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
Adopted Course Code (XX- αβγ)

XX-α β γ

Subject number (In case of Practical papers having corresponding theory paper, this number stands for its corresponding theory subject number).

0: Theory, 1: Practical/ Drawing/ Design, 2, 3: Elective

Semester Number

Teaching Subject code

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)

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**TA**-Teachers Assessment  **CT**-Class Test  **ESE**-End Semester Examination  
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Total Marks: 900  
Total Periods: 31  
Total Credits: 27
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TA-Teachers Assessment  CT-Class Test  ESE-End Semester Examination  Total Marks: 950
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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
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**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**
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**TA**-Teachers Assessment  **CT**-Class Test  **ESE**-End Semester Examination  **Total Marks**: 1050  **Total Periods**: 33  **Total Credits**: 30
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**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)
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<th>EVALUATION SCHEME</th>
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Total: 15 | 5 | 15 | 1050 | 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)
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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
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Detailed Syllabus
Semester-I

HU - 101 PROFESSIONAL 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:

Text Books:

Reference Books:
2. Patnaik, P., Group Discussion and Interview Skills, CUP, New Delhi, 2011.
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: Three Hours.

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’Hospital Rule (statements only with applications) and indeterminate 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 \( \log(1+x), e^x, \sin x, \cos x \); curvature, radius of curvature and centre of curvature of plane curves, Fundamental theorem of integral calculus. Reduction formulae.

UNIT-III

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. \( a_n y^{(n)} + a_1 y' + a_2 y = 0 \) where \( a_i \)'s are constants. Nonlinear equations and Clairaut’s equations.

Text Books:

Reference Books:
PH - 103 ENGINEERING PHYSICS  
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: Three Hours.

UNIT – I

UNIT – II
Electromagnetism and Physical optics: Gradient, divergence, curl; Electrostatic field $\mathbf{E}$ and potential $\varphi$, their relation. Short electric dipole, Gauss law and its applications for finding $\mathbf{E}$ 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
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
Nuclear reaction and Q value, Nuclear fission, chain reaction, nuclear fusion and stellar energy. Problems.

Text Books:

Reference Books:
ME-104 ENGINEERING MECHANICS

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: Three Hours.

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:

Reference Books:
EE – 105 BASIC ELECTRICAL ENGINEERING

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

UNIT – III

UNIT – IV

Text Books:

Reference Books:
HU - 111DIGITAL ENGLISH LANGUAGE LABORATORY 0-0-3 - 2

Subject Code: HU - 111.
Subject Name: Digital English Language Laboratory.
No. of Hours Per Week: Practical - 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.
7. Reporting.
8. Debating.
10. Writing E-mails.
12. Drafting Curriculum Vitae/ Resume/Biodata.

Resource Materials:–

A. Books:
4. Rajeevan, Dutt, Sasikumar, A course in Listening and Speaking I & II with CD, CUP, New Delhi, 2007.

B. Software: Orell Digital Language Lab Software.
PH - 113 ENGINEERING PHYSICS LABORATORY

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 statitical 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:
EE - 115BASIC ELECTRICAL ENGINEERING LABORATORY 0-0-3 - 2

Subject Code: EE - 115.
Subject Name: Basic Electrical Engineering Laboratory.
No. of Hours Per Week: Practical - 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:
ME - 116  WORKSHOP PRACTICE

Subject Code: ME - 116.
Subject Name: Workshop Practice.
No. of Hours Per Week: Practical - 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, equipment and 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 such as cracks, undercutting, slag inclusion, porosity.
(c) Metal Cutting: Introduction to machining and common machining operations. Cutting tool materials. Definition of machine tools, specification and 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 and classification.

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:
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:

Reference Books:
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

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

UNIT-IV

Text Books:

Reference Books:
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-unimolecular 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 B12 and Haemoglobin).

Text Books:

Reference Books:
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

UNIT-II
Imperative programming (Using C): Overview of C, Constants, Variables and Data Types, Operators and Expressions, Input and Output Operations, Branching and looping operation.

UNIT-III
Functions: Defining a function, accessing a function, passing arguments to a function, specifying argument data types, function prototypes 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 of structure as argument.
Pointers: Fundamentals, pointer declarations, passing pointers to a function, pointer and one dimensional arrays, pointer as function arguments, Functions returning Pointer, Pointer to functions, pointers and structures.

UNIT - V

Text Books:
2. E. Balaguruswami, Programming in ANSI C, 2/e, Tata McGraw Hill, 2004

Reference Books:
EC - 205 BASIC ELECTRONICS

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.


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) and UJT: 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:

Reference Books:
CH - 213 ENGINEERING CHEMISTRY LABORATORY

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 permanganometry.
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.

Text Books:

Reference Books:
IT - 214 COMPUTER PROGRAMMING LABORATORY 0-0-3 - 2

Subject Code: IT - 214.
Subject Name: Computer Programming Laboratory.
No. of Hours Per Week: Practical: 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, passing array (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 structure and union.

Text Books:
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 of Zener 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:
CE - 216 ENGINEERING GRAPHICS 0-0-3 - 2

Subject Code: CE - 216.
Subject Name: Engineering Graphics.
No. of Hours Per Week: Practical-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).
5. Projection of Points.
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:

Reference Books:
GP-I General Proficiency-I

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.
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.

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.

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

TEXT BOOKS:

REFERENCES:
MA – 302 ENGINEERING MATHEMATICS – III

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

UNIT-II

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

UNIT-III

UNIT-IV

Text Books:
2. G.Strang: Linear Algebra & its applications 4th e/2007 Thomson BROOKS/COLE

Reference Books:
EC – 303 SIGNALS AND SYSTEMS

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:

Reference Books:
IT – 304 Computer Graphics and Multimedia

**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 clipping, 2D transformations: Scaling, rotation, translation, homogeneous co-ordinates, rotation about arbitrary points.

**UNIT-III**  

**UNIT-IV**  
*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**  

**Text Books:**  

**Reference Books:**  
UNIT-I
Introduction to Data structure, Time and Space analysis of Algorithms, Order Notations, Linear Data Structures: List: array and link list representation, insertions, deletions and searching elements in a list, traversing a list, Sparse matrices, doubly link list 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, insertions and deletions 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

UNIT-V

Text Books:

Reference Books:
Detail Syllabus for B.Tech. (IT) Program

**IT-306 Discrete Mathematics**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>IT- 306</th>
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<td>Subject Name</td>
<td>Discrete Mathematics</td>
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<tr>
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<td>Lecture – 3, Tutorial -1</td>
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</tr>
<tr>
<td>Examination duration</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

**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, Complemented 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:**

**Reference Books:**
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

<table>
<thead>
<tr>
<th>Subject Code</th>
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<td>Subject Name</td>
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<td>No. of Hours Per Week</td>
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<td>Marks Distribution</td>
<td>: Sessional work: 20, End Semester Exams: 30</td>
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<td>Question to be answered</td>
<td>: One will be allotted to a student on lottery basis</td>
</tr>
<tr>
<td>Examination duration</td>
<td>: 3 hours</td>
</tr>
</tbody>
</table>

List of Programs:

1. Programs (in C) for line drawing using DDA and Bresnham’s algorithms.
2. Programs (in C) for circle generations using Bresnham’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:

**IT – 315 Data Structure Laboratory**

- **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**: 3 hours

**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.
10. Implementation of Kruskal’s algorithms.
12. Implementation of Insertion sort techniques.
13. Implementation of Bubble sort techniques.
15. Implementation of Heap sort techniques.
17. Implementation of Hashing using chaining and linear probing technique.

**Text book:**
**IT-317 Numerical Programming Laboratory**  

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>IT –317</th>
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</thead>
<tbody>
<tr>
<td>Subject Name</td>
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<tr>
<td>No. of Hours Per Week</td>
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<td>Marks Distribution</td>
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<td>Question to be answered</td>
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<tr>
<td>Examination duration</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

**List of Programs:**

1. Implementation of Newton forward & backward Interpolation methods.
2. Implementation of Lagrange methods.
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:**

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

Text Books:

Reference Books:

**IT–402 Data Communication**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>IT – 402</th>
</tr>
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<tr>
<td>Subject Name</td>
<td>Data Communication</td>
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<tr>
<td>No. of Hours Per Week</td>
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</tr>
<tr>
<td>Examination duration</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

**UNIT-I**


**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:**

**Reference Books:**
EC – 403 DIGITAL ELECTRONIC

Subject Code: EC- 403
Subject Name: Digital Electronic Circuits.
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
Signed numbers; Canonical 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 and asynchronous 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:

Reference Books:
1. A. Anand Kumar, Fundamental of Digital Circuits, 2/e, PHI, 2009.
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:

Reference Books:
### IT– 405 System Programming

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>: IT - 405</th>
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<td>Subject Name</td>
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<td>No. of Hours Per Week</td>
<td>: Lecture –3, Tutorial -1</td>
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<tr>
<td>Examination duration</td>
<td>: 3 hours</td>
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</tbody>
</table>

**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**

**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, until, for-statements, 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

**Reference Books:**
4. Linux Manuals.
**IT- 406 Computer Organization and Architecture**  

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

**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:**

**Reference Books:**
**Practical**

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

**Subject Code:** EC - 413.
**Subject Name:** Digital Electronics Laboratory.
**No. of Hours Per Week:** Practical-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.

**Text Books:**
IT – 415 System Programming Laboratory

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.
4. Y. Kenetkar, “Introduction to shell programming”, BPB Publications
**IT - 417 General Proficiency-II**

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>IT - 417</th>
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</thead>
<tbody>
<tr>
<td>Subject Name</td>
<td>General Proficiency-II</td>
</tr>
<tr>
<td>Marks Distribution</td>
<td>End Semester Exams: 50</td>
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Proficiency will be evaluated through viva/seminar covering the subjects studied during Semester-III and Semester-IV.
Semester-V

HU – 501 Management Information System

<table>
<thead>
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<th>Subject Code</th>
<th>HU - 501</th>
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<tr>
<td>Subject Name</td>
<td>Management Information System</td>
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<tr>
<td>No. of Hours Per Week</td>
<td>Lecture –3, Tutorial -1</td>
</tr>
<tr>
<td>Marks Distribution</td>
<td>Sessional work: 60, End Semester Exams: 90</td>
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<td>Question to be set</td>
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<tr>
<td>Question to be answered</td>
<td>Any 5 (five)</td>
</tr>
<tr>
<td>Examination duration</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

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, soln evaluation & choice. Effectiveness vs efficiency. MIS Planning, Design and control.

UNIT-III

Transaction processing & management reporting systems: A management information systems framework: 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


Text Books:
1. Davis, “MIS”, TMH

Reference Books:
EC –502 MICROPROCESSOR  
Subject Code: EC- 502.  
Subject Name: Microprocessor.  
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  

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  

Text Books:  

Reference Books:  
**UNIT-I**

*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, Arithmetic 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:**

**Reference Books**
1. W. Stalling, “Cryptography and Network security “, PHI.  
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

Text Books:
1. E. Balaguruswamy, “Object oriented programming with C++”, TMH

Reference Books:
IT – 505 Algorithm Analysis and Design

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
Sorting and order statistics: Heap Sort, Quick Sort, Sorting in linear time, Medians and order statistics

UNIT-II:

UNIT – III

UNIT- IV

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

Reference Books:
   Udi Manber, “Introduction to Algorithms”, Addison-Wesley.
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 specification, 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:

Text Books:

Reference Books:
Practical:

EC – 512 Microprocessor Laboratory

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 Fibonacci 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:
Detail Syllabus for B.Tech.(IT) Program

**IT–514 Object Oriented Programming Laboratory**  
**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:**

IT – 516 Computer Networks Laboratory

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.
3. NS-2 Tutorial (on-line available)
Semester VI

IT – 601 Operating Systems

<table>
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<tr>
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<tr>
<td>Subject Name</td>
<td>: Operating System</td>
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<tr>
<td>No. of Hours Per Week</td>
<td>: Lecture – 3, Tutorial -1</td>
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<td>: Any 5 (five)</td>
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<td>Examination duration</td>
<td>: 3 hours</td>
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</table>

UNIT – I


UNIT – II


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


Text Books:

Reference Books:
IT – 602 Software Engineering

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

Text book:

Reference Books:
**IT – 603 Relational Database Management System**

**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:**  

**Reference Books:**  
IT–604 Compiler Design

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

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:

Reference Book:
IT – 61X Elective – I

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

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:

<table>
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<tr>
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<tbody>
<tr>
<td>Subject Name</td>
<td>Operating Systems Laboratory</td>
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<tr>
<td>No. of Hours Per Week</td>
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<tr>
<td>Marks Distribution</td>
<td>Sessional work: 20, End Semester Exams: 30</td>
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<td>Question to be answered</td>
<td>One will be allotted to a student on lottery basis</td>
</tr>
<tr>
<td>Examination duration</td>
<td>3 hours</td>
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</tbody>
</table>

#### 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

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 : 3 hours

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 subqueries, 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.
11. Program using trigger in data manipulation.

Text Books:
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 : 3 hours

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.

Text Books:

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

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, semiconductor and integrated circuits layout design, grant of patent in India, authority and procedure, patent forms, surrender and revocation of patents and compulsory licensing, acquisition 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 infringement and piracy under Indian Laws.

Text Books:

Reference Books:
2. Govindarajan, Natarajan & Senthil Kumar – Engineering Ethics. PHI.
IT–702 System Administration

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>IT - 702</th>
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<tbody>
<tr>
<td>Subject Name</td>
<td>System Administration</td>
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<tr>
<td>No. of Hours Per Week</td>
<td>Lecture – 3, Tutorial -1</td>
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</table>

UNIT-I

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.

UNIT-V
System Backup & Recovery: Log files for system and applications; Backup schedules and methods (manual and automated).

Text Books:
2. Kirch – “ Linux network Administrator’s guide (2nd Ed.)” – O’Rielly
3. Maxwell – “Unix system administration” - TMH

Reference Book:
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

Text Books:
2. Ivor Horton, “Beginning J2EE 1.4”, SPD Publication,2005

Reference Books
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

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<td>Subject Name</td>
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<td>No. of Hours Per Week</td>
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<td>Marks Distribution</td>
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<td>Examination duration</td>
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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

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<tr>
<td>Examination duration</td>
<td>3 hours</td>
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</table>

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:
4. Wells, LINUX Installation & Administration, Vikas
IT – 713 Web Technology Laboratory

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
5. Design student information system portal which maintain attendance, marks etc.
6. Design online examination system.

Text Books:
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,
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.

Text Books:
2. Cornell, “Visual Basic 6 from the Ground up”, TMH, 2000

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

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)

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

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

Text Books:
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

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

Text Books:

**Reference Books:**

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**IT-623 Data Compression**


**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 Huffman coding: Loss less image compression, Text compression, Audio Compression.


**Unit – IV:** Distortion criteria, Models, Scalar Quantization: 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

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**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, 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.
Detail Syllabus for B.Tech.(IT) Program

Textbooks:
3. Ramesh S. Gaonkar, Microprocessor architecture, programming and applications with 085/8085A, Wiley Eastern Ltd.
5. Adam Osborne and J. Kane, An introduction to micro computers Vol. 2 – some real Microprocessor – Galgotia Book Source, New Delhi

Text Books/Reference
3. Dr. Rajiv Kapadia, 8051 Microcontroller & Embedded Systems, Jaico Press
5. Ray and Bhurchandi, Advanced Microprocessors, TMH
8. Alan R. Miller, Assembly Language Programming the IBM PC, Subex Inc, 1987

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.


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:
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
**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**


**UNIT- IV**


**UNIT- V**

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

**Text books:**

**Reference books:**

**IT-632 E-Commerce**

**UNIT- I**


**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**


**UNIT- IV**

UNIT- V


Text books:

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-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.


Text Books/ Reference :
2. Seila, Simulation Modeling, Cengage Learning
3. Law, Simulation Modeling And Analysis, McGraw Hill
4. Deo, System Simulation with Digital Computer, PHI
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


UNIT- III


UNIT- IV


UNIT- V


Text Books:

Reference Books:
**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.

**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**

**UNIT-III**

**UNIT-IV**
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

IT-722 Natural Language Processing


TEXT BOOK

REFERENCE
IT- 723 Internet and its Application Technologies

UNIT- I

UNIT- II

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 Providers, 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

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;


Books/References
5. Neuro-Fuzzy and Soft Computing, Jang, Sun, & Mizutani, PHI.
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; Segmentation 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

**Reference Books:**
1. Pattern Classification and Scene Analysis- P. E. Hart and R. O. Duda, John Wiley;
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, diversity techniques, 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:**

**Reference Books:**
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:**
**Reference Books:**

**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:**
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 microprogrammed 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