

# **SCHEME OF EXAMINATION**

**&**

**SYLLABI**

**for**

**Bachelor / Master of Technology (Dual Degree)  
Information Technology**

**Offered by**

**University School of Information Technology**



**GURU GOBIND SINGH  
INDRAPRASTHA  
UNIVERSITY**

**Guru Gobind Singh Indraprastha University  
Kashmere Gate, Delhi – 110 403 [INDIA]  
*www.ipu.ac.in***

**Duration: 4 + 2 Years.**

**Applicable to:**

The present scheme is being proposed for B.Tech. / M. Tech (IT) for the first eight semesters. The scheme would be effective from August – 2007. The scheme is proposed to be applicable to the batch admitted for the August – 2007 session. The scheme is also applicable from third semester onwards to the batch admitted in August – 2006.

**Design Inputs**

1. Gate syllabi.
2. Minimal changes in the existing course of B.Tech. (IT), but a rearrangement of the paper sequence (if required).

**Comparison of the GATE Syllabus:**

<b>CSE – TOPICS</b>	<b>IT – TOPICS</b>	<b>ECE – TOPICS</b>
1. Calculus, Linear Algebra, Probability	- do -	- do -, Transforms, ODEs, Complex Variables
2. Numerical Analysis	- do -	- do -
3. Mathematical Logic, Set Theory and Algebra, Combinatorics, Graph Theory	- do -	Networks
4. Digital Logic	- do -	Electronic Devices
5. Computer Organization and Architecture	Computer Organization	Analog Circuits
6. Programming and Data Structure, Algorithms	Programming methodology, Data Structures, Algorithms	Digital Circuits
7. Databases	- do -	Signal and Systems
8. Theory of Computation	Regular Languages, Context Free Languages	Control Systems
9. Operating Systems	- do – (in context to Unix)	Communications
10. Computer Networks	Data Comm. And CN	Electromagnetics
11. Compiler Design	Web Technologies	
12.	Information Systems and Software Engineering	

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**KASHMERE GATE, DELHI**  
**Bachelor / Master of Technology (Dual Degree)**  
**Information Technology**

**First Semester**

<b>First Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>Credits</b>
<b>Theory Papers</b>					
HS101	98101	Communication Skills-I	2	1	3
BA103	99103	Chemistry – I	2	1	3
IT 105	15105	Introduction to Computers	3	-	3
IT 107	15107	Electrical Science	3	1	4
BA109	99109	Mathematics – I	3	1	4
BA111	99111	Physics – I	2	1	3
HS119*	98119	Impact of Science & Technology on Society – I	1	-	1
<b>Practical/Viva Voce</b>					
BA151	99151	Chemistry-I Lab	-	2	1
BA153	99153	Physics-I Lab	-	2	1
IT155	15155	Computer Lab	-	2	1
IT157	15157	Engineering Graphics-I	-	2	1
IT159	15159	Electrical Science Lab	-	2	1
<b>Total</b>			<b>16</b>	<b>15</b>	<b>26</b>

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**Second Semester**

<b>Second Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>Credits</b>
<b>Theory Papers</b>					
HS102	98102	Communication Skills – II	1	2	3
IT104	15104	Engineering Mechanics	3	1	4
BA108	99108	Mathematics – II	3	1	4
BA110	99110	Physics-II	2	1	3
BA114	99114	Statistics Theory of Probability and Linear Programming	2	1	3
BA118	99118	Chemistry-II	2	1	3
HS126*	98126	Impact of Science & Technology on Society – II	1	-	1
IT128	15128	Data Structures	3	0	3
<b>Practical/Viva Voce</b>					
BA156	99156	Physics –II Lab	-	2	1
BA162	99162	Chemistry –II Lab	-	2	1
IT152	15152	Data Structure Lab	-	2	1
IT154	15154	Engineering Graphics-II lab	-	2	1
<b>Total</b>			<b>16</b>	<b>16</b>	<b>28</b>

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**Third Semester**

<b>Third Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Theory Papers</b>					
IT201	15201	Computational Methods	3	1	4
IT203	15203	Circuits and Systems	3	1	4
IT205	15205	Electronic Devices and Circuits	3	1	4
IT207	15207	Object Oriented Programming Using C++	3	1	4
IT209	15209	Computer Graphics	3	1	4
IT211	15211	Database Management Systems	3	1	4
<b>Practical/Viva Voce</b>					
IT251	15251	Electronic Devices and Circuits Lab.		2	1
IT253	15253	Computation Lab.		2	1
IT255	15255	Object Oriented Programming Lab.		2	1
IT257	15257	Computer Graphics Lab.		2	1
IT259	15259	DBMS Lab.		2	1
<b>TOTAL</b>			<b>18</b>	<b>16</b>	<b>29</b>

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**Fourth Semester**

<b>Fourth Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Theory Papers</b>					
IT202	15202	Java Programming	3	1	4
IT204	15204	Multimedia Applications	3	1	4
IT206	15206	Switching Theory and Logic Design	3	1	4
MS208	39208	Organization Behaviour	3	1	4
IT210	15210	Foundations of Computer Science	3	1	4
IT212	15212	Software Engineering	3	1	4
<b>Practicals</b>					
IT252	15252	Java Programming Lab.		2	1
IT254	15254	Multimedia Lab.		2	1
IT256	15256	Switching Theory and Logic Design Lab.		2	1
IT258	15258	Software Engineering Lab.		2	1
<b>Total</b>			<b>18</b>	<b>14</b>	<b>28</b>

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**Fifth Semester**

<b>Fifth Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
IT305	15301	Computer Architecture	3	1	4
IT307	15307	Digital Signal Processing	3	1	4
IT309	15309	Object Oriented Software Engineering	3	1	4
IT313	15313	Communication Systems	3	1	4
IT315	15315	Linux and Win32 Programming	3	1	4
IT317	15317	Operating Systems	3	1	4
<b>Practicals</b>					
IT353	15353	Digital Signal Processing Lab.		2	1
IT359	15359	Object Oriented Software Engineering Lab.		2	1
IT361	15361	Linux and Win32 Programming Lab.		2	1
IT357*	15357	Summer Training (Conducted at the end of the 4 <sup>th</sup> Semester) Report, Seminar and Viva - Voce			1
<b>Total</b>			<b>18</b>	<b>12</b>	<b>28</b>

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**Sixth Semester**

<b>Sixth Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Theory Papers</b>					
IT302	15302	Microprocessors	3	1	4
IT304	15304	Computer Networks	3	1	4
IT306	15306	Algorithm Analysis and Design	3	1	4
IT314	15314	Digital System Design	3	1	4
IT316	15316	Digital Communication	3	1	4
<b>Practicals</b>					
IT352	15352	Microprocessor Lab.		2	1
IT354	15354	Algorithm Analysis & Design Lab.		2	1
IT360	15360	DSD Lab.		2	1
IT362	15362	Digital Communication Lab.		2	1
<b>Total</b>			<b>15</b>	<b>13</b>	<b>24</b>



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**Seventh Semester**

<b>Seventh Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Theory Papers</b>					
IT401	15401	Advanced Computer Networks	3	1	4
IT413	15413	Front End Design Tools and Web Technologies	3	1	4
<b>Electives (Choose any two)</b>					
IT403	15403	Software Testing	3	1	4
IT405	15405	Distributed Systems	3	1	4
IT415	15415	Advanced Java Programming	3	1	4
IT417	15417	Embedded System Design	3	1	4
IT419	15419	Wireless and Mobile Communication	3	1	4
IT421	15421	Data Warehousing and Mining	3	1	4
<b>Practicals</b>					
IT451	15451	ACN Lab.		2	1
IT453	15453	FEDT & Web Technology Lab.		2	1
IT455	15455	Laboratory work for electives		2	1
IT457	15457	Minor Project			5
IT459*	15459	Summer Training (Conducted at the end of the 6 <sup>th</sup> Semester) Report, Seminar and Viva - Voce			1
<b>Total</b>			<b>12</b>	<b>10</b>	<b>25</b>

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**Eighth Semester**

<b>Eighth Semester</b>					
<b>Code</b>	<b>Paper ID</b>	<b>Paper</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
HS402*	98402	Technical Writing	2		2
<b>Electives (Choose any two)</b>					
IT404	15404	Advanced Computer Architecture	3	1	4
IT406	15406	Control Systems	3	1	4
IT408	15408	Advanced Database Management Systems	3	1	4
IT414	15414	Windows .Net Framework and C# Programming	3	1	4
IT416	15416	Mobile Computing	3	1	4
IT418	15418	Semantic Web	3	1	4
<b>Practicals</b>					
IT452	15452	Major Project (Report)			8
IT454	15454	Viva – Voce (On major project)			2
IT456*	15456	Seminar and progress report			1
IT458	15458	Laboratory Assignments			1
<b>Total</b>			<b>8</b>	<b>2</b>	<b>22</b>

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Note:

1. ‘\*’ Marked papers are NUES papers.
2. Total number of credits in BTECH(IT) = 210
3. The minimum number of credits to be earned for the award of the degree is = 200
4. No student is allowed to enter into 9<sup>th</sup> semester, till student becomes eligible to be awarded B.Tech.

## FIRST SEMESTER

**Code: HS 101**  
**Paper ID: 98101**

**Paper: Communication Skills – I**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>1</b>

- I. Remedial Grammar
  - (a) Simple sentences – their phrase structure
  - (b) Parts of speech
  - (c) Tense and concord
  - (d) Gerunds, Participles & Infinitives
  - (e) Complex and Compound sentences (Use of connectives)
  - (f) Conditional clauses
  - (g) Question tags & short responses
  - (h) Common errors
  
- II. Vocabulary and Usage
  - (a) Synonyms & Antonyms
  - (b) One word substitutions
  - (c) Words often confused
  - (d) Idioms / Idiomatic expressions
  - (e) Foreign Phrases (Greek and Latin)
  
- III. Presentation of Technical Information:  
Technical description of
  - (a) Simple objects, tools, appliances
  - (b) Processes and operations
  - (c) Scientific principles
  
- IV. Composition:
  - (a) Comprehension – Unseen passages
  - (b) Dialogues – Creation of mock situations.
  - (c) Debates – Discussing the pros and cons of a given topic.
  - (d) Thematic Appreciation Exercises / Development of situational outlines.
  
- V. Prose  
Selected prose pieces from prescribed texts.

1. **Water:** Specifications for water, Analysis of water-Alkanity, hardness and its determination (EDTA Method only), water for domestic use, Water-softening-Lime-Soda process, Ion-exchanger polished water, Boiled-feed water, boiler problems-scale, sludge priming and foaming, caustic embrittlement and corrosion, their causes and prevention, removal of silice, removal of dissolved gases, carbonates phosphates conditioning, colloidal conditioning, Calgon treatment, conditioning, Numerical problems of Alkanity, hardness Lime-Soda process and EDTA method.
2. **Fuels:** Definition and classification, combustion and chemical principles involved in it. Calorific value: Gross and Net Calorific values and their determination by Boy's Gas Calorimeter and Bomb Calorimeter.
  - i) **Solid fuels:** Proximate and ultimate analysis of coal and their importance.  
**Carbonization:** High and Low temperature carbonization, coke, its manufacture by the Otto Hoffman Oven and uses.
  - ii) **Liquid fuels:** Converison of coal into liquid fuels (Bogius process & Fischer Tropsch process and mechanism, Petroleum: its chemical composition and Fractional distillation, Cracking of heavy oil residues: thermal cracking and catalytic cracking, Knocking-chemical structure and knocking: Octane and Cetane number and their significance, Power alcohol.
  - iii) **Gaseous Fuels:** Natural gas, producer gas, water gas, carburetted water gas, coal gas and oil gas, fuel and fuel gases and their analysis by Orsat's apparatus.
  - iv) Numerical on calorific value, combustion, Proximate and ultimate analysis of coal and fuel gas analysis.
  - v) **Nuclear Fuels:** Nuclear reactions, nuclear fission and nuclear fusion, Nuclear reactor.
3. **Polymers:** Basic concepts & Terminology, such as monomers, Polymers, functionality, Thermoplastics, Thermosets, Linear, Branched, cross linked polymers etc. Different definitions of molecular weight's viz. Mw, Mn, Mv and then determinations, Industrial applications of polymers, Addition, condensation and Ionic polymerization's solutions of polymers, good solvents, & bad solvent, solubility parameter, solutions viscosity and determination of intrinsic viscosity.
4. **Corrosion:** Definition and types of corrosion, Laws of oxide film 'growth (Linear, parabolic and logarithmic), different theories of corrosion, Atmospheric corrosion, Stress corrosion, water-line, pitting and soil corrosion.

**Protective measures against corrosion:**

- i) Modification of environment
- ii) Modification of the properties of the metal
- iii) Use of protective coatings
- iv) Cathodic Protection
- v) Material selection and design

- I. Introduction: Overview of computer organization and historical perspective computer applications in various fields of science and management.  
Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions. Binary arithmetic, Floating point arithmetic, signed and unsigned numbers. Data Storage: Primary and Secondary storage, Introduction to various computer devices such as keyboard, mouse, printers, disk files, floppies etc. Concept of computing, contemporary, Operating Systems such as DOS, Windows'95, UNIX etc. (only brief user level description). Introduction to organization and architecture of mainframe, mini and micro systems. Introduction to E-mail, ftp, login and other network services, world wide web, MS-Office.
- II. Introduction to Programming: Concept of algorithms, Flow charts, Example of Algorithms such as how to add ten numbers, roots of a quadratic equation. Concept of sequentially following up the steps of a algorithm. Notion of program, programmability and programming languages, Structure of programs, Object codes, compilers.  
Introduction to the Editing tools such as vi or MS-VC editors. Concepts of the finite storage, bits, bytes, kilo, mega and gigabytes, Concepts of character representation.
- III. Programming using C: The emphasis should be more on programming techniques rather than the language itself. The C programming language is being chosen mainly because of the availability of the compilers, books and other reference materials. Example of some simple C program. Dissection of the program line by line, Concepts of Variables, program statements and function calls from the library (printf for example)
- o C data types, int, char, float etc.
  - o C expressions, arithmetic operations, relational and logic operations.
  - o C assignment statements, extension of assignment to the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions.
  - o C statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.
  - o Concepts of loops, example of loops in C using for, while and do-while, Optionally continue may be mentioned.
  - o One dimensional arrays and example of iterative programs using arrays, 2-d arrays. Use in matrix computations.
  - o Concept of Sub-programming, functions, Example of functions, Argument passing mainly for the simple variables.
  - o Pointers, relationship between arrays and pointers, Argument passing using pointers, Array of pointers, Passing arrays as arguments.
  - o Strings and C string library  
Structures and Unions. Defining C structures, passing strings as arguments, programming examples.
  - o File I/O, Use of fopen, fscanf and fprintf routines

**Code: IT107**  
**Paper ID: 15107**

**Paper: Electrical Science**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

- I. Properties of Conductors and Insulators  
Basic laws of Electrical Engineering  
Temperature Resistance Coefficients
- II. D.C. Circuits  
Network theorems and applications  
Division of Current  
Potentiometer  
Circuit Parameters  
Energy and Power  
Superposition  
Thevenin and Reciprocity theorems  
Star Delta Formations
- III. Alternating Currents  
Peak, Average and RMS values for alternating currents  
Power and Power factor  
Resistance, Inductance and Capacitance  
Resonance  
Q Factor
- IV. Electromagnetism  
Magnetic Induction  
Permeability  
Hysteresis
- V. Measuring Instruments  
Moving Coil and Moving Iron Instruments  
Construction of Instruments  
Attraction and Repulsion type  
Permanent Magnet and Electrodynamic, Dynamometer type
- VI. D.C. Generators & Motors  
Principle of operation of Generators & Motors  
Speed Control of shunt motors  
Flux control, Rheostatic control, voltage control  
Speed control of series motors
- VII. A.C. Generators & Motors  
Principle of operation  
Removing Magnetic field  
Squirrel cage and phase wound rotor  
Starting of Induction motors  
Direct on line and Star Delta starters  
Synchronous machines
- VIII. Transformers  
  
Construction  
Regulation and efficiency calculations  
Open and short circuit tests

**Paper Code: BA-109**

**Paper ID: 99109**

**Paper : Mathematics – I**

**L**

**3**

**T/P**

**2**

**C**

**4**

**1(a) Calculus of functions of One variable**

- (i) Successive Differentiation, Leibnitz's theorem (without proof). Lagrange's Theorem, Cauchy Mean value theorems, Taylor's theorem (without proof), Remainder term, Asymptotes, Curvature, Curve Tracing.

**14 hrs**

- (ii) Infinite Series: Convergence, divergence, Comparison test, Ration Test, Cauchy  $n^{\text{th}}$  root test, Leibnitz's test (without proof), Absolute and Conditional Convergence, Taylor and Meclaurin series, Power Series, Radius of Convergence.

**5 hrs**

- (iii) Integral Calculus: Reduction Formulae of trigonometric functions, Properties of definite Integral, Applications to length, area, volume, surface of revolution, Definition of improper integrals, Beta-Gamma functions.

**8 hrs**

**1(b) Calculus of Functions of several variables:**

Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials. Maxima, Minima and saddle points, Method of Lagrange multipliers. Differentiation under Integral sign, Jacobians and transformations of coordinates. Double and Triple integrals. Simple applications to areas, Volumes etc.

**12 hrs**

**II Vector Calculus:**

Scalar and vector fields, Curves, Arc length, Tangent, normal, Directional Derivative, Gradient of scalar field, divergence and curl of a vector field. Line integral (independent of path), Green's theorem, Divergence theorem and Stoke's theorem (without proofs), Surface Integrals.

**12 hrs**

**Suggested Text Books & References**

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry", 6th edition, Addison-Wesley/Narosa, 1985.
2. Shanti Narayan, "Differential Calculus", S. Chand & Co.
3. Shanti Narayan, "Integral Calculus", S. Chand & Co.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publ.
5. E. Kreyszig, "Advanced Engineering Mathematics", 5th Edition, Wiley Eastern, 1985.
6. Murray R. Spiegel, "Theory and Problems of Vectors Analysis", Schaum's Outline Series, Mc Graw Hill Ed.
7. S.C. Malik, "Mathematical Analysis", Wiley Eastern Ltd.
8. "Advanced Calculus", Schaum's Outline Series, Mc Graw Hill Ed.
9. Widder, "Advanced Calculus", 2nd Edition, Prentice Hall Publishers.

**Paper Code: BA-111**

**Paper ID: 99111**

**Paper: Physics – I**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>3</b>

## **I OPTICS**

### **Polarization**

Types of polarization, elliptically and circularly polarized light Brewsters law, Malu's law, Nicol prism, double refraction, quarter-wave and half-wave plates, optical activity, specific rotation, Laurent half shade polarimeter.

**5 hrs.**

### **Interference**

Coherence and coherent sources, interference by division of wave front (young's double slit experiment, Fresnel's biprism), interference by division of amplitude (thin films, Newton's rings, Michelson's interferometer, Fabry Perot interferometer)

**7 hrs.**

### **Diffraction**

(Fresnel and Fraunhofer types of diffraction) Fraunhofer diffraction: Single slit, double slit, circular aperture and N-slit, diffraction grating wavelength determination, resolving power and dispersive power, Fresnel Diffraction: Zone plate, circular aperture, opaque circular disc, narrow slit.

**7 hrs.**

## **II LASER AND FIBRE OPTICS**

### **Lasers**

Introduction, coherence, Einstein A and B coefficients, population inversion, basic principle and operation of a laser, type of lasers, He-Ne laser, Ruby laser, semiconductor laser, holography-theory and applications.

**5 hrs.**

### **Fibre Optics:**

Introduction to optical fibre, types of optical fibres and their characteristics, (Attenuation and dispersion step index and graded index fibres, principle of fibre optic communication-total internal reflection, numerical aperture, fibre optical communication network (qualitative)-its advantages.

**5 hrs.**

## **III Theory of relativity**

Absolute and Inertial frames of reference, Galenlian transformations, Michelson-Morley experiment, the postulates of the special theory of relativity, Lorentz transformations, time dilation, length contraction, velocity addition, mass energy equivalence.

**5 hrs.**

### **Recommended Books**

1. Concepts of Modern Physics: A. Beiser
2. Modern Physics: Kenneth Krane
3. Fundaments of Optics: Jenkins and White
4. Optics: Ghatak
5. Fundamental of Physics by RESNICK & HALLIDAY



## Practicals:

<b>Code: BA151</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:99151</b>	<b>Paper: Chemistry – I Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on BA103.

<b>Code: BA153</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:99153</b>	<b>Paper: Physics– I Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on BA109.

<b>Code: IT155</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15155</b>	<b>Paper: Computer Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT105.

<b>Code: IT157</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15157</b>	<b>Paper: Engineering Graphics –I</b>	<b>0</b>	<b>2</b>	<b>1</b>

1. General  
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic projections, B.I.S. Specifications.
2. Projections of Points and Lines  
Introduction of planes of projection, Reference and auxiliary planes, projections of points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on auxiliary planes, shortest distance intersecting and non-intersecting lines.
3. Planes Other than the Reference Planes  
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., projections of points and lines lying in the planes, conversion of oblique plane into auxiliary plane and solution of related problems.
4. Projections of Plane Figures  
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one or both reference planes). Obtaining true shape of the plane figure by projection.
5. Projection of Solids  
Simple cases when solid is placed in different positions, Axis, faces and lines lying in the faces of the solid making given angles.
6. Development of Surface  
Development of simple objects with and without sectioning.
7. Nomography  
Basic concepts and use.

**Code: IT159**  
**Paper ID:15159**

**Paper: Electrical Science Lab.**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT107.

## SECOND SEMESTER

**Code: HS102**  
**Paper ID:98102**

**Paper: Communication Skills – II**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>1</b>	<b>2</b>	<b>3</b>

1. **Some Key Concepts:**  
Communication as sharing; context of communication; the speaker/writer and the listener/reader; medium of communication; barriers to communication; accuracy, brevity, clarity and appropriateness in communication.
2. **Writing:**  
Selecting material for expository, descriptive, and argumentative pieces; business letters; formal report; summarizing and abstracting; expressing ideas within a restricted word limit; paragraph division, introduction and the conclusion; listing reference material; use of charts, graphs and tables; punctuation and spelling; semantics of connectives, modifiers and modals, variety in sentences and paragraphs.
3. **Reading Comprehension:**  
Reading at various speeds (slow, fast, very fast), reading different kinds of texts for different purposes (e.g., for relaxation, for information, for discussion at a later stage, etc.); reading between the lines.
4. **Speaking:**  
Achieving desired clarity and fluency; manipulating paralinguistic features of speaking (voice quality, pitch, tone, etc.); pausing for effectiveness while speaking, task-oriented, interpersonal, informal and semiformal speaking; making a short classroom presentation.
5. **Group Discussion:**  
Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).
6. **Listening Comprehension:**  
Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English and American English, intelligent listening in situations such as an interview in which one is a candidate.

**Code: IT104**  
**Paper ID:15104**

**Paper: Engineering Mechanics**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

1. Force System: Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force, moment of force about a line. Varignon's theorem, couple, resolution of force into force and a couple, properties of couple and their application to engineering problems.
2. Equilibrium: Force body diagram, equations of equilibrium and their applications to engineering problems, equilibrium of two force and three force member
3. Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section and graphical method.
4. Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, frictional lock, friction of flat pivot and collared thrust bearings, friction in journal-bearing, friction in screws, derivation of equation.  
$$T_1 / T_2 = \lambda_e A$$
 and its application.
5. Distributed Forces: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertial., Dynamics.
6. Kinematics of Particles: Rectilinear motion, plane curvilinear motion-rectangular co-ordinates, normal and tangential coordinates
7. Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.
8. Kinematics of Rigid Bodies: Concept of rigid body, types of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of zero velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism.
9. Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.
10. Vibrations: Classification, torsional free vibrations-single rotor and two rotor system, Spring mass system-its damped (linear dash pot) and undamped free vibrations, spring in series and parallel, simple problems.

**Text/Reference:**

1. U.C. Jindal, "Engineering Mechanics", Galgotia Publication.2000.

## Mathematics - II

Paper Code: BA – 108

Paper ID:99108

L	T/P	Credits
3	1	4

**I. Linear Algebra:** Linear Independence and dependence of vectors, Systems of linear equations – consistency and inconsistency, Gauss elimination method, rank of a matrix, Bilinear, Quadratic, Hermitian, Skew – Hermitian Forms, Eigenvalues and Eigenvectors of a matrix, diagonalization of a matrix, Cayley – Hamilton Theorem (without proof).

**10 hrs.**

**II. Ordinary Differential Equations:** Formation of ODE's, definition of order, degree and solutions. ODE's of first order: Method of separation of variables, homogeneous and nonhomogeneous equations, exactness and integrating factors, linear equations and Bernoulli equations, operator method, method of undetermined coefficients and nonhomogeneous, operator method, method of undetermined coefficients and variation of parameters. Solutions of simple simultaneous ODE's. Power series method of solution of DE, Legendre's Equation, Legendre's Polynomials, Bessel's equation, Bessel's function.

**10 hrs.**

**III. Complex Variables:** Curves and Regions in the Complex Plane, Complex Functions, Limits, Derivative, Analytic Function, Cauchy-Riemann Equations, Laplace's Equation, Linear Fractional Transformations, Conformal Mapping, Complex Line Integral, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivatives of Analytic Function, Power Series, Taylor Series, Laurent Series, Methods for obtaining Power Series, Analyticity at Infinity, Zeroes, Singularities, Residues, Residue Theorem, Evaluation of Real Integrals.

**18 hrs.**

**IV. Probability:** Definition of Sample Space, Event, Event Space, Conditional Probability, Additive and Multiplicative law of Probability, Baye's Law theorem, Application based on these results.

**5 hrs.**

### Suggested Text Books & References

1. M. K. Singhal & Asha Singhal "Algebra", R. Chand & Co.
2. Shanti Narayan, "Matrices" S. Chand & Co.
3. G. B. Thomas and R. L. Finney, "Calculus and Analytic Geometry" Addison Wesley / Narosa.
4. E. Kreyszig, "Advanced Engineering Mathematics", 5<sup>th</sup> Edition, Wiley Eastern Ltd. 1985.
5. N. M. Kapoor "Differential Equations" Pitamber Pub. Co.
6. Schaum Outline Series "Differential Equations" Mc. Graw Hill.
7. Schaum Outline Series "Complex Variables" Mc. Graw Hill.
8. Schaum Outline Series "Linear Algebra" Mc. Graw Hill.
9. Schaum Outline Series "Probability" Mc. Graw Hill.

## PHYSICS - II

Paper Code: BA – 110

Paper ID:99110

L	T/P	Credits
2	1	3

### I. Quantum Mechanics

Wave particle duality, deBroglie waves, evidences for the wave nature of matter – the experiment of Davisson and Germer, electron diffraction, physical interpretation of the wave function and its properties, the wave packet, the uncertainty principle

**4 hrs.**

The Schrodinger wave equation (1 – dimensional), Eigen values and Eigen functions, expectation values, simple Eigen value problems – solutions of the Schrodinger's equations for the free particle, the infinite well, the finite well, tunneling effect, simple harmonic oscillator (qualitative), zero point energy.

**6 hrs.**

### II. Quantum Statistics

The statistical distributions: Maxwell Boltzmann, Bose-Einstein and Fermi-Dirac statistics, their comparisons, Fermions and Bosons Applications: Molecular speed and energies in an ideal gas. The Black body spectrum, the failure of classical statistics to give the correct explanations – the applications of Bose-Einstein statistics to the Black body radiation spectrum, Fermi-Dirac distribution, free electron theory, electronic specific heats, Fermi energy and average energy – its significance.

**10 hrs.**

### III Band Theory of Solids

Origin of energy bands in solids, motion of electrons in a periodic potential – the Kronig – Penny model. Brillouin zones, effective mass, metals, semiconductors and insulators and their energy band structures. Extrinsic and Intrinsic semiconductors, doping – Fermi energy for doped and undoped semiconductors, the p-n junction (energy band diagrams with Fermi energy), the unbiased diode, forward and reverse biased diodes – tunnel diodes, zener diode, photo diode its characteristics, LED, Introduction to transistors.

**10 hrs.**

### IV Overview of Electro – Magnetism

Maxwell's Equations: The equation of continuity for Time – Varying fields, Inconsistency in ampere's law Maxwell's Equations, conditions at a Boundary Surface, Introduction to EM wave.

**4 hrs.**

### **Recommended Books**

1. Concept of Modern Physics: A. Beiser
2. Modern Physics: Kenneth Krane
3. Solid State Physics by Kittel
4. Electronic Principles: Malvino
5. Statistical Mechanics by Garg Bansal and Ghosh (TMH)

## STATISTICS, THEORY OF PROBABILITY AND LINEAR PROGRAMMING

Paper Code: BA – 114

Paper ID:99114

L	T/P	Credits
2	1	3

### I. Probability, Statistics

Elementary Probability theory, Random Variables: discrete and continuous, distribution and density functions, Expectation, Moments, Moment Generating function, Skewness, Kurtosis, Binomial, Poisson and Normal distribution, Method of least square for linear and parabolic curves, Correlation of a bivariate distribution, Linear regression, properties of regression coefficient, Sampling distribution of mean and variance, Testing of Statistical hypothesis, F-test, T-test and chi square test.

**17 hrs.**

### II. Linear Programming

Mathematical Preliminaries, Formulation of the Problem and Solution by Graphical method. The simplex Method, Dual problem formulation and Solution, Application to Transportation and Assignment Problems.

**17 hrs.**

### Suggested Text Books & References

1. Irwin Miller and John E. Freund, "Probability and Statistics for Engineers" PHI
2. Spiegel, "Probability and Statistics", Schaum Series
3. S C. Gupta and V. K. Kapur "Fundamentals of Mathematical Statistics", Sultan Chand & Sons.
4. Kambo N. S., "Mathematical Programming Techniques", Mc Graw Hill
5. Hadley, "Linear Programming" Narosa Publications.



## CHEMISTRY – II

Paper Code: BA – 118

Paper ID:99118

L	T/P	Credits
2	1	3

1. Atomic Structure: Introduction to wave mechanics, the Schrodinger equation as applied to hydrogen atom, origin of quantum numbers, Long form of periodic table on the basis of Electronic configuration s, p, d, f block elements periodic trends, Ionisation potential, atomic and ionic radii electron affinity & electro-negativity.
2. Chemical Bonding: Ionic bond, energy changes, lattice energy Born Haber Cycle, Covalent bond-energy changes, Potential energy curve for H<sub>2</sub> molecule, characteristics of covalent compound, co-ordinate bond-Werner's Theory, effective atomic numbers, A hybridization and resonance, Valence Shell Electron Repulsion theory (VSEPR), Discussion of structures of H<sub>2</sub>O, NH<sub>3</sub>, BrF<sub>3</sub>, SiF<sub>4</sub>, Molecular orbital theory, Linear combination of atomic orbitals (LCAO) method. Structure of simple homo nuclear diatomic molecule like H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>.
3. Thermochemistry: Hess's Law, heat of reaction, effect of temperature on heat of reaction at constant pressure (Kirchoff's Equation) heat to dilution, heat of hydration, heat of neutralization and heat of combustion, Flame temperature.
4. Reaction Kinetics: Significance of rate law and rate equations, order and molecularity, Determinations of order of simple reactions-experimental method, Equilibrium constant and reaction rates-Lindemann, collision and activated complex theories, complex reactions of 1<sup>st</sup> order characteristics of consecutive, reversible and parallel reactions-Steady state and non-steady state approach.
5. Electron Chemistry: Conductance of electrolytic solutions transference number and its determination, Kohlrausch's Law of in-dependent migration of ions, Interionic attraction theory, activity and activity coefficient of strong electrolytes.
6. Catalysis: Criteria for Catalysis-Homogeneous Catalysis, acid-base, Enzymatic catalysis, Catalysis by metal salts, Heterogeneous catalysis – concept of promoters, inhibitors and poisoning, Physiosorption, Chemisorption, Surface area, Industrially important process. Theories of catalysis.
7. Phase rule: Derivation of phase rule, Significance of various terms involved in the definitions phase diagram of one component system miscibility, interpolations of two component system diagrams.

**Code No.: IT 128**  
**PaperID: 15128**

**Paper: Data Structures**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>3</b>

**Unit – 1:**

Introduction to programming methodologies and design of algorithms. Abstract Data Type, array, array organization, sparse array. Stacks and Stack ADT, Stack Manipulation, Prefix, infix and postfix expressions, their interconversion and expression evaluation. Queues and Queue ADT, Queue manipulation. General Lists and List ADT, List manipulations, Single, double and circular lists.

**Unit – 2:**

Trees, Properties of Trees, Binary trees, Binary Tree traversal, Tree manipulation algorithms, Expression trees and their usage, binary search trees, AVL Trees, Heaps and their implementation.

**Unit – 3:**

Multiway trees, B-Trees, 2-3 trees, 2-3-4 trees, B\* and B+ Trees. Graphs, Graph representation, Graph Traversal.

**Unit – 4:**

Sorting concept, order, stability, Selection sorts (straight, heap), insertion sort (Straight Insertion, Shell sort), Exchange Sort (Bubble, quicksort), Merge sort (only 2-way merge sort). Searching – List search, sequential search, binary search, hashing concepts, hashing methods (Direct, subtraction, modulo-division, midsquare, folding, pseudorandom hashing), collision resolution (by open addressing: linear probe, quadratic probe, pseudorandom collision resolution, linked list collision resolution), Bucket hashing.

**Text:**

- [1] R. F. Gilberg, and B. A. Forouzan, “Data structures: A Pseudocode approach with C”, Thomson Learning.
- [2] A .V. Aho, J . E . Hopcroft, J . D . Ulman “Data Structures and Algorithm”, Pearson Education.

**Reference**

- [2] S. Sahni and E. Horowitz, “Data Structures”, Galgotia Publications.
- [3] Tanenbaum: “Data Structures using C”, Pearson/PHI.
- [4] T .H . Cormen, C . E . Leiserson, R .L . Rivest “Introduction to Algorithms”, PHI/Pearson.
- [5] V . Manber “Introduction to Algorithms – A Creative Approach”, Pearson Education.
- [6] Ellis Horowitz and Sartaj Sahni “Fundamentals of Computer Algorithms”, Computer Science Press.

## Practicals:

<b>Code: BA156</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:99156</b>	<b>Paper: Physics– II Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on BA110.

<b>Code: BA162</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:99162</b>	<b>Paper: Chemistry– II Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on BA118.

<b>Code: IT152</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15152</b>	<b>Paper: Data Structure Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT128.

<b>Code: IT154</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15154</b>	<b>Paper: Engineering Graphics Lab.0</b>		<b>2</b>	<b>1</b>

### Basic Concepts

I. S. drawing conventions, line symbols, kinds of line, drawing sheet lay-out, rules of printing, preferred scales.

#### 2. Projections

Perspective, orthographic, isometric and oblique projections, isometric scale, isometric drawing, Technical sketching.

#### 3. Shape Description (External)

Multiplanar representation in first- and third angle systems of projections, glass-box concept, sketching of orthographic views from pictorial views, precedence of lines.

Sketching of pictorial (isometric and oblique) views from Multiplanar orthographic views, Reading exercises, Missing line and missing view exercises.

#### 4. Shape Description (Internal)

Importance of sectioning, principles of sectioning, types of sections, cutting plane representation, section lines, conventional practices.

#### 5. Size Description

Dimensioning, tools of dimensioning, Size and location dimensions, Principles of conventions of dimensioning, Dimensioning exercises.

#### 6. Computer Aided Drafting

Basic concepts and use.

## THIRD SEMESTER

<b>Paper ID: 15201</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper Code: IT201</b>	<b>3</b>	<b>1</b>	<b>4</b>
<b>Paper: Computational Methods</b>			

### Unit – 1:

Errors in computation, Review of Taylor Series, Mean Value Theorem. Representation of numbers (integers and Floating Point). Loss of Significance in Computation.

Location of Roots of functions and their minimization: Bisection method (convergence analysis and implementation), Newton Method (convergence analysis and implementation), Secant Method (convergence analysis and implementation). Unconstrained one variable function minimization by Fibonacci search, Golden Section Search and Newton's method. Multivariate function minimization by the method of steepest descent, Nelder- Mead Algorithm.

### Unit – 2:

Interpolation and Numerical Differentiation: Interpolating Polynomial, Lagrange Form, Newton Form, Nested Form, Inverse Interpolation, Neville's Algorithm, Errors in interpolation, Estimating Derivatives and Richardson Extrapolation.

Numerical Integration: Definite Integral, Riemann – Integrable Functions, Trapezoid Rule, Romberg Algorithm, Simpson's Scheme, Gaussian Quadrature Rule.

### Unit – 3:

Linear System of Equations: Conditioning, Gauss Elimination, Pivoting, Cholesky Factorization, Iterative Methods, Power Method

Approximation by Spline Function: 1<sup>st</sup> and 2<sup>nd</sup> Degree Splines, Natural Cubic Splines, B Splines, Interpolation and Approximation.

### Unit – 4:

Differential Equations: Euler method, Taylor series method of higher orders, Runge – Kutta method of order 2 and 4, Runge – Kutta – Fehlberg method, Adams – Bashforth – Moulton Formula. Solution of Parabolic, Hyperbolic and Elliptic PDEs.

Implementation to be done in C/C++.

### Text:

- [1] D. Kincaid and W. Cheney, "Numerical Analysis: Mathematics of Scientific Computing", Thomson/Brooks-Cole., 2001.

### Reference:

- [2] D. Kincaid and W. Cheney, "Numerical Analysis", Thomson/Brooks-Cole., 2002.  
[3] R. L. Burden and J. D. Faires, "Numerical Analysis", Thomson/Brooks-Cole, 2001.  
[4] W. Y. Yang, W. Cao, T.-S. Chung and J. Morris, "Applied Numerical Methods Using Matlab", Wiley, 2005.  
[5] J. H. Mathews and K. D. Fink, "Numerical Methods Using Matlab", Printice Hall, 1999.  
[6] S. D. Conte and C. de Boor, "Elementary Numerical Analysis: An Algorithmic Approach", McGraw Hill, 1980.  
[7] J. D. Hoffman, "Numerical Methods for Engineers and Scientists", Marcel Dekker Inc., 2001.  
[8] J. Stoer and R. Bulirsch, "Introduction to Numerical Analysis", Springer – Verlag, 1993.  
[9] W. H. Press, S. A. Teukolsky, W. T. Vetterling, and B. P. Flannery, "Numerical Recipes in C", CUP, 2002.  
[10] W. Boehm and H. Prautzch, "Numerical Methods", Universities Press, 2005.  
[11] C. F. Gerald, and P. O. Wheatly, "Applied Numerical Analysis", Pearson, 1994  
[12] H. M. Antia, "Numerical Methods for Scientists & Engineers", Hindustan Book Agency, 2002.

**Paper ID: 15203**  
**Paper Code: IT203**

**Paper: Circuits and Systems**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

**Unit – 1:**

Review of complex variables: Complex Numbers, Algebra of Complex Numbers, Functions of Complex Variable, Taylor and Laurant Series, Differentiation, Integration, Cauchy Theorem, Residue Theorem.

**Unit – 2:**

Signals, Classification of Signals, Systems, Classification of Systems, Linear Time Invariant (LTI) Systems; Laplace Transform, z-Transform, Fourier Series and Transform (Continuous and Discrete) and their properties. Laplace Transform and Continuous Time LTI systems, z-Transform and Discrete Time LTI systems, Fourier analysis of signals and systems, State Space Analysis.

**Unit – 3:**

Circuits: Voltage, Ideal Voltage Source, Current Ideal Current Sources, Classification of Circuits, Ohm's Law, Resistivity, Temperature Effect, Resistors, Resistor Power Absorption, Nominal Values and Tolerances, Colour Codes, Open and Short Circuits, Internal Resistance.

DC Circuits: Series and Parallel Circuits, Kirchhoff's Voltage and Current Law, Mesh Analysis, Loop Analysis, Nodal Analysis, Thevenin's and Norton's Theorem, Maximum Power Transfer Theorem, Superposition Theorem, Millman's Theorem, Y -  $\Delta$  and  $\Delta$ - Y Transformation, Bridge Circuits.

**Unit – 4:**

AC Circuits: Circuits containing Capacitors and Inductors, Transient Response, Alternating Current and Voltages, Phasors, Impedences and Admittance, Mesh Analysis, Loop Analysis, Nodal Analysis, Thevenin's and Norton's Theorem, Y -  $\Delta$  and  $\Delta$ - Y Transformation, Bridge Circuits. Resonant Circuits, Complex Frequency and Network Function, Two port Networks. Passive Filters.

**Text:**

- [1] B. P. Lathi, "Signal Processing and Linear System", Berkeley Cambridge Press, 1998.
- [2] A. H. Robbins and W. C. Miller, "Circuit Analysis: Theory and Practice", Thomson Learning/Delmar Pub., 2007.
- [3] A. B. Carlson, "Circuits", Thomson/Brooks-Cole, 2000.

**Reference:**

- [4] S. Haykin and B. V. Veen, "Signal and Systems", John Wiley and Sons, 1999.
- [5] H. P. Hsu, "Schaum's Outlines of The Theory and Problems of Signals and Systems", McGraw-Hill, 1995.
- [6] S. Madhu, "Linear Circuit Analysis", Prentice Hall, 1988.
- [7] S. Ghosh, "Signals and Systems", Pearson Education, 2006.
- [8] S. Poornachandra, "Signal and Systems", Thomson Learning, 2004.
- [9] M. Nahvi and J. A. Edminister, "Schaum's Outline of Theory and Problems of Electric Circuits", McGraw-Hill, 2003.
- [10] Allan h. robbins and Wilhelm c. Miler, "Circuit Analysis" , Cengage Learning, 2008

**Paper ID: 15205**  
**Code No: IT205**

<b>Paper : Electronic Devices &amp; Circuits</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>4</b>

**UNIT – 1:**

**Semiconductor diodes and their applications**

Construction, characteristics and working principles of semi conductor diodes: PN junction diode, zener diode, varactor diode, schottky diode, photo diodes, Light emitting diode, Laser diode.

**UNIT – 2:**

**Transistors and Biasing**

Construction, operation of NPN & PNP transistor, characteristics, Types of configurations, methods of transistor biasing and stabilization.

**UNIT – 3:**

**Field Effect Transistor**

Classification of FET's, construction & working principles of JFET, MOSFET, biasing methods, small signal model parameters.

**UNIT – 4:**

**Linear Integrated Circuits**

Differential amplifier circuits, operational amplifiers and its applications,

**Oscillators**

Concept of Feedback, barkhausen criteria for sinusoidal oscillators, phase shift oscillators, wein bridge & crystal oscillator.

**Text/References:**

1. B. P. Singh and R. Singh, Electronic Devices & Integrated Circuits, Pearson, 2006.
2. B. Kumar and S. J. Jain, Electronic Devices and Circuits, "Prntice Hall of India, 2007.
3. Boylestad, "Electronic Devices and Circuit Theory", 9<sup>th</sup> Ed.
4. S.G. Burns, P.R. Bond, "Principles of Electronic Circuits, 2<sup>nd</sup> Ed., Galgotia
5. M.S. Roden, G.L. Carpenter & W.R. Wieseraman, "Electronic Design", Shroff Publisher & Distributors.
6. B. G. Streetman, Theory & Technology & Semiconductor Devices.
7. Millman & Halkias Electronic Devices & Circuits, TMH(ISE)
8. S. Salivahanan & other, Electronic Devices & Circuits, TMH.
9. Malvino, Electronic Principles, TMH.
10. Jacob Millman, Micro Electronics, TMH.
11. Russell L. Meale and Robert Diffenderfer, "Electronic Circuit & Devices", Cenage Learning, 2008
12. Robert Diffenderfer, "Electronic Circuit & Devices", Cenage Learning, 2008

**PaperID:15207**  
**Code: IT207**

**Paper: Object Oriented Programming  
using C++**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

**Unit – 1:**

Objects, relating to other paradigms (functional, data decomposition), basic terms and ideas (abstraction, encapsulation, inheritance, polymorphism).

Review of C, difference between C and C++, cin, cout, new, delete operators.

**Unit – 2:**

Encapsulation, information hiding, abstract data types, object & classes, attributes, methods. C++ class declaration, state identity and behavior of an object, constructors and destructors, instantiation of objects, default parameter value, object types, C++ garbage collection, dynamic memory allocation, metaclass/abstract classes.

**Unit – 3:**

Inheritance, Class hierarchy, derivation – public, private & protected; aggregation, composition vs classification hierarchies, polymorphism, categorization of polymorphic techniques, method polymorphism, polymorphism by parameter, operator overloading, parametric polymorphism, generic function – template function, function name overloading, overriding inheritance methods, run time polymorphism.

**Unit – 4:**

Standard C++ classes, using multiple inheritance, persistent objects, streams and files, namespaces, exception handling, generic classes, standard template library: Library organization and containers, standard containers, algorithm and Function objects, iterators and allocators, strings, streams, manipulators, user defined manipulators, vectors, valarray, slice, generalized numeric algorithm.

**Text:**

1. S. B. Lippman & J. Lajoie, “C++ Primer”, 3<sup>rd</sup> Edition, Addison Wesley, 2000.
2. A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH

**References:**

1. Rumbaugh et. al. “Object Oriented Modelling & Design”, Prentice Hall
2. G . Booch “Object Oriented Design & Applications”, Benjamin,Cummings.
3. E.Balaguruswamy, “Objected Oriented Programming with C++”, TMH
4. R. Lafore, “Object Oriented Programming using C++”, Galgotia.
5. D . Parsons, “Object Oriented Programming with C++”,BPB Publication.
6. Steven C. Lawlor, “The Art of Programming Computer Science with C++”, Vikas Publication.

**PaperID: 15209**  
**Code: IT209**

**Paper : Computer Graphics**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

**Unit – 1:**

Basic raster graphics algorithms for drawing 2 D Primitives liner, circles, ellipses, arcs, clipping, clipping circles, ellipses & polygon.

**Unit – 2:**

Polygon Meshes in 3D, curves, cubic & surfaces, Solid modeling.Geometric Transformation: 2D, 3D transformations, window to viewport transformations, acromatic and color models.  
Graphics Hardware: Hardcopy & display techniques, Input devices, image scanners

**Unit – 3:**

Shading Tech: Transparency, Shadows, Object reflection, Gouraud & Phong shading techniques. Visible surface determination techniques for visible line determination, Z-buffer algorithm, scanline algorithm, algorithm for oct-tres, algorithm for curve surfaces, visible surfaces ray-tracing, recursive ray tracing, radio-city methods.

**Unit – 4:**

Elementary filtering tech, elementary Image Processing techniques, Geometric & multi-pass transformation mechanisms for image storage & retrieval. Procedural models, fractals, grammar-based models, multi-particle system, volume rendering.

**Text:**

1. Foley et. al., “Computer Graphics Principles & practice”, Addison Wesley Ltd., 2003.

**References:**

1. R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
2. D. Hearn and P. Baker, “Computer Graphics”, Prentice Hall, 2003.
3. W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
4. R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 2001.
5. F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
6. D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989.
7. David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
8. Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 2002.



**Paper ID: 15211**  
**Code: IT211**

	<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper: Data Base Management Systems</b>	<b>3</b>	<b>1</b>	<b>4</b>

**Unit – 1:**

Basic concepts: database & database users, characteristics of the database, database systems, concepts and architecture, data models, schemas & instances, DBMS architecture & data independence, database languages & interfaces, data modelling using the entity-relationship approach. Overview of hierarchical, Network & Relational Data Base Management Systems.

Relational model, languages & systems: relational data model & relational algebra: relational model concepts, relational model constraints, relational algebra, SQL- a relational database language: data definition in SQL, view and queries in SQL, specifying constraints and indexes in sql.

**Unit – 2:**

Oracle Architecture, Logical Data Structures Physical Data Structure, Instances, Table Spaces, Types of Tablespaces, Internal Memory Structure, Background Processes, Data Types, Roles & Privileges, Stored Procedures, User Defined Functions, Cursors, Error Handling, Triggers.

**Unit – 3:**

Relational data base design: function dependencies & normalization for relational dataases: functional dependencies, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition (4NF, 5NF), domain key normal form.

**Unit – 4:**

Concurrency control & recovery techniques: concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, recovery techniques: recovery concepts, database backup and recovery from catastrophic failures.

Concepts of object oriented database management systems, Distributed Data Base Management Systems.

**Text:**

1. Elmsari and Navathe, “Fundamentals of database systems”, Pearson Education

**References:**

2. Date, C. J., “An introduction to database systems”, 8<sup>th</sup> Edition, Pearson Education.
3. P. Rob & C. Coronel, “Database Systems: Design Implementation & Management”, Thomson Learning, 2004
4. Date, C. J., “An introduction to database systems”, 3<sup>rd</sup> Edition, Narosa publishing house.
5. A. V. Silberschatz, H. F. Korth and S. Sudershan, “Database System Concept”, McGraw Hill, 2005.
6. Ullman, J. D., “Principals of database systems”, Galgotia publications.
7. Desai, B., “An introduction to database concepts”, Galgotia publications.

## Practicals:

<b>Code: IT251</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15251</b>	<b>Paper: Electronic Devices and Circuits Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT205.

<b>Code: IT253</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15253</b>	<b>Paper: Computation Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT201.

<b>Code: IT255</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15255</b>	<b>Paper: Object Oriented Programming Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT207.

<b>Code: IT257</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15257</b>	<b>Paper: Computer Graphics Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT207.

<b>Code: IT259</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15259</b>	<b>Paper: DBMS Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT211.

## FOURTH SEMESTER

**Paper ID: 15202**

**Code: IT202**

**Paper : Java Programming**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

### **Unit 1:**

Overview and characteristics of Java, Java program Compilation and Execution Process Organization of the Java Virtual Machine, JVM as an interpreter and emulator, Instruction Set, class File Format, Verification, Class Area, Java Stack, Heap, Garbage Collection. Security Promises of the JVM, Security Architecture and Security Policy. Class loaders and security aspects, sandbox model

### **Unit 2:**

Java Fundamentals, Data Types & Literals Variables, Wrapper Classes, Arrays, Arithmetic Operators, Logical Operators, Control of Flow, Classes and Instances, Class Member Modifiers Anonymous Inner Class Interfaces and Abstract Classes, inheritance, throw and throws clauses, user defined Exceptions , The StringBuffer Class ,tokenizer,applets, Life cycle of applet and Security concerns

### **Unit 3:**

Threads: Creating Threads, Thread Priority,Blocked States, Extending Thread Class, Runnable Interface, Starting Threads,Thread Synchronization, Synchronize Threads, Sync Code Block, Overriding Synced Methods, Thread Communication, wait, notify and notify all.

AWT Components, Component Class, Container Class, LayoutManager Interface Default Layouts, Insets and Dimensions, BorderLayout, FlowLayout, GridLayout, CardLayout GridBagLayout AWT Events, Event Models, Listeners,Class Listener,Adapters, ActionEvent Methods FocusEvent KeyEvent,MouseEvent,WindowEvent

### **Unit 4:**

Input/OutputStream, Stream Filters,Buffered Streams,Data input and OutputStream, PrintStream RandomAccessFile, JDBC (Database connectivity with MS-Access, Oracle, MS-SQL Server), Object serialization, Sockets, development of client Server applications, design of multithreaded server. Remote Method invocation, Java Native interfaces, Development of a JNI based application. Collection API Interfaces, Vector, stack, Hashtable classes, enumerations, set, List, Map, Iterators .

### **Text/References**

1. "Java-2 the complete Reference" by Patrick Naughton and Herbertz Schidt.
2. Head first Java,Sierra & bates , O'reilly
3. "Programming with Java" by E Balaguruswamy.
4. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
5. Decker & Hirshfield, "Programming.Java", Vikas Publication.

**Paper ID: 15204**  
**Code: IT204**

<b>Paper</b>	<b>:</b>	<b>Multimedia Applications</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
			<b>3</b>	<b>1</b>	<b>4</b>

**Unit - 1**

Concept of Multimedia ,Media & data stream, main properties of multimedia system ,  
Data stream characteristics &for continuous media Multimedia Applications, Hardware Software  
requirements, Storage Technologies: RAID, Optical Media.

**Unit - 2**

Text, Basic sound concepts , MIDI , Speech ,Basic concept of Images, Graphics format ,Basic concepts  
of Video & animation, Conventional system,Computer based animation, Authoring Tools, Categories  
of Authoring Tools.

**Unit - 3**

Lossless and Lossy compression, Run length coding, Statistical Coding, Transform Coding, JPEG,  
MPEG, Text compression using static Huffmann technique, Dynamic Huffmann Technique,  
Arithmetic Technique.

Introduction, Basic Terminology techniques, tweaning & morphing, Motion Graphics 2D & 3D  
animation.

**Unit - 4**

Introduction to MAYA(Animating Tool):  
Fundamentals, Modeling: NURBS, Polygon, Organic,  
Animation:Key frame animation,reactive animation,path animation,Skelton animationetc., deformers..  
Dynamics: soft bodies, Rigid bodies and its usages in the scene etc.,  
Rendering: soft,Hard renering. IPR rendering, Line and box rendering etc.,  
Special Effects: Shading & Texturing Surfaces, Lighting, Special effects.  
Working with MEL: Basics & Programming

**Text Books:**

1. David Hillman, "Multimedia Technology & Applications", Galgotia Publications.
2. Steinmetz "Multimedia Computing Communication and Application" Pearson Edn.
3. Aandleigh and Thakarar "Multimedia System Design" PHI

**Reference**

1. Nigel Chapman & Jenny Chapman, "Digital Multimedia", Wiley Publications.
2. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
3. Maya manuals.

**Paper ID: 15206**  
**Code: IT206**

<b>Paper</b>	<b>:</b>	<b>Switching Theory and Logic Design</b>	<b>L</b>	<b>T/P</b>	<b>C</b>
			<b>3</b>	<b>1</b>	<b>4</b>

**Unit – 1:**

Analog & Digital signals, AND, OR, NOT, NAND, NOR & XOR gates, Boolean algebra.

Standard representation of Logical functions, K-map representation and simplification of logical functions, Quinn-McClusky's Algorithm, Don't care conditions, X-OR & X-NOR simplification of K-maps.

**Unit – 2:**

Combinational circuits: Multiplexers, demultiplexers, Decoders & Encoders, Adders & Subtractors, Code Converters, comparators, decoder/drivers for display devices

Flip Flops: S-R, J-K, D & T Flip-flops, excitation table of a flip-flop, race around condition.

**Unit – 3:**

Sequential circuits: Shift registers, Ripple counter, Design of Synchronous counters and sequence detectors.

555 Timer and its application as mono-stable and astable multi-vibrator. Nyquist Sampling Theorem, A/D and D/A converters : Binary-weighted DAC, R-2R Ladder type networks, Successive-approximation ADC, Linear-ramp ADC, Dual-slope ADC

**Unit – 4:**

Bipolar-Transistor Characteristics, RTL and DTL circuits, TTL, ECL and C MOS Logic families.

Logic Implementations using ROM, PAL & PLA., Semiconductor Memories: Memory organization & operation, classification and characteristics of memories, RAM, ROM and content addressable memory.

**Text/References:**

1. R.P. Jain, "Modern Digital Electronics", TMH, 2<sup>nd</sup> Ed,
2. Malvino and Leach, "Digital principles and applications", TMH
3. Morris Mano, "Digital Design", PHI, 2<sup>nd</sup> Ed.
4. R. J. Tocci, "Digital Systems", PHI, 2000
5. I. J. Nagrath, "Electronics, Analog & Digital", PHI, 1999.
6. J. M. Yarbrough, "Digital Logic-Application and Design", PWS Publishing.
7. B. S. Nai, " Digital Electronics and Logic Design", PHI
8. Balabanian and Carlson, "Digital Logic Design Principles", Wiley Pub.

**Paper ID: 15208**  
**Code: MS208**

**Paper : Organization Behaviour**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

Introduction: Meaning and nature of management; management systems and processes, Tasks and responsibilities of a professional manager; Managerial skills.

Organization Structure and Process: Organizational climate and culture, Management ethos; Organizational Structure and Design: Managerial Communication; Planning process; Controlling.

Behavioural Dynamics: Individual detgerminants of Organization Behaviour; Perceptions, Learning, Personality, Attitudes and Values, Motivation; Stress and its management.

Interactive Aspects of Organizational Behaviour; Analysing inter-personal relations; Group Dynamics; Management of Organizational Conflicts; Leadership Styles.

Decision Making: Organizational Context of Decisions, Decision Making Models; Problem Solving and Decision Making.

**References:**

1. Luthans Fred., "Organizational Behaviour", McGraw Hill, 1998.
2. Robbins (4<sup>th</sup> ed.), "Essentials of organizational behaviour", Prentice Hall of India Pvt. Ltd., New Delhi, 1995.
3. Hersey and Blanchard (6<sup>th</sup> ed.), "Management of organizational behaviour: utilising human resources", Prentice Hall of India Pvt. Ltd., New Delhi, 1996.
4. Dwivedi, R. S., "Human relations and organizational behaviour: a global perspective", Macmillan India Ltd., Delhi, 1995.
5. Arnold, John, Robertson, Ivan t. and Cooper, Cary, I., "Work psychology: understanding human behaviour in the workplace", Macmillan India Ltd., Delhi, 1996.

**Unit – 1:**

Formal Logic: Statement, Symbolic Representation and Tautologies, Quantifiers, Predicates and validity, Normal forms. Propositional Logic, Predicate Logic. Direct Proof, Proof by Contraposition, Proof by exhausting cases and proof by contradiction.

Sets, Subsets, powersets, binary and unary operations on a set, set operations/set identities, fundamental counting principles, principle of inclusion and exclusion, pigeonhole principle, permutation and combination, pascal's triangles, binominal theorem. Relation, properties of binary relation, closures, partial ordering, equivalence relation, properties of function, composition of function, inverse, Permutation function, composition of cycles. Discrete Function Counting Theorem.

**Unit – 2:**

Lattices: definition, sublattices, direct product, homomorphism, definition of Boolean algebra, properties, isomorphic structures (in particular, structures with binary operations) subalgebra, direct product and homo-morphism, Boolean function, Boolean expression, representation & minimization of Boolean function.

Principle of Well Ordering, principle of mathematical induction, principle of complete induction. Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients, Analysis of Algorithms involving recurrence relations – comparison based sorting and searching algorithms, solution method for a divide-and-conquer recurrence relation. Growth of Functions, Masters theorem.

**Unit – 3:**

GCD, LCM, Fundamental Theorem of Arithmetic, primes, Congruences, Euler  $\phi$  function, Fermat's Little Theorem, Euler's Generalization of FLT, Wilson's Theorem, The functions  $\tau$  and  $\sigma$ , Mobius  $\mu$  function, Arithmetic Functions, primitive roots, Quadratic congruences and quadratic reciprocity law, Primality and Factoring, Simple Cryptosystems, RSA Cryptosystem. Groups, Group identity and uniqueness, inverse and its uniqueness, isomorphism and homomorphism, subgroups, Cosets and Lagrange's theorem, Permutation group and Cayley's theorem (without proof), Error Correcting codes and groups, Normal subgroup and quotient groups.

**Unit – 4:**

Graph Terminology, Isomorphism, Isomorphism as relations, Cut-Vertices, Menger's Theorem, Planar graphs, Euler's formula (proof), four color problem (without proof) and the chromatic number of a graph, Euler graphs, Hamiltonian graphs, five color theorem, Vertex Coloring, Edge Colouring. Trees terminology, in order, preorder & post order trees traversal algorithms, directed graphs, Computer representation of graphs, Shortest path and minimal spanning trees and algorithms, Depth-first and breadth first searches, trees associated with DFS & BFS, Connected components. Complexity Analysis and proof of correctness of the graph MST, traversal and Shortest path algorithms.

**Text/Reference:**

- [1] J.P. Tremblay & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science," TMH, New Delhi (2000).
- [2] Kolman, Busby & Ross "Discrete Mathematical Structures", PHI/Pearson.
- [3] D.S. Malik and M. K. Sen, "Discrete Mathematical Structures", Thomson Learning, 2006.
- [4] C.L.Liu, "Elements of Discrete Mathematics", McGraw Hill Book Company.
- [5] G. Haggard, J. Schlipf and S. Whitesides, "Discrete Mathematics for Computer Science", Thomson Learning, 2006.
- [6] J. L. Hein, "Discrete Structures, Logic and Computability", Narosa, 2002.
- [7] Neal Koblitz, "A course in number theory and cryptography", Springer – Verlag, 1994.
- [8] V. Shoup, "A Computational Introduction to Number Theory and Algebra", CUP, 2005.
- [9] John F. Humphreys, "A Course in Group Theory", OUP, 2001.
- [10] G. Chartrand, P. Zhang, "Introduction to graph theory", TMH, 2005.
- [11] A .V. Aho, J . E . Hopcroft, J . D . Ulman "The Design & Analysis of Computer Algorithms", Pearson Education.
- [12] T .H . Cormen, C . E . Leiserson, R .L . Rivest "Introduction to Algorithms", PHI/Pearson.
- [13] V . Manber "Introduction to Algorithms – A Creative Approach", Pearson Education.
- [14] Ellis Horowitz and Sartaz Sahani "Fundamentals of Computer Algorithms", Computer Science Press.
- [15] Iyengar, Chandrasekaran and Venkatesh, "Discrete Mathematics", Vikas Publication.

**Paper ID: 15212**  
**Code: IT212**

**Paper : Software Engineering**

<b>L</b>	<b>T/P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>4</b>

**UNIT – 1:**

Introduction:

Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM.

Software Metrics:

Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics.

**UNIT – 2:**

Software Project Planning:

Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

Software Requirement Analysis and Specifications:

Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioural and non-behavioural requirements, Software Prototyping.

**UNIT – 3:**

Software Design:

Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.

Software Reliability:

Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation.

**UNIT – 4:**

Software Testing:

Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Software Maintenance:

Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

**Text:**

1. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 3<sup>rd</sup> ed., McGraw Hill Int. Ed., 1992.
2. K.K. Aggarwal & Yogesh Singh, “Software Engineering”, New Age International, 2001

**Reference:**

1. R. Fairley, “Software Engineering Concepts”, Tata McGraw Hill, 1997.
2. P. Jalote, “An Integrated approach to Software Engineering”, Narosa, 1991.
3. Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
4. James Peter, W Pedrycz, “Software Engineering”, John Wiley & Sons
5. I. Sommerville, “Software Engineering”, Addison Wesley, 1999.



### **Practicals:**

<b>Code: IT252</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15252</b>	<b>Paper: Java ProgrammingLab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT202.

<b>Code: IT254</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15254</b>	<b>Paper: Multimedia Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT204.

<b>Code: IT256</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15256</b>	<b>Paper: Switching Theory and Logic Design Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT206.

<b>Code: IT258</b>		<b>L</b>	<b>T/P</b>	<b>C</b>
<b>Paper ID:15258</b>	<b>Paper: Software Engineering Lab.</b>	<b>0</b>	<b>2</b>	<b>1</b>

Practicals based on IT212.

## FIFTH SEMESTER

Code: IT 305

L:3 T/P:1 C: 4

Paper ID: 15305

Paper: Computer Architecture

### Unit I

#### Computer Arithmetic and Register transfer language:

Unsigned notation, signed notation, binary coded decimal, floating point numbers, **IEEE 754 floating point standard**, Micro-operation, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro operation, Arithmetic Logic Shift Unit.

### Unit II

#### Instruction set architecture & computer organization

Levels of programming languages, assembly language instructions, **8085 instruction set architecture**, Instruction Codes, Computer Registers, Computer Instructions, Timing & Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupts

### Unit III

#### Control Design:

Instruction sequencing & interpretation, Hardwired & Micro Programmed (Control Unit), Micromprogrammed computers, Micro coded CPU: Pentium processor

#### CPU Design

Specifying a CPU, Design & implementation of simple CPU, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, **Internal architecture of 8085 microprocessor**.

### Unit IV

#### Memory organization

Memory Technology, Main Memory (RAM and ROM Chips), Virtual memory, High-speed memories

#### Input/Output organization

Asynchronous Data Transfers, Programmed I/O, interrupts, Direct memory Access, Serial communication, UARTs, **RS-232-C & RS-422** standard

#### Text:

1. J. D. Carpinelli, "Computer Systems Organization and Architecture", Pearson Education, 2006.
2. J. P. Hayes, "Computer Architecture and Organization", McGraw Hill, 1988.

#### Reference:

1. J. L. Hennessy and D. A. Patterson, "Computer Architecture: A quantitative approach", Morgan Kaufman, 1992.
2. W. Stallings, "Computer organization and Architecture", PHI, 7<sup>th</sup> ed, 2005.
3. B. Parhami, "Computer Architecture: From Microprocessors to Supercomputers", Oxford University press, 2006.

### **Unit I**

**Signals and signal Processing:** Characterization & classification of signals, typical Signal Processing operations, example of typical signals, typical Signals Processing applications.

**Time Domain Representation of Signals & Systems:** Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI Discrete-Time systems.

### **Unit II**

**Transform-Domain Representation of Signals:** Discrete Fourier Transform (DFT), DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse z-transform, properties of z-transform.

### **Unit III**

**Computation of the Discrete Fourier Transform:** Computational complexity of the direct computation of the DFT, different approaches for reducing the computations, Decimation-in-Time FFT algorithms, Decimation-in-frequency FFT algorithms.

### **Unit IV**

**Digital Filter Structure:** Block Diagram representation, Signal Flow Graph Representation, Signal Flow Graph Representation, FIR Digital Filter Structure, IIR Filter Structures, Parallel all pass realization of IIR Filter design based on Frequency Sampling approach.

### **Text / Reference:**

1. A. Y. Oppenheim and R. W. Schater, "Digital Signal Processing", PHI 1975.
2. Sanjit K. Mitra, "Digital Signal Processing: A Computer based approach", TMH, 2005.
3. J. G. Proakis and D.G. Manolakis, "Digital Signal Processing, Principals, Algorithms, and Applications", Pearson Education, 4<sup>th</sup> ed., 2007.
4. A. Y. Oppenheim, R. W. Schater and J. R. Buck, "Discrete Time Signal Processing", PHI 1999

### **Unit I**

**Introduction to Software Engineering:** Software Engineering Development, Software Life Cycle Models, Standards for developing life cycle models.

**Object Methodology & Requirement Elicitation:** Introduction to object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model-Action & Use cases, Requirements Elicitation Activities, Managing Requirements Elicitation.

### **Unit II**

**Architecture:** Model Architecture, Requirements Model, Analysis Model, Design Model, Implementation Model, Test Model

### **Unit III**

**Modeling with UMLZ:** Basic Building Blocks of UML, A conceptual Model of UML, Basic Structural Modeling , UML Diagram

**System Design:** Design concepts & activities, Design Models, Block design, Testing

### **Unit IV**

**Testing Object Oriented Systems:** Introduction, Testing Activities & Techniques, The Testing Process, Managing Testing

### **Case Studies**

### **Text Books:**

1. I. Jacobson, "Object-Oriented Software Engineering: A Use Case Driven Approach", Pearson, 1992
2. B. Breugge and A. H. Dutoit, "Object Oriented Software Engineering: Using UML, Patterns, and Java", Prentice Hall, 2004.
3. G. Booch, J. Rumbaugh and I. Jacobson, "The Unified Modeling Language User Guide" Addison-Wesley, 2005

**Code No.: IT 313**  
**Paper ID: 15313**

**L:3 T/P:1 C: 4**  
**Paper: Communication Systems**

**Unit I**

Classification of signals & systems, Fourier Series, Fourier transforms and their applications to system analysis. Representations of random signals, Concept of Probability, Probability distribution Function, Probability density Function, Gaussian, Binomial, Raleigh and Poisson's distribution, Random Process, Correlation Function, Power Spectral Density, Response of Linear systems to random signals. Gaussian distribution, Central Limit theorem, Ergodicity, co-variance.

**Unit II**

Concepts of Modulation, Various Analog modulation and demodulation techniques (AM, FM, PM). Multiplexing,

**Unit III**

Analog to Digital Conversion, Various pulse modulation techniques (PAM, PPM, PWM & PCM). Delta Modulation.

**Unit IV**

Introduction to Information Theory & Noise: Introduction, Noise its sources, mathematical representation of noise, noise temperature, S/N ratio & Noise figure. Measure of Information, Channel Capacity, Bandwidth S/N trade off.

**Text:**

1. W. Tomasi, "Electronic communications systems(basics through advanced)", Pearson Education, 2<sup>th</sup> ed, 2004.
2. H. Taub and D. L. Schilling, "Principles of Communication Systems", TMH, 1992.

**Reference:**

1. J. C. Hancock, "An Introduction to the Principles of Communication Theory", McGraw Hill, 1961.
2. S. Haykins, "Introduction to Analog and Digital Communication", Wiley, 1986.
3. G. Kennedy and B. Davis, "Electronic communication systems", TMH, 1993.
4. J. G. Proakis, M. S.alehi, "Communications Systems Engineering", PHI, 2<sup>nd</sup> ed, 2002.
5. D. Roddy and J. Coolen, "Electronic Communications", PHI, 1995.
6. S. Haykins, "Communication Systems", Wiley, 2001.

**Code: IT 315**  
**Paper ID: 15315**

**L:3 T/P:1 C: 4**  
**Paper: Linux & Win32 Programming**

**Linux:**

**Unit I**

Linux overview, Compiler options, libraries, make, file system objects, error handling, I/O, file locking, managing files, directory management, temporary files and cleanup, command line processing.

**Unit II**

UserID, password and group management; signals, and signal handling, process management, fork and exec, regular expression, IPC, message queues, semaphores, shared memory, memory mapped files, Introduction to X-Windows.

**Win32:**

**Unit III**

Windows environment, Windows programming options, Windows and messages, text, controls, keyboard management, Mouse management, Timer, Child window controls, Menus and other resources, Dialog boxes, Clipboard management

**Unit IV**

GDI, Printer management, Bitmaps and Bitblts, Device Independent Bitmaps, Palette manager, Metafiles, Multiple Document Interface, Introduction to MFC.

**Text:**

1. K. Wall, M. Watson, and M. Whitis, “Linux Programming Unleashed”, SAMS, 1999.
2. C. Petzold, “Programming Windows: The definitive guide to Win32 API”, Microsoft Press, 5<sup>th</sup> Eds., 1998.

**Unit I.**

Introduction to the Operating System

Types of OS: Batch System, Time Sharing System, Real Time System, Multiuser/Single User System

Functions of Operating System: Process Management, Memory Management, File Management, I/O Devices Management, Information Management.

Process Management : Process concepts, Process State, Process Control Block, Process Scheduling, Context Switch, CPU Scheduling, Scheduling Criteria, Scheduling Algorithms, Pre Emptive/ Non Preemptive Scheduling, Threads, Thread Structure.

**Unit II**

Process Synchronisation: Critical Section Problem, Race Condition, Synchronisation Hardware, Semaphores, Classical Problems of Synchronisation.

Dead Locks: Characterisation, Methods for Handling Deadlocks Avoidance, Recovery and Detection.

**Unit III**

Memory Management: Contiguous Allocation, External Internal Fragmentation, Paging, Segmentation, Segmentation with Paging.

**Unit IV**

Virtual Memory: Virtual Memory Concepts, Access Methods, Directory Structure, allocation Methods; Contiguous Allocation, Linked Allocation, Indexed Allocation Free Space Management.

Device Management: dist Structure, Disk Scheduling Algorithms, Disk Management, Case study on DOS, Windows 2000, Windows XP, Linux.

**Text:**

1. Silbershatz and Galvin, "Operating Systems Concepts", Addition Weseley, 2002
2. Flynn, Mchoes, "Understanding Operating System", Thomson Press, Third Edition, 2003
3. Godbole Ahyut, "Operating System", PHI, 2003

**References:**

1. Charles Crowley, "Operating Systems, Tata Mcgraw-Hill Edition.
2. A.S. Tannenbaum, "Operating System Concepts", Addition Weseley, 2002

## SIXTH SEMESTER

Code No.: IT 302

L:3 T/P:1 C: 4

Paper ID: 15302

Paper: Microprocessors

### Unit I

**Introduction** – Microprocessors Evolution and types (Intel 4004 – Pentium IV and road maps), Overview of 8085, 8086, 80286, 80386, 80486, Pentium processors and Microntrollers.

### Unit II

**Architecture of 8086** – Register Organization, Execution unit, Bus Interface Unit, Signal Description, Physical Memory Organization, General Bus Operation, I/O addressing capabilities, Minimum mode and maximum mode timing diagrams, Comparison with 8088

### Unit III

**8086 programming** – Assembly language program development tools (editor, linker, loader, locator, Assembler, emulator and Debugger), Addressing modes, Instruction set descriptions, Assembler directives and operators, Procedures and Macros. (Writing programs for use with an assembler MASM)

### Unit IV

**8086 Interfacing** – Interfacing 8086 with semiconductor memory, 8255, 8254/ 8243, 8251, 8279, A/D and D/A converters. Numeric processor 8087, I/O processor 8089 tightly coupled and loosely coupled systems.

### Text:

1. D.V. Hall, “Microprocessors and Interfacing”, TMH, 2<sup>nd</sup> Ed. 1991.
2. Y.-C. Liu and G. A. Gibson, “Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design”, PHI, 2000.

### References:

1. J. L. Antonakes, “An Introduction to the Intel Family of Microprocessors”, Thomson, 1996.
2. K. J. Ayala, “The 8086 microprocessor”, Thomson, 1995
3. Peter Able, “IBM PC assembly language programming”, PHI, 2000.
4. A. K. Ray and K M Bhurchandi, “Advanced Microprocessors and Peripherals”, TMH, 2000.



### **Unit I**

**Introduction:** Uses of Computer Networks, Network and Protocol Architecture, Reference Model (ISO-OSI, TCP/IP-Overview)

**Physical Layer:** Data and signals, Transmission impairments, Data rate limits, performance factors, Transmission media, Wireless transmission, Telephone system (Structure, trunks, multiplexing & Switching)

### **Unit II**

**Data Link Layer:** Design issues, Error detection & correction, Data Link Protocols, sliding window protocols, HDLC, WAN Protocols.

### **Unit III**

**Medium Access Sub layer:** Channel allocation problem, multiple access protocols, IEEE standard 802.3 & 802.11 for LANS and WLAN, high-speed LANs, Network Devices-repeaters, hubs, switches bridges.

### **Unit IV**

**Network Layer:** Design issues, Routing algorithms, congestion control algorithms, Internetwork protocols, Internetwork operation

### **Text :**

1. B. A Forouzan., "Data Communications & Networking", 4<sup>th</sup> Ed, Tata McGraw Hill, 2007.
2. A. S. Tanenbaum. "Computer networks", Pearson Education, 4<sup>th</sup> ed , 2006.

### **References:**

1. W. Stallings, "Data and Computer Communications", Pearson Education, 8<sup>th</sup> Ed, 2007.
2. D. E. Comer., "Computer Networks & Internets", Pearson Education, 4<sup>th</sup> Ed, 2007
3. N. Olifer and V. Olifer, "Computer Networks", Wiley, 2006
4. L. L. Peterson and B. S. Davie, "Computer Networks", Elsevier, 4<sup>th</sup> Ed, 2007.
5. L. A. Gallo, "Computer Communications & networking technologies", Cengage Learning, India 1<sup>st</sup> Ed, 2007.

**Unit I**

**Growth of Functions, Summations, Algorithm Design Paradigms, Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort, Medians and Order Statistics, Disjoint Set operations, Linked List representation of disjoint sets, disjoint set forests.**

**Unit II**

Matrix Chain Multiplication, Strassen's algorithm for matrix multiplication, LCS, Optimal Binary Search Tree, General Greedy approach Vs Dynamic Programming approach Case studies: Knapsack problem, Huffman Coding Problem, Matroids

**Unit III**

Representation of Graphs, Breadth First Search, Depth First Search, Topological Sort, Strongly Connected Components, Algorithms of Kruskal's and Prim's, Dijkstra's and Bellman ford algorithm, All pair shortest path, Floyd Warshall Algorithm

**Unit IV**

**String Matching: The Naïve String Matching Algorithm, The Rabin Karp Algorithm, String Matching with Finite Automata, The Knuth Morris Pratt Algorithm.**

NP-Complete Problems: Polynomial Time Verification, NP-Completeness and Reducibility, NP Completeness proof, NP-Complete Problems.

**Text:**

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest, "Introduction to Algorithms", PHI, 2001.

**References:**

1. A.V. Aho, J.E. Hopcroft, J.D. Ullman "The Design & Analysis of Computer Algorithms", Addison Wesley, 1998.
2. U. Manber "Introduction to Algorithms – A Creative Approach", Addison Wesley, 1998.
3. E. Horwitz and S. Sahani "Fundamentals of Computer Algorithms", Galgotia, 1998.
4. P. Linz, "An Introduction to Formal Languages and Automata", Narosa Publishing House, 2000.
5. J.E. Hopcroft and J.D. Ullman, "Introduction to Automata Theory, Languages and Computation", Addison Wesley, 1998.
6. K.L. Mishra & N. Chandrasekaran, "Theory of Computer Science", PHI, 1996.
7. John C. Martin, "Introduction to Languages and Theory of Computation", TMH, 2001.

**Unit I**

Introduction to HDLs, Design Flow, Synthesis, VHDL Basics, Data types, Operators, Concurrent coding, Structural and Behavioural Modelling, Design of Adder, Subtractor, Decoder, encoder, Code converter, Multiplexer, VHDL for Combinational Circuits, Blocks, Generate Statements.

**Unit II**

Sequential Code, Control Structure, Attributes, VHDL for Flip Flops, Design of Shift Registers & Counters using VHDL, Design of memory using VHDL, Signals and Variable.

**Unit III**

VHDL timing, modelling with Delta time Delays, Inertial/Transport Delay, Packages and Libraries, Function, Procedure, Resolution Function, Operator Overloading, RTL systems: Organization of systems, Data Subsystem, Control Subsystem.

**Unit IV**

Testing and the Test Bench: Manufacturing Testing, Functional Testing, Test Benches, VHDL Test Bench, Files and Text I/O.  
Programmable Logic Arrays (PLAs), PALs, Study of architecture of FPGA and CPLD, Case study of FPGA device Virtex 5 family.

**Text:**

1. C. H. Roth and John, "Principle Digital System Design using VHDL", Cenage Learning 2008
2. V. A. Pedroni, "Circuit Design with VHDL", PHI, 2005

**References:**

1. B. Cohen, "VHDL coding Styles and Methodologies", Springer, 2005
2. J F Wakerly, "Digital Design Principles and Practice", Pearson Education Press 2007
3. S. Ghose, "Hardware Description Languages", PHI 2005
4. P.J. Ashendern, "The Designer Guide to VHDL", Morgan Kaufmann, 2005
5. D J Smith, "HDL Chip Design", Don Publisher, 2005
6. D. L. Perry, "VHDL programming", TMH, 2005
7. K.C. Chang and M Loeb, "Digital Systems Design with VHDL and Synthesis", Wiley, 2005
8. J. Bhaskar, "A VHDL Synthesis Primer", BSP, 2006.
9. J. Bhaskar, "A VHDL Primer", Pearson Education, 2005
10. S. Lee, "Advanced Digital Logic Design Using VHDL, State Machines, and Synthesis for FPGA's", Morgan Kaufmann, 2007
11. B. Vransesic, "Fundamental of Digital Logic Design with VHDL", TMH, 2007.

**Unit I**

**PULSE MODULATION**

Sampling process – PAM – other forms of pulse modulation – Bandwidth – Noise trade off – Quantization – PCM – Noise considerations in PCM Systems – TDM – Digital multiplexers – Virtues, Limitation and modification of PCM – Delta modulation – Linear prediction – Differential pulse code modulation – Adaptive delta Modulation.

**Unit-II**

**BASEBAND PULSE TRANSMISSION**

Matched Filter – Error Rate due to noise – Intersymbol Interference – Nyquist's criterion for Distortionless Base band Binary Transmission – Correlative level coding – Baseband and M-ary PAM transmission – Adaptive Equalization – Eye patterns.

**Unit III**

**PASSBAND DATA TRANSMISSION**

Introduction – Pass band Transmission model – Generation, Detection, Signal space diagram, bit error probability and Power spectra of BPSK, QPSK, FSK and MSK schemes – Differential phase shift keying – Comparison of Digital modulation systems using a single carrier – Carrier and symbol synchronization.

**Unit IV**

**ERROR CONTROL CODING**

Discrete memoryless channels – Linear block codes – Cyclic codes – Convolutional codes – Maximum likelihood decoding of convolutional codes – Viterbi Algorithm, Trellis coded Modulation, Turbo codes.

**SPREAD SPECTRUM MODULATION**

Pseudo – noise sequences – a notion of spread spectrum – Direct sequence spread spectrum with coherent binary phase shift keying – Signal space Dimensionality and processing gain – Probability of error – frequency – hop spread spectrum – Maximum length and Gold codes.

**Text:**

1. Simon Haykins, "Communication Systems" John Wiley, 4<sup>th</sup> Edition, 2001

**References:**

1. Sam K. Shanmugam "Analog and Digital Communication" John Wiley, 2002.
2. John G. Proakis, "Digital Communication" McGraw Hill 3<sup>rd</sup> Edition, 1995.
3. H. Taub and D. L. Schilling, "Principles of Communication Systems", TMH, 2003.

## SEVENTH SEMESTER

**Paper Code: IT-401**  
**Paper ID: 15401**

**L:3 T/P:1 C:4**  
**Paper: Advanced Computer Networks**

### Unit -I

Review of Physical, Data link layer, TCP/IP: Datalink Protocols; ARP and RARP.

### Unit-II

Network Layer: Routing algorithms and protocols, Congestion control algorithm, Router Operation, Router configuration, Internetworking, IP Protocol, IPv6 (an overview), Network layer in ATM Network.

### Unit-III

Transport Layer: Transport Service, Transport Protocol (TCP, UDP, ATM AAL layer protocol).

Application layer: Security, DNS, SNMP, RMON, Electronic Mail, WWW.

### Unit-IV

Network Security: Firewalls (Application and packet filtering), Virtual Public Network.

### Text:

1. Tananbaum A.S., "Computer Networks", 3<sup>rd</sup> Ed, PHI, 1999.
2. Laura Chappell (ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.

### References:

1. Black U., "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
2. Stallings W., "Computer Communication Networks", PHI.
3. Stallings W., "SNMP, SNMPv2, SNMPv3, RMON 1&2", 3<sup>rd</sup> Ed., Addison Wesley, 1999.
4. Michael A. Miller, "Data & Network Communications", Vikas Publication.
5. William A. Shay, "Understanding Data Communications & Networks", Vikas Publication.

**Paper Code: IT-413**  
**Paper ID: 15413**

**L:3 T/P:1 C:4**  
**Paper: Front End Design Tools & Web Technologies**

UNIT-I:

History of the Internet and World Wide Web – HTML 4 protocols – HTTP, SMTP, POP3, MIME, IMAP. HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;, Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

UNIT-II

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX , Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK , Introspection, Using Bound properties, Bean Info Interface, Constrained properties , Persistence, Customizes, Java Beans API, Introduction to EJB's

UNIT-III

Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servelet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues, Introduction to JSP: The Anatomy of a JSP Page. JSP Application Design with MVC , JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing Sharing Session and Application Data Memory Usage Considerations

UNIT IV:

Database Access : Database Programming using JDBC, Studying Javax.sql.\* package, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework..

TEXT BOOK

1. “Internet and world wide web – How to Program”, Deitel & Deitel, Goldberg, Pearson Education
2. “Using HTML 4, XML and JAVA”, Eric Ladd, Jim O’ Donnel, Prentice Hall of India
3. “Java Server Pages “, Hans Bergsten, SPD O’Reilly

REFERENCES

- 1 “Web Technology”, Rajkamal, Tata McGraw-Hill, 2001. KS:
2. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech
3. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH
4. Programming world wide web-Sebesta, Pearson
5. Jakarta Struts Cookbook , Bill Siggelkow, S P D O’Reilly

### **Unit-I**

**Introduction:** What is software testing and why it is so hard?, Error, Fault, Failure, Incident, Test Cases, Testing Process, Limitations of Testing, No absolute proof of correctness, Overview of Graph Theory.

### **Unit-II**

**Functional Testing:** Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique.

**Structural Testing:** Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing.

### **Unit-III**

**Reducing the number of test cases:**

Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, Slice based testing

**Testing Activities:** Unit Testing, Levels of Testing, Integration Testing, System Testing, Debugging, Domain Testing.

### **Unit-IV**

**Object Oriented Testing:** Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing.

**Testing Tools:** Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools.

### **Text:**

1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.
3. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
4. Louise Tamres, "Software Testing", Pearson Education Asia, 2002

### **Reference:**

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
2. Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.
3. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi, 2003.
4. Marc Roper, "Software Testing", McGraw-Hill Book Co., London, 1994.
5. Gordon Schulmeyer, "Zero Defect Software", McGraw-Hill, New York, 1990.
6. Watts Humphrey, "Managing the Software Process", Addison Wesley Pub. Co. Inc., Massachusetts, 1989.
7. Boris Beizer, "Software System Testing and Quality Assurance", Van Nostrand Reinhold, New York, 1984.
8. Glenford Myers, "The Art of Software Testing", John Wiley & Sons Inc., New York, 1979.

**Unit-I**

**Fundamentals of Distributed Computing:**

Architectural models for distributed and mobile computing systems, Basic concepts in distributed computing.

**Distributed Operating Systems:**

Overview, network operating systems, Distributed file systems, Middleware, client/server model for computing.

**Unit-II**

**Communication:**

Layered protocols, RPC, RMI, Remote objects. Basic Algorithms in Message Passing Systems, Leader Election in Rings, and Mutual Exclusion in Shared Memory, Message Passing, PVM and MPI.

**Process Concepts:**

Threads, Clients and Servers, Code migration, Agent based systems, Distributed objects, CORBA, Distributed COM.

**Unit-III**

**Synchronization:**

Clock synchronization, Logical clocks, Election algorithms, Mutual exclusion, Distributed transactions, Naming concepts, Security in distributed systems

**Distributed Databases:**

Distributed Data Storage, Fragmentation & Replication, Transparency, Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols.

**Unit-IV**

**Parallel Processing:**

Basic Concepts: Introduction to parallel processing, Parallel processing terminology, Design of parallel algorithms, Design of Parallel Databases, Parallel Query Evaluation.

**Text Books:**

1. Tannenbaum, A, Maarten Van Steen. Distributed Systems, Principles and Paradigm, Prentice Hall India, 2002
2. Elmars, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4<sup>th</sup> Edition, Pearson Education, 2007

**Reference Books:**

1. Tanenbaum, A, "Modern Operating Systems", 2nd Edition, Prentice Hall India, 2001.
2. Singhal and Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill, 1994
3. Attiya, Welch, "Distributed Computing", Wiley India, 2006
4. Coulouris, Dollimore and Kindberg, "Distributed Systems", Pearson, 2009.



**Paper Code: IT-415**

**L:3 T/P:1 C:4**

**Paper ID: 15415 Paper: Advanced Java Programming**

**Unit 1 :** Distributed Systems for Enterprise and Web-Based Applications , The Challenges of Scalability, Heterogeneity, Security, & Failure , Multi-Tiered Architectures , Messaging & Interfaces , JDBC: Java Database Connectivity , Messaging, Interfaces , RMI: Remote Method Invocation

**Unit 2:** MVC Architecture, Servlet, Servlet life cycle, web application structure, request response model, JSP pages and its elements JSP Architecture, JSP Page life cycle, Page directive attributes, JSP Tag libraries , JSTL Expression Language (EL) , Writing a Custom Tag Library

**Unit 3** Struts, Struts architecture, Struts classes - ActionForward, ActionForm, ActionServlet, Action classes , Understanding struts-config.xml , Struts Tiles , Combining Struts and Tiles, Tiles file structure , Understanding Tiles Definitions and Attributes , Creating a Definition in XML file and deploying , Creating a small application using Tiles

**Unit 4 :** Distributed System Models , J2EE: JNDI, EJB Entity Beans & Deployment Descriptors , J2EE: EJB Session Beans , Transactions , Web Services , Replication, Localization

**Text Books :**

1. Ivan Bayross , sharanam shah Java Server Programming , shroff Publishers
2. Holzner , Struts : Essential skills , TMH

**References :**

1. Coulouris, G., Dollimore, J., & Kindberg, Distributed Systems, Concepts and Design , Pearson Education
2. Joe wigglesworth , McMilan Paula , Java Programming : advanced topic , Thomson

**Unit –I**

Introduction to Embedded Systems, Special Challenges with Embedded Systems, Introduction to the 68HC12 and HCS12 Microcontrollers, HCS12 Family, Advantages of programming in assembly Language and HLL, Choosing the best HLL available for Embedded Systems, Structured Programming and Design, Programming & Debugging Procedures, Emulators and Logic analyzers, Cross compiler

**Unit-II**

Architecture of 68HC12/HCS12 System, Modes of Operations: Normal operating Modes, B32 EVB Modes of Operation, Register Block Relocation, Port System, B32 Memory System, B32 Memory Map, Memory Resource Remapping, HCS12 DP256 Memory System, Exception processing, 68HC12 Interrupt Response

**Unit-III**

The Timing System-the standard timer module, component of timer module, free running counter and its associated register, I/O channel, Real-time Interrupt, the Enhanced Capture Timer: MC68HC12BE32  
Serial Communications, 68HC12 Serial Communication Interface, Serial Peripheral Interface, Input/output interfacing concepts, RS-232 Interface, I<sup>2</sup>C interfacing, USB Interfacing

**Unit – IV**

Real-Time Operating Systems: Review of Concepts, Basic Concepts, Types of RTOS, RTOS Issues, Implementing of RTOS, Distributed Processing Sysyem-Networking with msCAN: Design Approaches, CAN protocol, The controller Unit for the 68HC12 msCAN12, Timing issue

**Text book:**

1. Embedded Systems: Design and Applications with 68HC12 and HCS12 by Steven F. Barrett and Daniel J. Pack, Pearson Education, 2005

**Reference book:**

1. Embedded System Design by Raj Kamal, THM, 2005
2. Embedded Microcomputer Systems by Jonathan W. Valvano, Cenage Learning, 2008
3. Real Time System by C. M. Krishna, MGH, 2005
4. Real Time System by Levi and Agarwal, MGH, 2005
5. Real Time System: Specification, Validation & Analysis by Mati Joseph, PHI
6. Real Time System by Jane W.S. Liu, Pearson Education, 2005
7. The Co-design of Embedded Systems: A Unified Hardware Software Representation, Kluwer Academic Publisher, 2002.
8. Introduction to Real-time software design by S. Allworth, Spriner-Verlag, 2004.

**UNIT – I**

Introduction to Cellular Mobile Systems

A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, overview of generations of cellular systems. Elements of cellular radio systems Design and interference

General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems, Introduction to co-channel interference, co-channel measurement design of antenna system, antenna parameter and their effects.

**UNIT – II**

Cell Coverage for Signal & antenna structures

General introduction, obtaining the mobile point to point mode, propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point to point prediction model – characteristics, cell site, antenna heights and signal coverage cells, mobile to mobile propagation, Characteristics of basic antenna structures, antenna at cell site, mobile antennas.

Frequency Management and Channel Assignment, Hand Off and Dropped Calls

Frequency management, fixed channel assignment, non-fixed channel assignment, traffic & channel assignment, Why hand off, types of handoff and their characteristics, dropped call rates & their evaluation.

**UNIT – III**

Modulation methods and coding for error detection and correlation

Introduction to Digital modulation techniques, modulation methods in cellular wireless systems, OFDM, Block coding, convolution coding and Turbo coding.

Multiple access techniques: FDMA, TDMA, CDMA

Time – division multiple access (TDMA), code division multiple access (CDMA), CDMA capacity, probability of bit error considerations, CDMA compared with TDMA.

**UNIT – IV**

Second generation, digital, wireless systems

GSM, IS\_136 (D-AMPS), IS-95, Mobile management, voice signal processing and coding.

**TEXT BOOKS:**

1. C. Y. Lee and William, “Mobile Cellular Telecommunications”, 2<sup>nd</sup> Ed, McGraw Hill. 2001
2. Mischa Schwartz, “Mobile Wireless Communications”, Cambridge Univ. Press, UK, 2005.

**REFERENCES:**

1. Mobile Communication Hand Book”, 2<sup>nd</sup> Edition, IEEE Press. 2002
2. Theodore S Rappaport, “Wireless Communication Principles and Practice”, 2<sup>nd</sup> Ed, Pearson Education. 2002
3. Lawrence Harte, “3G Wireless Demystified”, McGraw Hill Publications. 2000
4. Kaveh Pahlavan and Prashant Krishnamurthy, “Principles of Wireless Networks”, PHI.2000

**Unit-I**

**Data Warehousing:** An Introduction to data ware housing and characteristics of a data warehouse, various aspects of data marts.

**On Line Analytical processing:** OLTP and OLAP systems, Data Modelling, OLAP Tools, web OLAP, Decision support system.

**Unit-II**

**Developing a Data Ware house:** Architectural strategies and Organization Issues, Design Considerations, Tools for Data Warehousing, crucial decisions in designing a Data Ware house using ORACLE 8i / SQL server.

**Unit-III**

**Data Mining:** From Data ware housing to Data Mining, Objectives of Data Mining, the Business context for Data mining, Process improvement, marketing and Customer Relationship Management (CRM), the Technical context for Data Mining, machine learning, decision support and computer technology.

**Data Mining Techniques and Algorithms:** Process of data mining, Algorithms, Data base segmentation or clustering, predictive Modelling, Link Analysis, Data Mining Techniques, Automatic Cluster Detection, Decision trees and Neural Networks.

**Unit-IV**

**Data Mining Environment:** Case studies in building business environment, Application of data ware housing and Data mining in Government, National Data ware houses and case studies.

**Test Books**

1. "Mastering Data Mining: The Art and Science of Customer Relationship Management", by Berry and Lin off, John Wiley and Sons, 2001.
2. "Data Ware housing: Concepts, Techniques, Products and Applications", by C.S.R. Prabhu, Prentice Hall of India, 2001.

**Reference Books**

1. "Data Mining: Concepts and Techniques", J.Han, M.Kamber, Academic Press, Morgan Kanf man Publishers, 2001.
2. "Data Mining", by Pieter Adrians, Dolf Zantinge, Addison Wesley,2000.
3. "Data Mining with Microsoft SQL Server", by Seidman, Prentice Hall of India,2001.

**Paper Code: IT-451**  
**Paper ID: 15451**

**L:0 T/P:2 C:1**  
**Paper: Advanced Computer Network Lab**

**Paper Code: IT-453**  
**Paper ID: 15453**

**L:0 T/P:2 C:1**  
**Paper: FEDT & Web Lab**

**Paper Code: IT-455**  
**Paper ID: 15455**

**L:0 T/P:2 C:1**  
**Paper: Lab assignments**

This lab will be based on elective paper(s).

**Paper Code: IT-457**  
**Paper ID: 15457**

**L:0 T/P:0 C:5**  
**Paper: Minor Project**

**Paper Code: IT-459**  
**Paper ID: 15459**

**L:0 T/P:0 C:1**  
**Paper: Summer Training Report**

Students will undergo summer training/industry visit/In-house training/In-house project during the summer break after the completion of sixth semester. Report of the same is required to be submitted to the school. Viva-voce examination will be conducted based on the report submitted by the student. A panel of examiner will be appointed by the Dean, USIT.

## EIGHTH SEMESTER

**Paper Code: HS-402**  
**Paper ID: 98402**

**L:2 T/P:0 C:2**

**Paper: Technical Writing**

### **Unit-I**

Writing Skills: Descriptive, Narrative, Argumentative and Discursive, Reflective and Literary-Evaluative Writing.

Technical Writing: Definition, Purpose and Characteristics of Technical Writing.

### **Unit-II**

The Technical Writing Process: Prewriting Stage, The Writing Stage and the Post-writing stage.

Technical Writing Skills: Researching, Summarizing and Outlining, Visual Aids, Definition, Description, Set of Instructions.

### **Unit-III**

Formal Formatting: Arrangement of Formal Elements, Front Material, Format Devices in the Body of Formal Report-Heading, Pagination, End Material—Citations, References and Bibliography, Appendix.

### **Unit-IV**

Technical Writing Applications: Memorandums and Informal Format, Formal Format, Recommendations and Feasibility Reports, Proposals, Progress Reports, Analysis Reports Professional Communication, Letters and Job Applications.

Presentation and Meetings.

### **Text/References:**

1. Forsyth, Sandy and Lesley Hutchison, "Practical Composition", Edinburgh Oliver and Boyd, 1981.
2. Sides, Charles H., "How to Write and Present Technical Information", Cambridge, Cambridge University Press, 1999.
3. Guffey, Mary Ellen, "Business Communication, Cincinnati", South-Western College Publishing, 2000.

### **Unit-I**

#### **Parallel computer models:**

The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

#### **Program and network properties:**

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

### **Unit-II**

#### **Pipelining:**

Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

### **Unit-III**

#### **Arithmetic for computers**

Signed and unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point.

CPU Performance and Its factors, Evaluating performance of CPU.

### **Unit – IV**

#### **Memory Hierarchy**

Introduction, The basics of Cache, Measuring and Improving of Cache Performance, Virtual Memory, Common framework for memory hierarchies

Case study of PIV and AMD opteron memory hierarchies

#### **Text Books:**

1. Kai Hwang, "Advanced computer architecture"; TMH. 2000
2. D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002

#### **Reference Books:**

1. J.P.Hayes, "computer Architecture and organization"; MGH. 1998
2. Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication. 1998
3. V.Rajaraman & C.S.R.Murthy, "Parallel computer"; PHI. 2002
4. R.K.Ghose, Rajan Moona & Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
5. Kai Hwang and Zu, "Scalable Parallel Computers Architecture", MGH. 2001
6. Stalling W, "Computer Organisation & Architecture", PHI. 2000
7. D.Sima, T.Fountain, P.Kasuk, "Advanced Computer Architecture-A Design space Approach,"Addison Wesley,1997.
8. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing. 1998
9. D.A.Patterson, J.L.Hennessey, "Computer Architecture :A quantitative approach"; Morgan Kauffmann feb,2002.
10. Hwan and Briggs, " Computer Architecture and Parallel Processing"; MGH. 1999

**Unit I**

Definitions of Control Systems, Closed Loop and Open Loop Control, Examples of Control Systems; Laplace Transformation and Solution of Differential Equations; Concept of Mathematical model, Linear and Non-Linear Systems, Transfer Function with Simple Examples; Deriving transfer function of physical systems (Mechanical Translational Systems), Armature controlled and field controlled DC servomotors; AC servomotors and deriving their transfer functions; Block Diagram representation and Simplification.

**Unit II**

Signal Flow graph, Mason gain formula; Basic Control Actions: Proportional, integral and Derivative controllers, effect of feedback on control system; Transient and steady state response of first order system; Second order system, transient; Routh's Stability criterion, relative stability analysis; Static error co-efficients, position, velocity and acceleration error co-efficients.

**Unit III**

Root Locus Techniques Bode Diagram, Minimum and Non-Minimum phase systems; Determination of Transfer from Bode Diagram; Polar Plots; Nyquist Plot; Stability Analysis using; Constant M & N Loci.

**Unit IV**

Introduction to Compensators; Definitions of state, state variables, state space, representation of systems; Solution of time invariant, homogeneous state equation, state transition matrix and its properties; Z transform and solution of different equation; Transducers, synchro-transmitter; Stepper Motor, Tachogenerators; Rotating Amplifiers and Magnetic Amplifiers.

**Text Books:**

1. Ogata, "Modern Control Engineering" EEE, 4<sup>th</sup> Edition.
2. B. C. Kuo, "Automatic Control Systems" PHI – 7<sup>th</sup> Edition.

**References:**

1. D. R. Choudhary, "Modern Control Engineering", PHI, 2005.
2. I. J. Nagrath, M. Gopal, "Control System Engineering" New Age International, 2000.
3. N. K. Jain, "Automatic Control System Engineering" Dhanpat Rai, 2<sup>nd</sup> Edition.
4. Les Fenical, "Control Systems", Cenage Learning, 2008



Unit-I

**Relational Databases**

Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Unit-II

**Query Processing and Optimization**

Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

**Objected Oriented and Object Relational Databases**

Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Unit-III

**Parallel and Distributed Databases**

Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

**Advanced Transaction Processing**

Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

Unit-IV

**Data Mining**

Knowledge Representation Using Rules, Association and Classification Rules, Sequential Patterns, Algorithms for Rule Discovery

**Data Warehousing**

Data Warehousing Architecture, Multidimensional Data Model, Update Propagation

**Case Study: Oracle Xi**

**Text Books:**

1. Elmarsi, Navathe, Somayajulu, Gupta, “Fundamentals of Database Systems”, 4<sup>th</sup> Edition, Pearson Education, 2007
2. Garcia, Ullman, Widom, “Database Systems, The complete book”, Pearson Education, 2007
3. R. Ramakrishnan, “Database Management Systems”, McGraw Hill International Editions, 1998

**References:**

1. Date, Kannan, Swaminathan, “An Introduction to Database Systems”, 8th Edition Pearson Education, 2007
2. Singh S.K., “Database System Concepts, design and application”, Pearson Education, 2006.
3. Silberschatz, Korth, Sudarshan, “Database System Concepts”, Mcgraw Hill, 6<sup>th</sup> Edition, 2006
4. W. Kim, “Modern Database Systems”, 1995, ACM Press, Addison – Wesley,
5. D. Maier, “The Theory of Relational Databases”, 1993, Computer Science Press, Rokville, Maryland
6. Ullman, J. D., “Principals of database systems”, Galgotia publications, 1999
7. Oracle Xi Reference Manual
8. Dietrich, and Urban, “An Advanced Course in Database Systems”, Pearson, 2008.

**Unit -1** : Introduction to Three-Tier Architecture, overview of .NET Framework , Common Language Runtime (CLR) , The .NET Framework Class Library , familiarization with visual studio .NET IDE , Design Window, Code Window, Server , Explorer, Toolbox, Docking Windows, Properties Explorer, Solution Explorer, Object Browser, Dynamic Help, Task List Explorer, Features of VS.NET, XML Editor, Creating a Project, Add Reference, Build the Project, Debugging a Project

**Unit II** : Introducing C# Programming , introduction, basic language constructs, types (reference and value, relations between types) , delegates, generics, collections, strings , exceptions, threads , Networking

**Unit III** : Windows Forms, Adding Controls, Adding an Event Handler, Adding Controls at Runtime

Attaching an Event Handler at Runtime, Writing a Simple Text Editor, Creating a Menu Adding a New Form, Creating a Multiple Document Interface, Creating a Dialog Form Using Form Inheritance, Adding a Tab-Control, Anchoring Controls, Changing the Startup Form, Connecting the dialog, Using ListView and TreeView controls, Building an ImageList and add them to the ListView, Using details inside the ListView, Attaching a Context Menu, Adding a TreeView, Implementing Drag and Drop, Creating Controls at run time, Creating a User Control, Adding a Property, Adding Functionality, Writing a Custom Control, Testing the Control.

**Unit IV**: ADO.NET Architecture, Understanding the ConnectionObject, Building the Connection String, Understanding the CommandObject, Understanding DataReaders, Understanding DataSets and DataAdapters, DataTable, DataColumn, DataRow, Differences between DataReader Model and DataSet Model, Understanding the DataViewObject, Working with System.Data.OleDb, Using DataReaders, Using DataSets, Working with SQL.NET, Using Stored Procedures, Working with Odbc.NET, Using DSN Connection , Introducing the ASP.NET Architecture, ASP.NET Server Controls, Working with User, Controls, Custom Controls, Understanding the Web.config File, Using the Global.asax Page

**Text book and References :**

1. "Programming C#, 3rd Edition " Jesse Liberty , O'really
2. C# for Programmers, Deitel and Deitel, Pearson
3. "Understanding .NET", Chappell, David, , Addison Wesley, 2006

**UNIT – I**

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling.

Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling, Performance Analysis: Admission control and handoffs

**UNIT – II**

2.5/3G Mobile Wireless systems: packet switched Data Introduction, 3G CDMA cellular standards, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. 2.5/3G TDMA: General Packet Radio Services (GRPS) and EDGE.

**UNIT – III**

Access Scheduling techniques in cellular systems  
Slotted Aloha access, integrated access: voice and data, scheduling in packet based cellular systems.  
Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

**UNIT – IV**

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

**TEXT BOOKS:**

1. Yi-Bing and Imrich Chlamtac, “Wireless and Mobile Networks Architectures”, John Wiley & Sons, 2001.
2. Raj Pandya, “Mobile and Personal Communication Systems and Services”, PHI, 2001
3. Mischa Schwartz, “Mobile Wireless Communications”, Cambridge University Press, UK, 2005.

**REFERENCES:**

1. Mark Ciampa, “Guide to Designing and Implementing wireless LANs”, Thomson learning, Vikas Publishing House, 2001.
2. Ray Rischpater, “Wireless Web Development”, Springer Publishing, 2000.
3. Sandeep Singhal, “The Wireless Application Protocol”, Pearson Education Asia, 2000.
4. P. Stavronlakis, “Third Generation Mobile Telecommunication systems”, Springer Publishers, 2001

**Paper Code: IT-418**  
**Paper ID: 15418**

**L:3 T/P:1 C:4**  
**Paper: Semantic Web**

**Unit 1 : Structured Web Documents in XML**

1 Introduction , The Semantic Web Vision , Today's Web, From Today's Web to the Semantic Web Layered approach to Semantic Web Technologies , Overview of Structured Web Documents in XML , XML Language Overview , Structuring ,Namespaces , Addressing and Querying XML Documents , Processing of documents.

**Unit 2: Describing Web Resources in RDF** Understanding content: Metadata, metadata standards, XML+metadata specification, RDFBasics , XML-Based Syntax , RDF Schema: Direct Inference System for RDF , Querying in RQL

**Unit 3: Web Ontology Language:** , Web Ontology Language, OWL , Future Extensions , case study of any one ontology editor i.e Sesame or Protege, Monotonic Rules syntax and Semantics , Nonmonotonic Rules syntax and semantics .

**Unit 4: Applications** Semantic Applications,demonstrating power of semantic technology for search, personalization, contextual directory and custom/enterprise applications; next generation semantic content management , Contributions of IR, AI, Logic, NLP, DB and IS to Semantic Web, Ontology integration versus interoperation

**Text Books:**

1. Grigoris Antoniou and Frank van Harmelen, A Semantic Web Primer , The MIT Press
2. Daconta, Obrst and Smith , The Semantic Web: A Guide to the Future of XML, Web Services and Knowledge Management. Wiley 2003.

**References :**

1. Munindar P. Singh and Michael N. Huhns, Service-Oriented Computing, Wiley & Sons.
2. Thomas Erl , Service-Oriented Architecture (SOA): Concepts, Technology, and Design , Prentice Hall

**Paper Code: IT-452**  
**Paper ID: 15452**

**L:0 T/P:0 C:8**  
**Paper: Major Project (Report)**

**Paper Code: IT-454**  
**Paper ID: 15454**

**L:0 T/P:0 C:2**  
**Paper: Viva-voce (on Major Project)**

**Paper Code: IT-456**  
**Paper ID: 15456**

**L:0 T/P:0 C:1**  
**Paper: Seminar and Progress report**

This paper will be based on project work (IT-452). Seminar will be held in the school for the purpose of evaluation of the progress of the project work.

**Paper Code: IT-458**  
**Paper ID: 15458**

**L:0 T/P:0 C:1**  
**Paper: Lab assignment**

Lab will be based on elective paper(s).