segmentation using K-means clustering and Graph- Theoretic Clustering; Segmentation by fitting a model; Segmenttion and fitting using probabilistic methods; Tracking with linear dynamic models;

Unit V: Probabilistic and inferential methods- templates using classifiers, building classifiers form class histograms, feature selection, neural networks, support vector machines; Recognition by relations between templates; Geometric templates from spatial relations;

Text Books:
1. Two Tone Image Processing and Recognition-Chaudhuri and Dattamazumdar, Wiley Eastern;
2. Pattern Recognition and Image Analysis- Gose, Johnson , PHI
3. Computer Vision- Forsyth, Pearson Education
4. Computer Vision- D. H. Ballard and C. M. Brown, Prentice Hall;

Reference Books:
1. Pattern Classification and Scene Analysis- P. E. Hart and R. O. Duda, John Wiley;
2. Machine Vision- R. Jain, R. Kasturi and B. G. Schunck, McGraw-Hill;
3. Digital Image Processing R. C. Gonzalez and R. E. Woods, Pearson Education
4. Pattern Recognition – Statistical, Structural and Neural Approaches- R. Schalkoff, John Wiley;

IT-731 Pattern Recognition

Unit I: Introduction: Examples; The nature of statistical pattern recognition; Three learning paradigms; The sub-problems of pattern recognition; The basic structure of a pattern recognition system; Comparing classifiers.
Bayes Decision Theory: General framework; Optimal decisions; Classification; Simple performance bounds.

Unit II: Learning - Parametric Approaches: Basic statistical issues; Sources of classification error; Bias and variance; Three approaches to classification: density estimation, regression and discriminant analysis; Empirical error criteria; Optimization methods; Failure of MLE; Parametric Discriminant Functions : Linear and quadratic discriminants; Shrinkage; Logistic classification; Generalized linear classifiers; Perceptrons; Maximum Margin; Error Correcting Codes;

Unit III: Error Assessment: Sample error and true error; Error rate estimation; Confidence intervals; Resampling methods; Regularization; Model selection; Minimum description length; Comparing classifiers Nonparametric Classification: Histograms rules; Nearest neighbor methods; Kernel approaches; Local polynomial fitting; Flexible metrics; Automatic kernels methods

Unit IV:
Feature Extraction: Optimal features; Optimal linear transformations; Linear and nonlinear principal components; Feature subset selection; Feature Extraction and classification stages, Unsupervised learning and clustering, Syntactic pattern recognition, Fuzzy set Theoretic approach to PR,

Unit V:
Margins and Kernel Based Algorithms: Advanced algorithms based on the notions of margins and kernels
Applications of PR: Speech and speaker recognition, Character recognition, Scene analysis.

Textbooks:

1. Theodoridis & Koutroumbas, Pattern Recognition, Academic Press

IT-732 Wireless Communications

Unit I: Evolution of mobile radio communication fundamentals. Large scale path loss: propagation models, reflection, diffraction, scattering, practical link budget design using path loss model. Small scale fading & multipath propagation and measurements, impulse response model and parameters of multipath channels, types of fading, theory of multi-path shape factor for fading wireless channels

Unit II: Spread spectrum modulation techniques: Pseudo-noise sequence, direct sequence spread spectrum (DS-SS), frequency hopped spread spectrum(FHSS), performance of DS-SS, performance of FH-SS, modulation

performance in fading and multipath channels, fundamentals of equalisation, equaliser in communication receiver, survey of equalisation techniques, linear equaliser, linear equaliser, non-linear equalisation, diversitytechniques, RAKE receiver

Unit III: Characteristics of speech signals, quantisation techniques, vocoders, linear predictive coders, time division multiple access, space division multiple access, and frequency division multiple access

Unit IV: Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.

Unit V: Introduction to wireless networks, 2G, 3G wireless systems, wireless standards.

Text Book:

1. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson

Reference Books:

1. Willium C. Y. Lee, "Mobile communication Design and fundamentals"
2. D. R. Kamilo Fehar, "Wireless digital communication"
3. Haykin S & Moher M., "Modern wireless communication", Pearson, 2005.
4. R. Pandya, " Mobile and personal communication system", PHI

IT-733 Digital Image Processing

Unit I: Introduction - digital image representation - fundamental steps in image processing - elements of digital image processing systems - digital image fundamentals - elements of visual perception - a simple image model - sampling and quantization - basic relationship between pixels – image geometry

Unit II: image transforms - introduction to Fourier transform – discrete Fourier transform - some properties of 2d-fourier transform (DFT)- other separable image transforms - hotelling transform

Unit III: Image enhancement - point processing - spatial filtering - frequency domain -
image restoration - degradation model - diagonalization of circulant and block circulant matrices - inverse filtering - least mean square filter

Unit IV: Image compression - image compression models - elements of information theory - error-free compression - lossy compression - image compression standards

Unit V: Image reconstruction from projections - basics of projection - parallel beam and fan beam projection - method of generating projections - Fourier slice theorem - filtered back projection algorithms - testing back projection algorithms

Text Books:

1. Rafael C., Gonzalez & Woods R.E., *Digital Image Processing*, Addison Wesley, 1999.
2. Rosenfeld A. & Kak A.C., *Digital Picture Processing*, Academic Press, 1998
3. Jain A.K, *Fundamentals of Digital Image Processing*, Prentice Hall, Englewood Cliffs, 2002.

Reference Books:
1. Schalkoff R. J., *Digital Image Processing and Computer Vision*, John Wiley, 2004.
2. Pratt W.K., *Digital Image Processing*, John Wiley, 2002.

IT-734 Robotics

Unit I: Introduction Evolution of robotics, industrial robots; Cognitive and Biological aspects; Fields of application and future scope;

Unit II: Structural Design of Robot Anatomy of robot; Manipulation, arm geometry, Degrees of freedom; drives and control (hardware) for motions. End effectors and grippers, pickups, etc.

Unit III: Matching robots to the working place and conditions; Interlock and sequence control, reliability, maintenance and safety of robotic systems; Robot Design Direct and Inverse Kinematics, Path Planning and Motion Control, Robotic Manipulators, Sensors and Actuators; Low-Level Robot Control;

Unit IV: Navigation Algorithms and Sensor-Based Navigation; Robot Vision and Other Sensors; Multi-Agent Robotics; Expert Systems.

Unit V: Applications Studies in manufacturing processes, e.g. casting, welding, painting, machine tools, machining, heat treatment and nuclear power stations, etc. Synthesis and evolution of geometrical configurations, robot economics, educating, programming and control of robots.

Text Books:
1. Autonomous Robots G. A. Bekey, MIT Press
2. Robotics and Control- Mittal, TMGH
Reference Books:
3. Robotic Control- Fu, TMGH

IT-735 Advanced Computer Architecture

Unit 1: Introduction: Evolution of processor design; Cost/ performance issues in high performance processor design, performance metrics;

Unit 2: Architectural abstractions- architecture, key features, the instruction set- principles and design; Arithmetic unit- arithmetic instructions and various implementations; Registers; Datapath and control unit- datapath requirements for different instruction classes; fixed-cycle vs. variable-cycle instruction implementation; Approach to control unit design - FSM control and microprogrammmed control; exceptions and exception handling; Performance enhancement techniques - pipelining and memory hierarchy: datapath pipelining; instruction-level pipelining; performance issues in pipelining; software pipelining. Space-time locality and cache memory; virtual memory, paging, TLB; case studies- 80286, 80386, 80486, 80586;

Unit 3: Instruction Set and introduction to programming 80x86 Edit, assembly, link, test, debug; use of code, data, and stack segments

Unit 4: I/O Interface I/O performance measures; interfacing I/O to the memory, processor and OS; Interrupts and DMA; Data communication; Case studies (in brief): Intel x 86 families and the Pentium; RISC architectures like MIPS, SPARC, Power PC, PA-RISC.

Unit 5: Introduction to DSP Architectures Key issues in DSP architecture design; pipelining and parallelism in instruction set; On-chip memories and I/O peripherals. Case study- ADSP 21xx/ 21xxx family and TMS 320C5x family DSPs; Software and hardware development tools;

Text Books:
1. The 80x86 Family- Uffenbeck, Pearson Education
2. The Pentium Processor- Antanokos, Pearson Education
3. The Intel Microprocessor- Brey, Pearson Education

Reference Books:

1. Microprocessors and Interfacing- Hall, TMGH
2. Advanced Microprocessors and Peripherals- Ray, Bhurchandi, TMGH
3. Digital Signal Processors- Kuo, Gan, Pearson Education