



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**  
**Syllabus for UG Classes effective from First July,2013**

**FIRST YEAR FIRST SEMESTER**

<b>A. THEORY</b>							
Sl. No.	Paper Code	Paper Name	Contact Hours / week				Credit Point
			L	T	P	Total	
1	HU 102	Economics for Engineers	3	0	0	3	3
2	CH 101	Chemistry - I	3	1	0	4	4
3	EE 101	Basic Electrical Engineering	3	1	0	4	4
4	EC101	Basic Electronics Engineering	3	1	0	4	4
5	M 101	Mathematics – I	3	1	0	4	4
<b>Total of Theory</b>						<b>19</b>	<b>19</b>
<b>B. PRACTICAL</b>							
6	CH 191	Chemistry –I Laboratory	0	0	3	3	2
7	EC 191	Basic Electronics Engineering Lab	0	0	3	3	2
8	EE 191	Basic Electrical Engineering Lab	0	0	3	3	2
9	ME 192	Workshop Practice	0	0	3	3	2
<b>Total of Practical</b>						<b>12</b>	<b>8</b>
<b>Total of Semester</b>						<b>31</b>	<b>27</b>

**FIRST YEAR SECOND SEMESTER**

<b>A. THEORY</b>							
1	HU201	English Language & Technical Communication	2	0	0	2	2
2	PH 201	Physics –I	3	1	0	4	4
3	CS201	Principles of Computer Programming	3	1	0	4	4
4	ME 201	Engineering Mechanics	3	1	0	4	4
5	M 201	Mathematics - II	3	1	0	4	4
<b>Total of Theory</b>						<b>18</b>	<b>18</b>
<b>B. PRACTICAL</b>							
6	PH 291	Physics – I Lab	0	0	3	3	2
7	CS 291	Principles of Computer Programming Lab	0	0	3	3	2
8	ME 291	Engineering Drawing & Graphics	0	0	3	3	2
<b>Total of Practical</b>						<b>9</b>	<b>6</b>
<b>C. SESSIONAL</b>							
9	HU 281	English Language & Technical Communication	0	0	3	3	2
10	XC 281	Extra-Curricular Activities (NSS/NCC/NSO etc)	0	0	2	2	1
<b>Total of Sessional</b>						<b>5</b>	<b>3</b>
<b>Total of Semester</b>						<b>32</b>	<b>27</b>



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**  
**Syllabus for UG Classes effective from First July,2013**

**SECOND YEAR FIRST SEMESTER**

<b>A. THEORY</b>							
Sl. No.	Paper Code	Paper Name	Contact Hours / week				Credit Point
			L	T	P	Total	
1	CH 301	Basic Environmental Engineering & Elementary Biology	3	0	0	3	3
2	M(CS) 301	Numerical Methods	3	0	0	3	3
3	CS 302	Data Structure & Algorithm	3	0	0	3	3
4	CS 303	Computer Organization	3	1	0	4	4
5	CS 304	Analog & Digital Electronics	3	1	0	4	4
6	EC(CS)305	Communication Engg. & Coding Theory	3	0	0	3	3
<b>Total of Theory</b>						<b>20</b>	<b>20</b>
<b>B. PRACTICAL</b>							
7	M(CS)391	Numerical Methods Lab	0	0	3	3	2
8	CS 392	Data Structure & Algorithm Lab	0	0	3	3	2
9	CS 393	Computer Organization Lab	0	0	3	3	2
10	CS 394	Analog & Digital Electronics Lab	0	0	3	3	2
<b>Total of Practical</b>						<b>12</b>	<b>8</b>
<b>Total of Semester</b>						<b>32</b>	<b>28</b>
<b>SECOND YEAR SECOND SEMESTER</b>							
<b>A. THEORY</b>							
1	PH 401	Physics – II	3	1	0	4	4
2	M 401	Mathematics -III	3	1	0	4	4
3	HU 401	Value & Ethics in Profession	3	0	0	3	3
4	CS 401	Formal Language & Automata Theory	3	1	0	4	4
5	IT 401	Operating System	3	0	0	3	3
6	IT 402	Object Oriented Programming	3	0	0	3	3
<b>Total of Theory</b>						<b>21</b>	<b>21</b>
<b>B. PRACTICAL</b>							
7	PH 491	Physics – II Lab	0	0	3	3	2
8	IT 491	Operating System Lab	0	0	3	3	2
9	IT 492	Object Oriented Programming Lab	0	0	3	3	2
10	HU 481	Technical Report writing & Language Lab Practice	0	0	2	2	1
<b>Total of Practical</b>						<b>11</b>	<b>7</b>
<b>Total of Semester</b>						<b>32</b>	<b>28</b>



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

<b>THIRD YEAR FIRST SEMESTER</b>							
<b>A. THEORY</b>							
Sl. No.	Paper Code	Paper Name	Contact Hours / week				Credit Point
			L	T	P	Total	
1	IT 501	Microprocessors & Microcontrollers	3	1	0	4	4
2	IT 502	Software Engineering	3	1	0	4	4
3	IT 503	Design & Analysis of Algorithm	3	1	0	4	4
4	FE-I: IT 504	A. Operation Research B. Data Communication C. Digital Signal Processing D. Circuit Theory & Network	3	1	0	4	4
5	IT 505	Computer Architecture	3	1	0	4	4
<b>Total of Theory</b>						<b>20</b>	<b>20</b>
<b>B. PRACTICAL</b>							
7	IT 591	Microprocessors & Microcontrollers Lab	0	0	3	3	2
8	FE-I Lab.: IT 594	A. Operation Research Lab B. Data Communication lab C. Digital Signal Processing lab D. Circuit Theory & Network lab	0	0	3	3	2
9	IT 595	Computer Architecture Lab	0	0	3	3	2
10	IT 581	Seminar	0	0	3	3	2
<b>Total of Practical</b>						<b>12</b>	<b>8</b>
<b>Total of Semester</b>						<b>32</b>	<b>28</b>
<b>THIRD YEAR SECOND SEMESTER</b>							
<b>A. THEORY</b>							
1	HU 601	Principles of Management	3	0	0	3	3
2	IT 601	Database Management System	3	1	0	4	4
3	IT 602	Computer Networks	3	1	0	4	4
4.	IT 603	Multimedia	3	1	0	4	4
5.	<b>PE-I : IT 604</b>	A. Artificial Intelligence B. System Software and Administration C. Programming Practices using C++ D. Information Theory and coding	3	1	0	4	4
6	FE-II: IT 605	A. Distributed Operating System. B. Discrete Mathematics(Math) C. ERP D. Compiler Design	3	0	0	3	3
<b>Total of Theory</b>						<b>22</b>	<b>22</b>
<b>B. PRACTICAL</b>							
7	IT 691	Database Management System Lab	0	0	3	3	2
8	IT 692	Computer Networks Lab	0	0	3	3	2
9	IT 693	Multimedia Lab	0	0	3	3	2
<b>Total of Practical</b>						<b>9</b>	<b>6</b>
<b>Total of Semester</b>						<b>31</b>	<b>28</b>



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**  
**Syllabus for UG Classes effective from First July,2013**

<b>FOURTH YEAR FIRST SEMESTER</b>							
<b>A. THEORY</b>							
Sl. No.	Paper Code	Paper Name	Contact Hours / week				Credit Point
			L	T	P	Total	
1	IT 701	Internet Technology	3	1	0	4	4
2	IT702	Soft Computing	3	1	0	4	4
3	IT 703	Computer Graphics	3	1	0	4	4
4	PE-II: IT 704	A. Data Warehousing & Data Mining B. Mobile Computing C. Cloud Comp D. Sensor Networks	3	0	0	3	3
5	FE-III: IT 705	A. Image processing & GIS B. Pattern Recognition C. Cryptography and Network Security D. Microelectronics and VLSI design E. Advanced Data Communication and Coding	3	0	0	3	3
<b>Total of Theory</b>						<b>18</b>	<b>18</b>
<b>B. PRACTICAL</b>							
6.	IT 791	Internet Technology Lab	0	0	3	3	2
7.	IT 792	Soft Computing Lab	0	0	3	3	2
<b>Total of Practical</b>						<b>6</b>	<b>4</b>
<b>C. SESSIONAL</b>							
8.	IT 781	Industrial Training Evaluation	0	0	3	3	2
9.	IT 782	Project - I	0	0	3	3	2
10.	IT 783	Group Discussion	0	0	3	3	2
<b>Total of sessional</b>						<b>9</b>	<b>6</b>
<b>Total of Semester</b>						<b>33</b>	<b>28</b>
<b>FOURTH YEAR SECOND SEMESTER</b>							
<b>A. THEORY</b>							
1	HU 801	Financial Management	3	0	0	3	3
2	IT801	E commerce	3	1	0	4	4
2	FE-IV: IT802	A. Cyber Law and Security Policy B. NLP C. Advance CA D. Parallel Computing	3	1	0	4	4
<b>Total of Theory</b>						<b>11</b>	<b>11</b>
<b>B.PRACTICAL</b>							
	IT 891	E commerce lab	0	0	3	3	2
<b>A. SESSIONAL</b>							
5	IT 881	Grand Viva	0	0	0	0	5
6	IT 882	Project - II	0	0	9	9	6
<b>Total of sessional</b>						<b>9</b>	<b>11</b>
<b>Total of Semester</b>						<b>23</b>	<b>24</b>



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

**1st semester:**

**HU-102 Economics for Engineers 3-0-0-3-3:**

1. **Financial Accounting:** Meaning, Nature and scope of Financial Accounting, Accounting concepts & conventions, Business Transactions, Different types of Vouchers, Analysis of Transactions, Recording in Journals and cash books, Posting of Ledgers, Preparation of Trial balance, Preparation of Final Accounts ( Trading Account, Profit & Loss A/C and Balance Sheet)
2. **Cost Accounting:** Introduction, Classification of Costs; Break-even Analysis; Budgeting & Budgetary Control, Objectives, Advantages & Limitations of Budgeting, Cash Budget, Flexible Budget, Master Budget, etc
3. **Financial Management:** Cost of Capital: Capital Budgeting, Working Capital Management
4. **Economics:**

**Introduction:** Scarcity and Choice. Definition and Scope of Economics. Concept of Equilibrium. Concept of Market.

**Demand and Revenue Analysis:** Meaning of demand, Determinants of demand, Exception to the law of demand. Elasticity of demand- Meaning, Price Elasticity of demand. Price Elasticity of Supply.

**Cost and Production Analysis:** Cost concept: Classification of cost- Cost output relationship- Cost function and its determinants, uses of Cost function. Production: Meaning, Factors of production- Land, Labour, capital and organization.

**References**

- 1 Modern Accountancy A. Mukherjee & M. Hanif Tata McGraw- Hill
- 2 Accountancy (Vol.1) Dr. S.K. Paul New Central Book Agency
- 3 Practice in Accountancy S. P. Basu & Monilal Das Rabindra Library
- 4 Modern Economic Theory K.K. Dewett S.Chand
- 5 Fundamentals of Economic Principles and problems: A. Banerjee & D. Maumder; ABS Pub. House
- 6 Economics for Business John Sloman & Mark Sutcliffe Pearson Education
- 7 Management Accounting R.K. Sharma & S. Gupta Kalyani Publishers
- 8 Financial Management Dr. S. Kr. Paul New Central Book Agency
- 9 Financial Management Dr. D. Majumder; Sk. Raju Ali & Lutfun Neshia; ABS Publishing
10. S.A.Sherlekar & V.S.Sherlekar: Modern Business Organization & Management, Himalay Pub. House

**EE-101: Basic Electrical Engineering 3-1-0-4-4**

**Introduction:** Overview of Source of energy, Generation, Transmission and Distribution of Electric Power.

**DC Network:** Introduction of Electric Circuit, Loop Analysis, Node-voltage analysis. Star - Delta & Delta-star Transformations, Superposition Theorem, Thevenin's Theorem, Norton's theorems, Analysis of dc network in presence of one non-linear element, Transients in R-L, R-C and R-L-C circuits.

**Single-phase AC Network:** Single-phase AC Circuits, Generation of Sinusoidal Voltage Waveform (AC) and Some Fundamental Concepts, Representation of Sinusoidal Signal by a Phasor, Current and Resonance in R-L-C Series and parallel Circuits.

**Three-phase AC Network:** Three-phase AC Circuits, Three-phase Balanced Supply, Three-phase Delta-Connected Balanced Load, Power in a Three-phase Circuit.

**Magnetic Circuits:** Magnetic circuits, Core losses, Eddy Current & Hysteresis Loss.

**Transformer:** Ideal & Practical Transformer, Testing, Efficiency & Regulation, Three Phase Transformer, Auto-Transformer, Problem solving on Transformers

**Three-phase Induction Motor:** Construction, Principle of Operation, Rotating Magnetic Field, Equivalent Circuit, Power Flow Diagram, Torque-Slip (speed) Characteristics in Three-phase Induction Motor, Starters for Induction Motor.

**DC Machines:** , Constructional Features, Principle of Operation, EMF & Torque Equation of D.C Machines, D.C Generators, D.C Motors, Losses, Efficiency and Testing of D.C. Machines, Problem Solving on D.C Machines.

**Measuring Instruments:** Study of DC-AC Measuring Instruments, Study of Electro-Dynamic Type Instrument, Study of Single Phase Induction Type Energy Meter.

**General structure of electrical power system:** Power generation to distribution through overhead lines and under ground cables with single lone diagram.

**Text books:**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
3. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
4. Basic Electrical Engineering, J.P. Tewari, New age international publication

**Reference books:**

1. Basic Electrical Engineering(TMh WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
2. Electrical Engineering Fundamental, Vincent.D.Toro, Pearson Education, Second Edition.
2. Hughes Electrical & Electronics Technology, 8/e, Hughes, Pearson Education.
3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiyah, TMH
5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

**EE-191: Basic Electrical Engineering Lab. 0-0-3-3-2**

List of Experiments:

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin's theorem.  
(b) Verification of Norton's theorems.
4. Verification of Maximum power theorem.
5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit
8. Calibration of ammeter and voltmeter.
9. Open circuit and Short circuit test of a single phase Transformer.
10. No load characteristics of D.C shunt Generators
11. Starting and reversing of speed of a D.C. shunt
12. Speed control of DC shunt motor.
13. Measurement of power in a three phase circuit by two wattmeter method

**CH-101 Chemistry 3-1-0-4-4:**

**Module 1:Chemical Thermodynamics**

**Concept of Thermodynamic system:** Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

**Introduction to first law of thermodynamics:** Different statements, mathematical form.

**Internal energy:** Definition, example, characteristics, physical significance, mathematical expression for change in internal energy, expression for change in internal energy for ideal gas.

**Enthalpy:** Definition, characteristics, physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas. **3L**

**Heat Capacity:** Definition, classification of heat capacity ( $C_p$  and  $C_v$ ): Definition and general expression of  $C_p-C_v$ . Expression of  $C_p-C_v$  for ideal gas.

**Reversible and irreversible processes:** Definition, work done in isothermal reversible and isothermal irreversible process for ideal gas, adiabatic changes: Work done in adiabatic process, interrelation between thermodynamic parameters (P, V and T), slope of P-V curve in adiabatic and isothermal process.

**Application of first law of thermodynamics to chemical processes:** exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation, Kirchhoff's law. **3L**

**2nd law of thermodynamics:** Statement, mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for ideal gas, concept of inversion temperature. Evaluation of entropy: Characteristics and expression, entropy change in irreversible cyclic process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases. **2L**

Work function and free energy: Definition, characteristics, physical significance, mathematical expression of  $\Delta A$  and  $\Delta G$  for ideal gas, Maxwell's Expression (only the derivation of four different forms), Gibbs Helmholtz equation, condition of spontaneity and equilibrium reaction. **2L**



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

**Module 2: Industrial Chemistry and Polymerization**

**Industrial chemistry**

**Solid Fuel:** Coal, classification of coal, constituents of coal, carbonization of coal (HTC and LTC), coal analysis: Proximate and ultimate analysis.

**Liquid fuel:** Petroleum, classification of petroleum, refining, petroleum distillation, thermal cracking, octane number, cetane number, aviation fuel (aviation gasoline, jet gasoline), and bio-diesel.

**Gaseous fuels:** Natural gas, water gas, coal gas, bio-gas.

**5L**

**Polymerization:** Concepts, classifications and industrial applications

Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Poly dispersity index (PDI). Polymerization processes (addition and condensation polymerization), degree of polymerization, copolymerization. Preparation, structure and use of some common polymers: plastic (PE: HDPE, LDPE), rubber (natural rubber, SBR), fibre (nylon 6.6). Vulcanization, conducting and semi-conducting polymers.

**3L**

**Module 3: Reaction dynamics, and structure and reactivity of organic molecules**

**Reaction dynamics:** Reaction laws: rate and order; molecularity; zero, first and second order kinetics. Pseudo unimolecular reaction, Arrhenius equation. Mechanism and theories of reaction rates (Transition state theory, Collision theory:). Catalysis: Homogeneous catalysis (Definition, example, mechanism, kinetics).

**3L**

**Structure and reactivity of Organic molecules:** Electronegativity, electron affinity, hybridization, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief studies on some addition, elimination, and substitution reactions.

**3L**

**Module 4: Electrochemistry**

**Conductance:** Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (strong and weak electrolyte). Kohlrausch's law of independent migration of ions, transport numbers, and hydration of ions. Conductometric titrations: SA vs SB & SA vs WB; precipitation titration KCl vs AgNO<sub>3</sub>.

**2L**

**Electrochemical cell:** Cell EMF and its thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, quinhydrone half cell and calomel half cell (construction, representation, cell reaction, expression of potential, discussion, application). Storage cell, fuel cell (construction, representation, cell reaction, expression of potential, discussion, application). Application of EMF measurement on (a) ascertain the change in thermodynamic function ( $\Delta G$ ,  $\Delta H$ ,  $\Delta S$ ) (b) ascertain the equilibrium constant of a reversible chemical reaction (c) ascertain the valency of an ion.

**Module 5: Solid state and coordination chemistry**

**Solid state Chemistry:** Introduction to stoichiometric defects (Schottky & Frenkel) and non – stoichiometric defects (Metal excess and metal deficiency). Role of silicon and germanium in the field of semiconductor.

**2L**

**Coordination chemistry:** Double salt, complex salt, Werner's theory of coordination compounds, coordination number, ligand, chelate, stability constant: stepwise and overall.

**2L**

**Reference Books**

1. P. C. Rakshit, Physical Chemistry, Sarat Book House (7th Edition).
2. S. Glasstone, Text Book of Physical Chemistry, Macmillan India Limited.
3. S. Pahari, Physical Chemistry, New Central Book Agency.
4. S. Sarkar, Fuels and Combustion, Taylor & Francis (3rd Edition), 2009
5. P. Ghosh, Polymer Science and Technology of Plastics and Rubbers, TMH.
6. F.W. Billmeyer: Textbook of Polymer Science is published by Wiley India
7. Joel R. Fried, Polymer Science and Technology, Pearson Education (2nd Edition).
8. I. L. Finar, Organic Chemistry, Addison Wesley Longman, Inc.
9. Physical Chemistry, Atkins, 6th Edition, Oxford Publishers.
10. Organic Chemistry, Mark Loudon, 4th Edition, Oxford Publishers.
11. Inorganic Chemistry–R. L. Dutta, Current Distributors

**CH-191 Chemistry Lab. 0-0-3-3-2:**

**List of Experiments**

1. To Determine the alkalinity in a given water sample.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

2. Redox titration (estimation of iron using permanganometry)
3. To determine calcium and magnesium hardness of a given water sample separately.
4. Estimation of available chlorine in bleaching powder.
5. To determine chloride ion in a given water sample by argentometric method (using chromate indicator solution).
6. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water)
7. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)
8. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.
9. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.
10. Determination of dissolved oxygen present in a given water sample.
11. Estimation of available oxygen in pyrolusite.

**M-101 Mathematics-II 3-1-0-4-4:**

**Module I**

**Ordinary differential equations (ODE)- First order and first degree:** Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation). **6L**

**Module II**

**ODE- Higher order and first degree:** General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Euler equations, Solution of simultaneous linear differential equations. **7L**

**Module III**

**Partial Differential Equations:** Origin of PDE, its order and degree, concept of solution in PDE. Solution of First Order Partial differential equation by Lagrange's Method, Integral Surfaces passing through a given curve, Solution of non-linear first order partial differential equations by Charpit's method, Solution of Second order Linear partial Differential equations with constant coefficients and with variable coefficients. **14L**

**Module IV**

**Improper Integral:** Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations. **3L**

**Laplace Transform (LT):** Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of  $\frac{f(t)}{t}$ ,  $t^n f(t)$ ,  $f^{(n)}(t)$  and  $\int f(u)du$ . Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT. **10L**

**Total 40 Lectures**

Suggested Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, (Wiley Eastern)
2. Engineering Mathematics: B.S. Grewal (S. Chand & Co.)
3. Engineering Mathematics (Volume 2): S. S. Sastry (Prentice-Hall of India)
4. Advanced Engineering Mathematics, 3E: M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OUP).
5. An Introduction to Differential Equations, R.K. Ghosh and K.C. Maity (New Central Book Agency )
6. Elements of Partial Differential Equations, I. N. Sneddon, (McGraw-Hill International)
7. Laplace Transforms, M. R. Spiegel(MGH)

**EC-101 Basic Electronics Engineering 3-1-0-4-4:**

**Pre-requisite:** Knowledge of class XII level Physics and Mathematics

**Introduction:** Basic ideas on different circuit components (Resistor, Inductor, Capacitor) **1L** **Module – 1:**  
**Semiconductors:** **4L**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Crystalline material: Mechanical properties, Conductors, Semiconductors and Insulators: electrical properties. Energy band theory, Fermi levels; Semiconductors: intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers.

**Module – 2: Diodes and Diode Circuits:**

3L+3L = 6L

Formation of P-N junction, energy band diagram, built-in-potential, forward and reverse biased P-N junction, formation of depletion region, Junction capacitance, V-I characteristics of diode, Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, (PIV, DC voltage and current, ripple factor, efficiency), idea of regulation, rectifier filter circuits, clipper, clamper, voltage multiplier circuits, breakdown mechanism of diodes, Zener diode, Varactor diode.

**Module – 3: Bipolar Junction Transistors**

5L+2L=7L

Formation of PNP / NPN junctions, energy band diagram; current flow diagram, transistor mechanism and transistor principles, CE, CB, CC configuration, transistor input output characteristics: amplification factors for CB, CC and CE modes. Biasing and Bias stability: calculation of stability factor; small signal analysis, h-parameter model.

**Module – 4: Field Effect Transistors:**

5L

Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD amplifier configurations, FET parameters, small signal equivalent circuits for different configurations; CMOS: Basic Principles.

**Module – 5: Feed Back Amplifier and Operational Amplifiers:**

4L+4L = 8L

Positive and negative feed back, close loop gain, open loop gain, topologies of feed back amplifier, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feed back: instability and oscillation, condition of oscillation, Barkhausen criteria. Introduction to integrated circuits, open loop characteristics of operational amplifier; Application of operational amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Constant gain multiplier, Voltage follower, Comparator, Integrator, Differentiator. OPAMP parameters: CMRR, OFFSET parameters, slew rate.

**Module – 6: Special Semiconductor devices:**

3L

SCR, DIAC, TRIAC, UJT, IGBT- structure, characterization, principle of operation and applications.

**Module – 7: Cathode Ray Oscilloscope (CRO)**

4L

CRT structure, block diagram, operation, Deflection systems, sweep circuit operation, basic block of CRO, applications of CRO, Frequency, phase and amplitude measurement using CRO, Lissajous figure.

**Module – 8: Digital Electronics:**

2L

Introduction to binary number; Basic Boolean algebra; De Morgan's Theorem, Logic gates.

**Outcome:** The students will be able to select proper electronics component and device depending on the requirement. The student should be able to use required rectifier circuit and to calculate its different parameters. The students must be able to design a transistor amplifier.

**Recommended Books:**

1. Chattopadhyay & Rakshit: Electronics Fundamentals & Applications
2. Millman & Halkias: Integrated Electronics References:
  1. Boylestad & Nashelsky: Electronic Devices & Circuit Theory
  2. Sanjeev Gupta: Electronic Devices Circuits
  3. Malvino: Electronic Principle

**EC-191 Basic Electronics Engineering Lab. 0-0-3-3-2:**

There will be a couple of familiarization lectures before the practical classes are undertaken where basic concept of the instruments handled Eg: CRO, Multimeters etc will be given.

**List of Experiments:**

1. Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, multimeters etc.
2. Familiarisation with measuring and testing equipment like CRO, Signal generators etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

7. Study of Characteristic curves for CB, CE and CC mode transistors
8. Study of I-V characteristics of Field Effect Transistors.
9. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
10. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
11. Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.

**ME-192 Workshop Practice 0-0-3-3-2:**

**Jobs:**

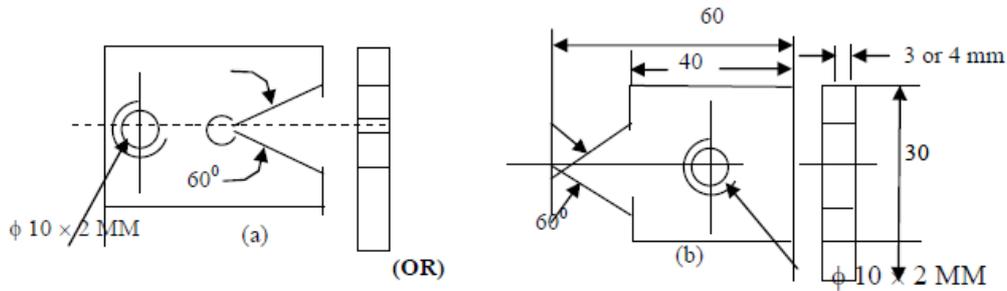


Fig.1: Job for fitting practice

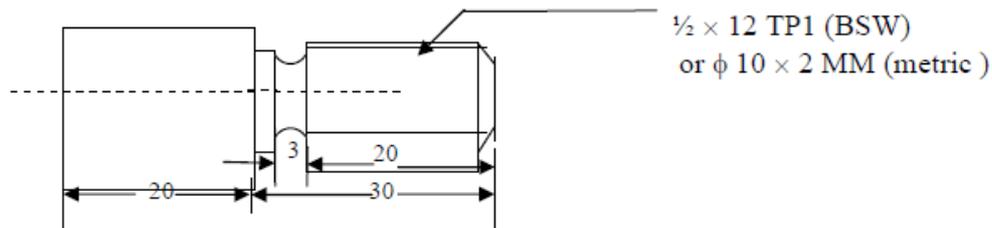


Fig.2: Job for practice on a lathe

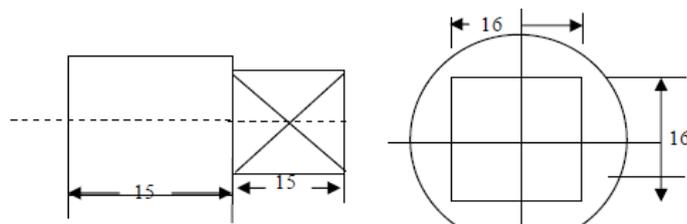


Fig.3: Job for practice on a shaping and/or milling machine

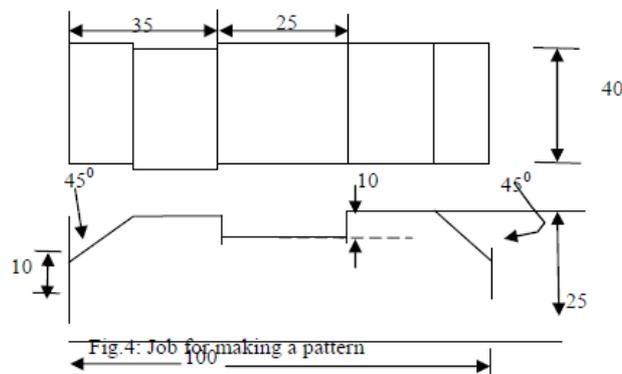


Fig.4: Job for making a pattern



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

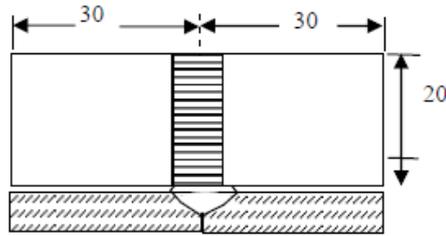


Fig.5: Welding specimen for practice

1. FITTING : Making a gauge from MS plate as shown in Fig.1. Operations required:
  - a. Squaring and finishing of the blank by filing
  - b. Making the Vee-portion by sawing and filing
  - c. Drilling (in machine) and tapping (hand)
2. MACHINING : To make a pin as shown in Fig.2 from a  $\square 20$ mm mild steel rod in a lathe.
3. MACHINING : To make a MS prism as shown in Fig.3 from a  $\square 20$ mm mild steel rod in a shaping and / or milling machine.
4. PATTERN MAKING, SAND MOULDING AND CASTING: To make a wooden pattern and a sand mould with that pattern for casting a cast iron block as shown in Fig.4.
5. WELDING (GAS WELDING): To join two thin mild steel plates or sheets (1 to 3mm thick) as shown in Fig. 5 by gas welding.
6. WELDING (ARC WELDING) : To join two thick (6mm) MS plate as shown in Fig. 5 by arc welding.
7. SHEET METAL WORK (in 1 day or 3 hours); Forming a cone, for example.

**2<sup>nd</sup> semester:**

**HU-201 English Language & Technical Communication 2-0-0-2-2:**

Guidelines for Course Execution:

**Objectives of the Course: This Course has been designed**

1. To impart advanced skills of Technical Communication in English through Language Lab. Practice Sessions to 1st Semester UG students of Engineering & Technology.
2. To enable them to communicate confidently and competently in English Language in all spheres.

Desired Entry Behaviour: The students must have basic command of English to Talk about day-to-day events and experiences of life. Comprehend Lectures delivered in English. Read and understand relevant materials written in English. Write grammatically correct English. Strategies for Course Execution:

1. It is a Course that aims to develop Technical Communication Skills. It is, therefore, *Lab-* based and practical in orientation. Students should be involved in Practice Sessions.
2. The content topics should be conveyed through real-life situations. Lecture classes should be conducted as Lecture cum Tutorial classes.
3. Keeping in view the requirements of students, the teachers may have to prepare some learning aids task materials.
4. Some time should be spent in teaching stress and intonation.
5. In teaching 'Speaking skill,' emphasis should be on *clarity, intelligibility, fluency, (as well as accepted pronunciation)*.
6. Micro Presentation and Group Discussion Sessions should be used for developing Communicative Competence
7. The Language Lab, device should be used for giving audio-visual inputs to elicit students' responses by way of Micro-Presentation, Pair Conversation, Group Talk and Class Discussion.
8. The teacher must function as *a creative monitor in the Language Lab for the following:*

**A. Developing Listening Comprehension Skill;**

1. Developing Listening Comprehension through Language Lab Device
2. Developing sub skills of the Listening Skill by Conversational Practice Sessions
3. Focusing on intelligent and advanced Listening Sessions e.g. Seminars, Paper Presentation, Mock Interviews etc.
4. Conducting Conversational Practice: Face to Face & Via Media (Telephone, Audio, Video + Clips)

**B. Developing Speaking Competence:**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

- a) Helping students in achieving *clarity and fluency*; manipulating paralinguistic features of speaking (*voice modulation ,pitch , tone stress , effective pauses* ). Conducting *Task oriented interpersonal ,informal and semiformal Speaking / Classroom Presentation* 4
- b) *Teaching strategies for Group Discussion, Teaching Cohesion and Coherence, Teaching effective communication & strategies for handling criticism and adverse remarks. Teaching strategies of Turn- taking, effective intervention, kinesics (use of body language) and courtesies and all components of soft skills.*

**C. Developing Reading Comprehension Skill:**

- a) Developing Reading Skill through Non Technical (Literary) Texts (See Recommended Book 5)
  1. The Thief by Ruskin Bond
  2. The Open Window by Saki
  3. Marriage is a private Affair by Chinua Achebe
  4. The Moon in the Earthen Pot by Gopini Karunakar
- b) Developing Reading Skill through Radio Commentary, Technical Texts and Case Studies (Refer to Recommended Book 1.) \* Freedom by G. B. Shaw (Radio Commentary)
- a) Guiding students for Intensive & Extensive Reading( See Recommended Book 1 )

**D. Developing Writing Competence:**

- a) Teaching all varieties of Technical Report, Business Letters and Job Application (Expressing Ideas within restricted word limit through paragraph division, Listing Reference Materials through Charts , Graphs ,Tables and Diagrams);
- b) Teaching correct Punctuation & Spelling, Semantics of Connectives, Modifiers and Modals, variety of sentences and paragraphs
- c) Teaching Organizational Communication: Memo, Notice, Circular, Agenda / Minutes etc.

**SYLLABUS -- DETAILED OUTLINES**

**A. ENGLISH LANGUAGE GRAMMAR: 5L**

Correction of Errors in Sentences, Building Vocabulary, Word formation, Single Word for a group of Words, Fill in the blanks using correct Words, Sentence Structures and Transformation, Active & Passive Voice, Direct & Indirect Narration, (MCQ Practice during classes)

**B. READING COMPREHENSION:**

Strategies for Reading Comprehension. 1L  
Practicing Technical & Non Technical Texts for Global/Local/Inferential/Referential comprehension; 3L  
Precis Writing

**C. TECHNICAL COMMUNICATION**

The Theory of Communication –Definition & Scope, Barriers of Communication, Different Communication Models, Effective Communication (Verbal / Non verbal), Presentation / Public Speaking Skills 5L  
(MCQ Practice during classes) 5

**D. MASTERING TECHNICAL COMMUNICATION**

Technical Report (formal drafting) 3L  
Business Letter (formal drafting) 4L  
Job Application (formal drafting) 3L  
Organizational Communication (see page 3) 3L  
Group Discussion –Principle & Practice 3L  
Total Lectures 30

MARKS SCHEME (Written Examination) Total Marks 70

1. 10 Multiple Choice Questions(Communication & Eng. Language-Vocabulary & Syntax) Marks 10
2. Short Questions & Precis writing on unseen passages Marks 15 (10+5)
3. 3 Essay type Questions on Technical Communication (Technical Report / Business Letter / Job Application / Organizational Communication etc.) Marks 45-15\*3

MARKS SCHEME (Internal Examination) Total Marks 30

1. Attendance Marks 5
2. Testing Speaking Ability Marks 5
3. Testing Listening Ability Marks 5
4. 2 Unit Tests Marks 15



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

Syllabus for UG Classes effective from First July, 2013

**HU -281 English Language & Technical Communication Lab 0-0-3-3-2:**

- a) Honing 'Listening Skill' and its sub skills through Language Lab Audio device; 3P
  - b) Honing 'Speaking Skill' and its sub skills; 2P
  - c) Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch & Accent) of connected speech; 2P
  - j) Honing 'Conversation Skill' using Language Lab Audio –Visual input; Conversational Practice Sessions (Face to Face / via Telephone , Mobile phone & Role Play Mode); 2P
  - k) Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success; 2P
  - f) G D Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD; 4P
  - g) Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/ Technical/Non Technical Passages; Learning Global / Contextual / Inferential Comprehension; 2P
  - h) Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input; Practice Sessions 2P
- Total Practical Classes 17

**Books Recommended:**

Dr. D. Sudharani: Manual for English Language Laboratory Pearson Education (WB edition), 2010

Board of Editors: Contemporary Communicative English for Technical Communication Pearson Longman, 2010

**PH- 201 Physics-I 3-1-0-4-4:**

**Module 1: Oscillation:**

- 1.1 Simple Harmonic motion: Preliminary concepts, Superposition of Simple Harmonic motions in two mutually perpendicular directions: Lissajous figure.
- 1.2 Damped vibration: Differential equation and its solution, Logarithmic decrement, Quality Factor.
- 1.3 Forced vibration: Differential equation and its solution, Amplitude and velocity resonance, Sharpness of resonance. Application in L-C-R circuit. (2L+3L+3L)

**Module 2: Optics I:**

- 2.1 Interference of electromagnetic waves: Condition for sustained interference, double slit as an example. Qualitative idea of Spatial and Temporal Coherence, conservation of energy and intensity distribution, Newton's ring.
- 2.2 Diffraction of light: Fresnel and Fraunhofer class. Fraunhofer diffraction for single slit and double slit. Intensity distribution of N-slits and plane diffraction grating (No deduction of the intensity distributions for N-slit), Missing orders. Rayleigh criterion, resolving power of grating and microscope. (3L+5L)

**Module 3: Optics II**

- 3.1 Polarization: General concept of polarization, Plane of vibration, Qualitative discussion on plane, circularly and elliptically polarized light. Polarization through reflection and Brewster's law. Double refraction (birefringence) – Ordinary and Extra-ordinary rays. Nicol's prism, Polaroid, Half wave and quarter wave plate.
- 3.2 Laser: Spontaneous and Stimulated emission of radiation, Population inversion, Einstein's A & B co-efficient (derivation of the mutual relation), Optical resonator and condition necessary for active Laser action, Ruby Laser, He-Ne Laser, application of laser.
- 3.3 Holography: Theory of holography, viewing of hologram, applications. (4L+4L+3L)

**Module 4: Quantum Physics:**

- 4.1 Concept of dependence of mass with velocity, mass energy equivalence, energy-momentum relation (no deduction required), Blackbody radiation: Rayleigh Jean's law (derivation without the calculation of number of states), Ultraviolet catastrophe, Wien's law, Planck's radiation law (calculation of average energy of the oscillator), Derivation of Wien's law and Stephan's law from Planck's radiation law. Rayleigh Jean's law and Wien's law as limiting case of Planck's law. Compton's effect (calculation of Compton wavelength is required).
- 4.2 Wave-particle duality and de Broglie's hypothesis. Concept of matter waves, Davisson-Germer experiment, Concept of wave packets and Heisenberg's uncertainty principle. (5L+4L)

**Module 5: Crystallography:**

- 5.1 Elementary ideas of crystal structure: Lattice, Basis, Unit cell, fundamental types of lattice-Bravais Lattice, simple cubic, FCC and BCC lattices (use of models in class during teaching is desirable), Miller indices and Miller planes, coordination number and atomic packing factor.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

5.2 X-rays: origin of characteristic and continuous x-rays, Bragg's law (no derivation), determination of lattice constant.

**PH- 291 Physics-I Lab. 0-0-3-3-2:**

**Group 1:** Experiment from Higher Secondary knowledge of Physics

1. Determination of thermal conductivity of a good conductor by Searle's method.
2. Determination of thermal conductivity of a bad conductor by Lees and Charlton's method.
3. Determination of dispersive power of the material of given prism.
4. Use of Carry Foster's bridge to determine unknown resistance.

**Group 2:** Experiments on General properties of matter

5. Determination of Young's modulus by Flexure method and calculation of bending moment and shear force at a point on the beam.
6. Determination of modulus of rigidity by static / dynamic method.
7. Determination of co-efficient of viscosity by Poiseuille's capillary flow method.

**Group 3:** Optics

8. Determination of wavelength of light by Newton's ring method.
9. Determination of wavelength of light by Fresnel's bi-prism method.
10. Determination of wavelength of light by Laser diffraction method.
11. Determination of numerical aperture and the energy losses related to optical fibre experiment.

**Innovative experiment:**

One more experiment designed by the student or the concerned teacher or both.

**CS- 201 Introduction to Computing 3-1-0-4-4:**

**Fundamentals of Computer:**

History of Computer, Generation of Computer, Classification of Computers 2L  
Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output Devices  
Binary & Allied number systems representation of signed and unsigned numbers. BCD, ASII. Binary Arithmetic & logic gates 9L  
Assembly language, high level language, compiler and assembler (basic concepts) 2L  
Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Algorithm & flow chart 2L

**C Fundamentals:**

The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements 3L

**Operators & Expressions:**

Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Input and Output: Standard input and output, formatted output -- printf, formatted input scanf. 5L

**Flow of Control:**

Statement and blocks, if - else, switch, loops - while, for do while, break and continue, go to and labels 2L

**Fundamentals and Program Structures:**

Basic of functions, function types, functions returning values, functions not returning values, auto, external, static and register variables, scope rules, recursion, function prototypes, C preprocessor, command line arguments. 6L

**Arrays and Pointers:**

One dimensional arrays, pointers and functions, multidimensional arrays. 6L

**Structures Union and Files:**

Basic of structures, structures and functions, arrays of structures, bit fields, formatted and unformatted files. 5L

**Recommended reference Books:**

Introduction To Computing (TMH WBUT Series), E. Balagurusamy, TMH  
Kerninghan, B.W. The Elements of Programming Style  
Yourdon, E. Techniques of Program Structures and Design  
Schied F.S. Theory and Problems of Computers and Programming  
Gottfried Programming with C Schaum



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

Kerningham B.W. & Ritchie D.M.	The C Programming Language
Rajaraman V.	Fundamental of Computers
Balaguruswamy	Programming in C
Kanetkar Y.	Let us C
M.M.Oka	Computer Fundamentals,EPH
Leon	Introduction to Computers,Vikas
Leon-	Fundamental of Information Technology,Vikas
Ram B.	Computer Fundamentals, New Age International
Ravichandran D.	Programming in C, New Age International
Xavier C. C	Language & Numerical Methods, New Age Inter.
Xavier C.	Introduction to Computers, New Age International
Rao S.B.	Numerical Methods with Programs in Basic Fortran Pascal & C++,
Dutta N.	Computer Programming & Numerical Analysis, Universities Press
Bhanu Pratap	Computer Fundamentals
Rajaram	Computer Concepts & C Program, Scitech

**CS- 291 Principles of Computer Programming Lab 0-0-3-3-2:**

Exercises should include but not limited to:

1. DOS System commands and Editors ( Preliminaries)
2. UNIX system commands and vi ( Preliminaries)
3. Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not, evaluate summation series, factorial of a number , generate Pascal’s triangle, find roots of a quadratic equation
4. Programs to demonstrate control structure : text processing, use of break and continue, etc.
5. Programs involving functions and recursion
6. Programs involving the use of arrays with subscripts and pointers
7. Programs using structures and files.

**M-201 Mathematics-II 3-1-0-4-4:**

**Module I**

**Matrix:** Determinant of a square matrix, Minors and Cofactors, Laplace’s method of expansion of a determinant, Product of two determinants, Adjoint of a determinant, Jacobi’s theorem on adjoint determinant. Singular and non-singular matrices, Adjoint of a matrix, Inverse of a non-singular matrix and its properties, orthogonal matrix and its properties, Trace of a matrix. Rank of a matrix and its determination using elementary row and column operations, Solution of simultaneous linear equations by matrix inversion method, Consistency and inconsistency of a system of homogeneous and inhomogeneous linear simultaneous equations, Eigen values and eigen vectors of a square matrix (of order 2 or 3), Caley-Hamilton theorem and its applications. **9L**

**Module II**

**Successive differentiation:** Higher order derivatives of a function of single variable, Leibnitz’s theorem (statement only and its application, Problems of the type of recurrence relations in derivatives of different orders and also to find  $(y_n)_0$ . **2L**

**Mean Value Theorems & Expansion of Functions:** Rolle’s theorem and its application, Mean Value theorems – Lagrange & Cauchy and their application, Taylor’s theorem with Lagrange’s and Cauchy’s form of remainders and its application, Expansions of functions by Taylor’s and Maclaurin’s theorem, Maclaurin’s infinite series expansion of the functions:  $\sin x, \cos x, e^x, \log(1+x), (a+x)^n$ ,  $n$  being an integer or a fraction. **5L**

**Reduction formula:** Reduction formulae both for indefinite and definite integrals of types

$$\int \sin^n x \, dx, \int \cos^n x \, dx, \int \sin^m x \cos^n x \, dx, \int \cos^m x \sin^n x \, dx, \int \frac{dx}{(x^2 + a^2)^n}$$

where  $m, n$  are positive integers. **2L**

**Module III**

**Calculus of Functions of Several Variables:** Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives and related problems, Homogeneous functions and Euler’s theorem and related problems up to three variables, Chain rules, Differentiation of implicit functions, Total



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

differentials and their related problems, Jacobians up to three variables and related problems, Maxima, minima and saddle points of functions and related problems, Concept of line integrals, Double and triple integrals. **9L**

**Module IV**

**Infinite Series:** Preliminary ideas of sequence, Infinite series and their convergence/divergence, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's Root test, D' Alembert's Ratio test and Raabe's test (statements and related problems on these tests), Alternating series, Leibnitz's Test (statement, definition) illustrated by simple example, Absolute convergence and Conditional convergence. **5L**

**Module-V**

**Vector Algebra and Vector Calculus:** Scalar and vector fields – definition and terminologies, dot and cross products, scalar and vector triple products and related problems, Equation of straight line, plane and sphere, Vector function of a scalar variable, Differentiation of a vector function, Scalar and vector point functions, Gradient of a scalar point function, divergence and curl of a vector point function, Directional derivative. Related problems on these topics. Green's theorem, Gauss Divergence Theorem and Stoke's theorem (Statements and applications). **8L**

**Total 40 Lectures**

**Suggested Reference Books**

1. **Advanced Engineering Mathematics** 8e by Erwin Kreyszig is published by Wiley India
2. **Engineering Mathematics:** B.S. Grewal
5. **Calculus:** M. J. Strauss, G. L. Bradley and K. L. Smith (3PrdP Edition, 1PstP Indian Edition 2007, Pearson)
6. **Engineering Mathematics:** S. S. Sastry ( PHI)
7. **Advanced Engineering Mathematics, 3E:** M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OUP).
8. **Differential Calculus,** Ghosh & Maity (Central)
9. **Integral Calculus,** Ghosh & Maity (Central)
10. **Higher Algebra-Classical & Modern,** J.G. Chakravorty and P.R. Ghosh(U.N. Dhur)
11. **Vector Analysis (Schaum Series),** M. R. Spiegel (MGH)

**ME-201 Engineering Mechanics 3-1-0-4-4:**

**Module – 1:** Importance of mechanics in Engg.; Introduction to Statics; Concept of particle and Rigid Body; Types of Forces: **2L**

Introduction to Vector Algebra; Parallelogram Law; Triangle and Polygon Law; Addition and Subtraction of Vector; Dot product and Cross product of Vectors; Unit Vector; Dot product and Cross product of Vectors and their applications. Types of Vectors ( Sliding Vector, Bound Vector ). **4L+1T**

Two dimensional force system, Resolution of forces; Moments; Varignon's theorem; Couple; Equivalence of Force and Force –Couple system. **4L+2T**

**Module – II**

Equilibrium of a body under two dimensional force system and under two dimensional force-moment system; Free body diagram; Lami's Theorem. **3L+1T**

Friction; Co-efficient of friction; Laws of friction; Angle of Repose; Wedge friction. **3L+1T**

**Module – III**

Centroid and Centre of Gravity; Centroid of Triangle, Quadrant of a circle and rectangle; Centroid of a composite area. **3L+1T**

Moment of Inertia of a plane figure about Co-planer axes; Parallel axis theorem; Polar Moment of Inertia; Mass Moment of Inertia of cylinder, sphere and cone about the axis of symmetry. **3L+1T**

**Module – IV**

Introduction to Dynamics; Kinematics and Kinetics; Newton's Laws of motion; Plane rectilinear motion under uniform and non-uniform acceleration; **3L+1T**

x-t, v-t and a-t graphs; Motion under gravity; Plane Curvilinear motion; Circular motion; Projectile motion. **3L+1T**

**Module – V**

Kinetics of particles; Newton's second Law; D' Alembert's principle; Principle of work, Energy and power; Principle of conservation of energy. **3L+1T**

**Module – VI**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

Concept of stresses and strains; Normal stress; Shear stress; Normal strain; Shear strain; Hooke's Law; Poisson's ratio; Stress-strain diagram of ductile material and brittle material; Elastic Modulus and Shear Modulus; Factor of safety-basic idea; bulk Modulus; Volumetric strain. 3L+1T

**Books Recommended :**

1. Engineering mechanics : Statics and dynamics by I.H. Shames, 4<sup>th</sup> ed. – PHI.
2. Engineering mechanics by Timoshenko, Young and Rao, Revised 4<sup>th</sup> ed. – TMH.
3. Elements of Strength of Materials by Timoshenko & Young, 5<sup>th</sup> ed. – E.W.P.
4. Fundamentals of Engineering Mechanics by Debabrata Nag & abhijit Chanda – Chhaya Prakashani.
5. Engineering Mechanics by Basudeb Bhattacharya- Oxford University press.
6. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11<sup>th</sup> ed. – pearson.
7. Engineering mechanics [vol-1 & II] by Meriam & kraige, 5<sup>th</sup> ed. – Wiley india.

**ME-291 Engineering Drawing & Graphics Lab. 0-0-3-3-2:**

**A. THEORETICAL PART**

1. Introduction to Lines , Lettering, Dimensioning, Scales. – 1L
2. Geometrical Construction and curves. – 1L
3. Projection of points, Lines and Surfaces. – 2L
4. Projection of solids. – 2L
5. Isometric Views. – 1L
6. Sectional Views. – 1L
7. Development of Surfaces. – 1L
8. Introduction to Computer Aided Drafting. – 3L

**B. PRACTICAL PART**

1. LINES, LETTERING, DIMENSIONING, SCALES: Plain scale, Diagonal scale. – 6hrs.
2. GEOMETRICAL CONSTRUCTION AND CURVES : Construction of Polygons, Parabola, Hyperbola , Ellipse. – 6 hrs.
3. PROJECTION OF POINTS, LINES, SURFACES : Orthographic projection – 1<sup>st</sup> and 3<sup>rd</sup> angle projection, Projection of lines and surfaces – Hexagon. – 3 hrs.
4. PROJECTION OF SOLIDS : Cube, Pyramid, prism, Cylinder, Cone. – 6 hrs.
5. DRAWING ISOMETRIC VIEW FROM ORTHOGONAL / SECTIONAL VIEWS OF SIMPLE SOLID OBJECTS. – 3 hrs.
6. FULL AND HALF SECTIONAL VIEWS OF SOLIDS. – 3 hrs.
7. DEVELOPMENT OF SURFACES : Prism , Cylinder, Cone. – 3 hrs.

**Books Recommended :**

1. Narayana, K.L. and Kannaiyah, P. Text Book of engineering Drawing “ Engineering Graphics”, Scitech
2. Bhatt, N.D. “Elementary Engineering Drawing”, Charotar Book Stall, Anand,1998.
3. Lakshminarayanan, v. and Vaish Wanar, R.S., “ Engineering Graphics”, Jain brothers, New Delhi,1998.
4. Chandra, A.M. and Chandra Satish, “ Engineering Graphics”, Narosa, 1998.
5. Jolhe, “ Engineering Graphics”, Tata Mc Graw –Hill – WBUT Series.
6. Gill, P.S., “ A Text Book of Engg Drawing”, Katson Publishing House ( Kataria and Sons).
7. Venugopal, K., “ Engineering Drawing & Graphics+ AUTO CAD”, New Age International.
8. Venkata Reddy K., “ Text Book of Engineering Drawing (2<sup>nd</sup> Edition)”, BS Publication.

**XC -281 Extra Curricular Activities 0-0-2-2-1:**

- a) Creating awareness in social issues
  - b) Participating in mass education programmes
  - c) Proposal for local slum area development
  - d) Waste disposal
  - e) Environmental awareness
  - f) Production Oriented Programmes
  - g) Relief & Rehabilitation work during Natural calamities
- Creating awareness in social issues:

1. Women's development – includes health, income-generation, rights awareness.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

2. Hospital activities – Eg. Writing letters for patients, guiding visitors
3. Old age home – visiting the aging in-mates, arranging for their entertainment.
4. Children's Homes – visiting the young in-mates, arranging for their entertainment
5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers)
6. Gender issues- Developing an awareness, to link it with Women's Cell of college

Participating in mass education programmes

1. Adult education

2. Children's education

Proposal for local slum area development

One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted.

Environmental awareness

- Resource conservation – Awareness to be developed on water, energy, soil.
- Preservation of heritage monuments- Marches, poster campaigns
- Alternative energy consciousness amongst younger school-children.
- Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.
- Waste disposal- Proper methods of domestic waste disposal.

Production Oriented Programmes

5. Working with people and explaining and teaching improved agricultural practices
6. Rodent control land pest control practices;
7. Soil-testing, soil health care and soil conservation;
8. Assistance in repair of agriculture machinery;
9. Work for the promotion and strengthening of cooperative societies in villages;
10. Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
11. Popularization of small savings and
12. Assistance in procuring bank loans

Relief & Rehabilitation work during Natural calamities

g) Assisting the authorities in distribution of rations, medicine, clothes etc.;

h) Assisting the health authorities in inoculation and immunization, supply of medicine etc.;

i) Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;

j) Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;

### **Third Semester:**

#### **Basic Environmental Engineering & Elementary Biology**

**Code: CH301**

**Contacts: 3L = 3**

**Credits: 3**

Basic ideas of environment, basic concepts, man, society & environment, their interrelationship. 1L

Mathematics of population growth and associated problems, Importance of population study in environmental Engg.

Definition of resource, types of resource, renewable, non-renewable, potentially renewable, effect of excessive use vis-à-vis E Population growth, Sustainable Development. 2L

Materials balance: Steady state conservation system, steady state system with non-conservative pollutants, step function. 1L

Environmental degradation: Natural environmental Hazards like Flood, earthquake, Landslide-causes, effects and Control/management; anthropogenic degradation like Acid rain-cause, effects and control. Nature and scope of Environmental Science and Engineering. 2L

#### Ecology

Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function. 1L



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Mangrove ecosystem (special reference to Sundar ban); Food chain [definition and one example of each food chain], Food web. 2L

Biogeochemical Cycle- definition, significance, flow chart of different cycles with only elementary reaction [Oxygen, carbon, Nitrogen, Phosphate, Sulphur]. 1L

Biodiversity- types, importance, Endemic species, Biodiversity Hot-spot, Threats to biodiversity, Conservation of biodiversity. 2L

Air pollution and control

Atmospheric Composition: Troposphere, Stratosphere, Mesosphere, Thermosphere, Tropopause and Mesopause. 1L

Energy balance: Conductive and Convective heat transfer, radiation heat transfer, simple global temperature model [Earth as a black body, earth as albedo], Problems. 1L

Green house effects: Definition, impact of greenhouse gases on the global climate and consequently on sea water level, agriculture and marine food. Global warming and its consequence, Control of Global warming. Earth's heat budget. 1L

Lapse rate: Ambient lapse rate adiabatic lapse rate, atmospheric stability, temperature inversion (radiation inversion). 2L

Atmospheric dispersion: Maximum mixing depth, ventilation coefficient, effective stack height, smokestack plumes and Gaussian plume model. 2L

Definition of pollutants and contaminants, Primary and secondary pollutants: emission standard, criteria pollutant.

Sources and effect of different air pollutants- Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN. 2L

Smog, Photochemical smog and London smog. Depletion Ozone layer: CFC, destruction of ozone layer by CFC, impact of other greenhouse gases, effect of ozone modification. 1L

Standards and control measures: Industrial, commercial and residential air quality standard, control measure (ESP, cyclone separator, bag house, catalytic converter, scrubber (ventury), Statement with brief reference). 1L

Water Pollution and Control : Hydrosphere, Hydrological cycle and Natural water. Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, thermal application, Heavy metals, pesticides, volatile organic compounds. 2L

River/Lake/ground water pollution: River: DO, 5 day BOD test, Seeded BOD test, BOD reaction rate constants, Effect of Oxygen demanding wastes on river [deoxygenation, reaeration], COD, Oil, Greases, pH. 2L

Lake: Eutrophication [Definition, source and effect]. 1L

Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only) 1L

Standard and control: Waste water standard [BOD, COD, Oil, Grease], Water Treatment system [coagulation and flocculation, sedimentation and filtration, disinfection, hardness and alkalinity, softening]

Waste water treatment system, primary and secondary treatments [Trickling filters, rotating biological contractor, Activated sludge, sludge treatment, oxidation ponds] tertiary treatment definition. 2L

Water pollution due to the toxic elements and their biochemical effects: Lead, Mercury, Cadmium, and Arsenic 1L

Land Pollution: Lithosphere; Internal structure of earth, rock and soil 1L

Solid Waste: Municipal, industrial, commercial, agricultural, domestic, pathological and hazardous solid wastes; Recovery and disposal method- Open dumping, Land filling, incineration, composting, recycling. Solid waste management and control (hazardous and biomedical waste). 2L

Noise Pollution : Definition of noise, effect of noise pollution, noise classification [Transport noise, occupational noise, neighbourhood noise] 1L

Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, 10L  
Noise pollution control.:

Environmental Management: Environmental impact assessment, Environmental Audit, Environmental laws and protection act of India, Different international environmental treaty/ agreement/ protocol. 2L

References/Books

1. Masters, G. M., "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd., 1991.
2. De, A. K., "Environmental Chemistry", New Age International.

**Numerical Methods**

**Code-M(CS) 301**



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

**Contacts-3L+1T**

**Credit point-3**

What is Numerical Analysis?

Errors in Numerical computation : Gross error, Round off error, Truncation error, Approximate numbers.

Significant figures. Absolute, relative and percentage error. Definition of Operators:  $\Delta$ ,  $\nabla$ ,  $E$ ,  $E^{-1}$ ,  $\mu$ ,  $\delta$  and simple relation among them.

Interpolation: Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation.

Numerical Differentiation based on Newton's forward and backward and Lagrange's formulae.

Numerical Integration : Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Expression for corresponding error terms.

Numerical solution of a system of linear equations : Gauss elimination method, Matrix inversion, LU factorization method, Gauss-Seidel iterative method, Gauss-Jacobi method.

Numerical Solution of Algebraic equation : Bisection method, Regula-Falsi method, Newton-Raphson method.

Numerical Solution of Ordinary Differential Equation : Euler's method, Modified Euler's method, Runge-Kutta methods, Picard's method, Taylor's Method.

References:

1. C. Xavier: C Language and Numerical Methods.

2. N. Dutta : Computer Programming & Numerical Analysis, Universities Press.

3. S. S. Sastry: Numerical Methods.

4. Aitkinson : Elementary Numerical Analysis

**Data Structure & Algorithm**

**Code-CS 302**

**Contacts-3L+1T**

**Credit point-4**

Introduction (2L): Concepts of data structures, Abstract Data Type. Algorithms and programs, basic idea of pseudo-code. Algorithm efficiency and time, space trade off, different order notations.

Fundamental Data Structures (2L):

Array: Different representations – row major, column major. Sparse matrix - its implementation and usage. Array representation of polynomials.

Linked List (4L): Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.

Linear Data Structure (5L): Stack and its implementations (using array, using linked list), applications. Queue, circular queue, dequeue. Implementation of queue- both linear and circular (using array, using linked list), applications, prefix, infix, postfix notations.

Recursion (2L): Principles of recursion – use of stack, differences between recursion and iteration, tail recursion. Applications - The Tower of Hanoi Problem.

Nonlinear Data structures (8L): Tree: Basic terminologies, forest, tree representation (using array, using linked list). Binary trees - binary tree traversal (pre-, in-, post- order), threaded binary tree (left, right, full), application, non-recursive traversal algorithms, expression tree. Binary search tree- operations (creation, insertion, deletion, searching). Height balanced binary tree – AVL tree (insertion, deletion with examples only). B- Trees – operations (insertion, deletion with examples only), Application of Trees. Heaps and its application- priority queue implementation.

Sorting Algorithms (4L): Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort, radix sort, Time complexity of various sorting algorithms.

Searching (2L): Sequential search, binary search, interpolation search.

Hashing (2L): Hashing functions, collision resolution techniques, Hash applications.

Graphs (5L): Graph definitions and concepts (directed/undirected graph, weighted/un-weighted edges, sub-graph, degree, cut-vertex/ articulation point, pendant node, clique, complete graph, connected components – strongly connected component, weakly connected component, path, shortest path, Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list. Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge,



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

back-edge, cross-edge, forward-edge), applications. Minimal spanning tree – Prim's algorithm (basic idea of greedy methods).

**Reference books:**

1. "Data Structures in C" by Aaron M. Tenenbaum.
2. "Data Structures and algorithms" by S. Lipschutz
3. Data Structure using C by P. Gupta

**Computer organization**

**Code: CS303**

**Contacts: 3L+1T**

**Credits: 4**

**Pre-requisite:** Concept of basic components of a digital computer, Basic concept of Fundamentals & Program structures. Basic number systems, Binary numbers, representation of signed and unsigned numbers, Binary Arithmetic as covered in Basic Computation & Principles of Computer Programming Second semester, first year. Boolean Algebra, Karnaugh Maps, Logic Gates – covered in Basic Electronics in First year

**Module – 1: [8L] :** Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes. [7L]

Commonly used number systems. Fixed and floating point representation of numbers. [1L]

**Module – 2: [8L] :** Overflow and underflow. Design of adders - ripple carry and carry look ahead principles. [3L]  
Design of ALU. [1L]

Fixed point multiplication -Booth's algorithm. [1L]

Fixed point division - Restoring and non-restoring algorithms. [2L]

Floating point - IEEE 754 standard. [1L]

**Module-3: [10L] :** Memory unit design with special emphasis on implementation of CPU-memory interfacing. [2L]

Memory organization, static and dynamic memory, memory hierarchy, associative memory. [3L]

Cache memory, Virtual memory. Data path design for read/write access. [5L]

**Module – 4: [10L] :** Design of control unit - hardwired and microprogrammed control. [3L]

Introduction to instruction pipelining. [2L]

Introduction to RISC architectures. RISC vs CISC architectures. [2L]

I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA. [3L]

**Learning Outcome:**

Additional Tutorial Hours will be planned to meet the following learning outcome.

Through this course, the students will be exposed to extensive development and use of computer organization based concepts for the future knowledge outcome of Advanced Computer Architecture offered in subsequent semester. The students will be able to understand different instruction formats, instruction sets, I/O mechanism. Hardware details, memory technology, interfacing between the CPU and peripherals will be transparent to the students. Students will be able to design hypothetical arithmetic logic unit.

**Text Book:**

1. Mano, M.M., "Computer System Architecture", PHI.
2. BehroozParhami "Computer Architecture", Oxford University Press

Reference Book:

1. Hayes J. P., "Computer Architecture & Organisation", McGraw Hill,
2. Hamacher, "Computer Organisation", McGraw Hill,
3. N. senthil Kumar, M. Saravanan, S. Jeevananthan, "Microprocessors and Microcontrollers" OUP
4. Chaudhuri P. Pal, "Computer Organisation & Design", PHI,
5. P N Basu- "Computer Organization & Architecture" ,Vikas Pub

**Analog & Digital Electronics**

**Code-CS 304**

**Contacts-3L+1T**

**Credit point-4**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

**Analog Electronics**

**Module -1: [6L]**

1. Different Classes of Amplifiers - (Class-A, B, AB and C - basic concepts, power, efficiency [2L]; Recapitulation of basic concepts of Feedback and Oscillation [1L],
2. Astable & Monostable Multivibrators [1L]; Schmitt Trigger circuits [1L], 555 Timer [1L].

**Digital Electronics**

**Module – 2: [12 L]**

1. Binary Number System & Boolean Algebra (recapitulation ) [1L]; BCD, ASCII, EBCDIC, Gray codes and their Conversions [1L]; Signed binary number representation with 1's and 2's complement methods [1L], Binary arithmetic, Venn diagram, Boolean algebra (recapitulation) [1L]; Representation in SOP and POS forms [1L]; Minimization of logic expressions by algebraic method. [2L]
2. Combinational circuits - Adder and Subtractor circuits (half & full adder & subtractor) [2L]; Encoder, Decoder, Comparator, Multiplexer, De-Multiplexer and Parity Generator circuits and design. [3L].

**Module - 3: [15L]**

1. Sequential Circuits - Basic Flip-flop & Latch [1L], Flip-flops -SR, JK, D, T and JK Master-slave, One Flip Flop to another Flip-Flop design. [3L]
2. Registers (SISO, SIPO, PIPO, PISO), bidirectional universal Shift Register. [2L]
3. Ring counter, Johnson counter [1L], Basic concept and designing of Mod N Counter, Synchronous and Asynchronous counters and their design [4L] Sequence generator and Programmable Logic Devices-PLD, PLA, PAL, FPGA structures & applications[4L].

**Module – 4: [4L]**

1. IC Digital Logic Families - Characteristics of digital IC's, Transistor – Transistor Logic family, Standard TTL characteristics, Totem pole, Open collector TTL, Tristate TTL, Basic ideas about ECL Metal-oxide semiconductor (MOS) family, NMOS and CMOS gates and their characteristics.

Total: 37 hours

**Textbooks:**

Microelectronics Engineering - Sedra& Smith-Oxford.

Principles of Electronic Devices & circuits—B L Thereja&Sedha—S Chand

Digital Electronics – salivhanan – Vikas Publications.

Digital Electronics – Logic & Systems by J.Bigmeil&R.Donovan; Cambridge Learning.

**Reference:**

Electronic Devices & Circuit Theory – Boyelstad & Nashelsky - PHI

Bell-Linear IC & OP AMP—Oxford

Morries Mano- Digital Logic Design- PHI

R.P.Jain—Modern Digital Electronics, 2/e ,McGraw Hill

H.Taub&D.Shilling, Digital Integrated Electronics- McGraw Hill.

D.RayChaudhuri- Digital Circuits-Vol-I & II, 2/e- Platinum Publishers

Leach &Malvino—Digital Principles & Application, 5/e, McGraw Hill

Floyed& Jain- Digital Fundamentals-Pearson.

**Communication Engg.& Coding Theory**

**Code-EC(CS) 305**

**Contacts-3L**

**Credit point-3**

**Module - 1:**

*Elements of Communication system, Analog Modulation & Demodulation, Noise, SNR Analog-to-Digital Conversion. (Basic ideas in brief) [9]*

Details: Introduction to Base Band transmission & Modulation (basic concept) (*IL*); Elements of Communication systems(mention of transmitter, receiver and channel); origin of noise and its effect, Importance of SNR in system design (*IL*);Basic principles of Linear Modulation (Amplitude Modulation),brief ideas about SSB-SC and DSB-SC(Generation and Detection not required) (*IL*); Basic principles of Non-linear modulation (Angle Modulation - FM, PM).Basics of PLL (*IL*); Sampling theorem, Sampling rate, Impulse sampling, Reconstruction from samples,



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Aliasing (*1L*); Analog Pulse Modulation - PAM (Natural & flat topped sampling), PWM, PPM (*1L*); Basic concept of Pulse Code Modulation, Block diagram of PCM (*1L*); Multiplexing - TDM, FDM basic ideas (*1L*);

**Module - 2:**

Digital Transmission: [8]

Details: Concept of Quantisation & Quantisation error, Uniform Quantiser (*1L*); Non-uniform Quantiser, A-law &  $\mu$ -law. Companding (mention only) (*1L*); Encoding, Coding efficiency (*1L*); Line coding & properties, NRZ & RZ, AMI, Manchester coding (*1L*); Baseband Pulse Transmission, Matched filter (mention of its importance and basic concept only), Error rate due to noise (*2L*); ISI, Raised cosine function, Nyquist criterion for distortion-less base-band binary transmission, Eye pattern, Signal power in binary digital signals (*2L*);

**Module - 3:**

Digital Carrier Modulation & Demodulation Techniques: [8]

Details: Bit rate, Baud rate (*1L*); Information capacity, Shanon's limit (*1L*); M-ary encoding, Introduction to the different digital modulation techniques - ASK, FSK, PSK, BPSK, QPSK, mention of 8 BPSK, 16 BPSK (*2L*); Introduction to QAM, mention of 8QAM, 16 QAM without elaboration (*1L*); Delta modulation, Adaptive delta modulation (basic concept and importance only, no details) (*1L*); introduction to the concept of DPCM, Delta Modulation, Adaptive Delta modulation and their relevance (*1L*); Spread Spectrum Modulation - concept only (*1L*).

**Module - 4:**

Information Theory & Coding: [8]

Details: Introduction, News value & Information content (*1L*); Entropy (*1L*); Mutual information (*1L*); Information rate (*1L*); Shanon-Fano algorithm for encoding (*1L*); Shannon's Theorem - Source Coding Theorem (*1L*); Channel Coding Theorem, Information Capacity Theorem (basic understanding only) (*1L*); Error Control & Coding - basic principle only (*1L*);

**Text Books:**

- 1 Communication System by B.P.Lathi, Oxford publisher.
2. Data Communication and Networking by Behrouz A. Forouzan, Published by Tata McGraw-Hill
- 3 Analog and Digital Communication System by Sanjay Sharma, Publisher by Katson

**References:**

4. Communication Systems 4th Edition by Simon Haykin; Published by Wiley India (Student Edition)
5. Principles and Analog and Digital Communication by Jerry D Gibson, Published by MacMillan.
6. Communication Systems by A. B. Carlson, Published by McGraw-Hill.

**Numerical Methods Lab**

**Code-M(CS) 391**

**Contacts-2**

**Credit points-2**

1. Assignments on Newton forward /backward, Lagrange's interpolation.
2. Assignments on Interpolation, Newton's Divided difference.
3. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.
4. Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations.
5. Assignments on numerical solution of Algebraic Equation by Regular-falsi and Newton-Raphson methods.
6. Assignments on ordinary differential equation: Euler's and Runge-Kutta methods.

**Data Structure & Algorithm Lab**

**Code-CS 392**

**Contacts-3**

**Credit points-2**

Implementation of array operations. Stack Queue and Circular Queue: inserting, deleting elements. Evaluation of expressions. Operations on Multiple stacks & queues.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Implementation of linked lists: inserting, deleting, and inverting a linked list. Implementation of stacks & queues using linked lists. Polynomial addition, Polynomial multiplication, Sparse Matrices: Multiplication, addition. Implementation of various sorting and searching techniques. Implementation, Recursive and Non-recursive traversal of Trees, Threaded binary tree traversal. AVL tree implementation, Application of Trees. Application of sorting and searching algorithms, Hash tables implementation: searching, inserting and deleting, searching & sorting techniques. Graph implementation, execution of shortest path algorithms.

**Computer Organization Lab**

**Code-CS 393**

**Contacts-2**

**Credit points-2**

1. Familiarity with IC-chips, e.g.
  - a) Multiplexer, b) Decoder, c) Encoder b) ComparatorTruth Table verification and clarification from Data-book.
2. Design an Adder/Subtractor composite unit.
3. Design a BCD adder.
4. Design of a 'Carry-Look-Ahead' Adder circuit.
5. Use a multiplexer unit to design a composite ALU.
6. Use ALU chip for multi-bit arithmetic operation.
7. Implement read write operation using RAM IC.
8. (a) & (b) Cascade two RAM ICs for vertical and horizontal expansion.

**Analog & Digital Electronics Lab**

**Code-CS 394**

**Contacts-3**

**Credit points-2**

ANALOG: At least any two of the following

1. Design a Class A amplifier
2. Design a Phase-Shift Oscillator
3. Design of a Schmitt Trigger using 555 timer.

DIGITAL: At least any four of the following

1. Design a Full Adder using basic gates and verify its output / Design a Full Subtractor circuit using basic gates and verify its output.
2. Construction of simple Decoder & Multiplexer circuits using logic gates.
3. Realization of RS / JK / D flip flops using logic gates.
4. Design of Shift Register using J-K / D Flip Flop.
5. Realization of Synchronous Up/Down counter.
6. Design of MOD- N Counter

**Second Year Second Semester**

PH401 : :Physics-II Contacts : 3L + 1T Credits : 4

Module 1:Vector Calculus:

1.1 Physical significances of grad, div, curl. Line integral, surface integral, volume integral- physical examples in the context of electricity and magnetism and statements of Stokes theorem and Gauss theorem [No Proof]. Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates.

Module 2 :Electricity

2.1 Coulombs law in vector form. Electrostatic field and its curl. Gauss's law in integral form and conversion to differential form . Electrostatic potential and field, Poisson's Eqn. Laplace's eqn (Application to Cartesian,



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Spherically and Cylindrically symmetric systems – effective 1D problems) Electric current, drift velocity, current density, continuity equation, steady current.

2.2 Dielectrics-concept of polarization, the relation  $D = \epsilon_0 E + P$ , Polarizability. Electronic polarization and polarization in monoatomic and polyatomic gases.

Module 3: Magnetostatics & Time Varying Field: Lorentz force, force on a small current element placed in a magnetic field. Biot-Savart law and its applications, divergence of magnetic field, vector potential, Ampere's law in integral form and conversion to differential form. Faraday's law of electro-magnetic induction in integral form and conversion to differential form.

Module 4: Electromagnetic Theory: 4.1 Concept of displacement current Maxwell's field equations, Maxwell's wave equation and its solution for free space. E.M. wave in a charge free conducting media, Skin depth, physical significance of Skin Depth, E.M. energy flow, & Poynting Vector.

Module 5: Quantum Mechanics:

5.1 Generalised coordinates, Lagrange's Equation of motion and Lagrangian, generalised force potential, momenta and energy. Hamilton's Equation of motion and Hamiltonian. Properties of Hamilton and Hamilton's equation of motion.

Course should be discussed along with physical problems of 1-D motion

5.2 Concept of probability and probability density, operators, commutator. Formulation of quantum mechanics and Basic postulates, Operator correspondence, Time dependent Schrödinger's equation, formulation of time independent Schrödinger's equation by method of separation of variables, Physical interpretation of wave function  $\psi$  (normalization and probability interpretation), Expectation values, Application of Schrödinger equation – Particle in an infinite square well potential (1-D and 3-D potential well), Discussion on degenerate levels. Module

6: Statistical Mechanics:

6.1 Concept of energy levels and energy states. Microstates, macro states and thermodynamic probability, equilibrium macrostate. MB, FD, BE statistics (No deduction necessary), fermions, bosons (definitions in terms of spin, examples), physical significance and application, classical limits of quantum statistics Fermi distribution at zero & non-zero temperature, Calculation of Fermi level in metals, also total energy at absolute zero of temperature and total number of particles, Bose-Einstein statistics – Planck's law of blackbody radiation.

<b>Paper Name:-</b>	<b>Mathematics III</b>
<b>Paper Code:-</b>	<b>M 401</b>
<b>Contacts:-</b>	<b>3-1-0-4</b>
<b>Credit Point:-</b>	<b>4</b>
<p><b>Module-1:</b>  <b>Theory of Probability:</b> Classical definition of probability and its limitation. Axiomatic definition of probability, Conditional probability, Independent events and related problems, Baye's theorem ( statement only) &amp; related problems. One dimensional random variable. Probability distributions- (discrete and continuous); Expectation and Variance. Binomial; Poisson, Uniform, Exponential, Normal distributions and related problems. <math>t</math>, <math>\chi^2</math> and F-distribution( Definition only). Transformation of random variables, Central Limit Theorem. 10L</p> <p><b>Module-2:</b>  <b>Sampling Theorem:</b> Random sampling, Parameter. Statistic and its Sampling. Standard error of statistic. Sampling distribution of sample mean and variance in random sampling from a normal distribution (Statement only) and related problems.  <b>Estimation of parameters:</b> Consistent and unbiased estimators. Point estimation. Interval estimation. Maximum likelihood estimation of parameters (Binomial, Poisson and Normal ). Confidence intervals and related problems. 7L</p> <p><b>Module-3:</b>  <b>Testing of Hypothesis:</b> Simple and Composite hypothesis; Critical Region; Level of Significance; Type-I and Type-II errors. One sample and two sample tests for mean and proportions. <math>\chi^2</math> test of goodness of fit 5L</p> <p><b>Module-4:</b>  <b>Graph Theory:</b>, graphs. Digraphs. Graph isomorphism. Weighted graph. Connected and disconnected graph. Complement of a graph. Regular graph. Complete graph. Sub graph. Walks. Paths. Trail. Cycle. Circuits. Euler graph. Cut sets and cut vertices. Matrix representation of a graph. Adjacency and incidence matrices of</p>	



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

a graph. Bipartite graph. Definition and properties of tree. Binary tree. Spanning tree of a graph. Minimal spanning tree. Properties of trees. Algorithms. Dijkstra's algorithm for shortest path problem. Determination of minimal spanning tree using DFS, BFS, Kruskal's and Prim's algorithm. Planar and dual graphs. Network. Flow Augmented path. Ford –Fulkerson algorithm for Max Flow-Mini Cut Theorem ( Statement only). 20L

**Books:**

1. Graph Theory: V.K.Balakrishnan, Schaum's Outline, THM
2. Introduction to Graph Theory, D.B.West, PHI
3. Graph Theory, N.Deo, PHI
4. Mathematical Probability A.Banerjee, S.K.De and S.Sen ( U.N.Dhur & Sons)
5. Mathematical Statistics, S.K.De and S.Sen ( U.N.Dhur & Sons)
6. Statistical Methods, N.G.Das, TMH
7. Fundamentals of Mathematical Statistics: A Modern Approach, S.C.Gupta, V.K.Kapoor (S.Chand)

Paper Name:-	VALUES & ETHICS IN PROFESSION
Paper Code:-	HU-401
Contacts:-	3-0-0-3
Credit Point:-	3
<p>Science, Technology and Engineering as knowledge and as Social and Professional Activities.            Effects of Technological Growth: Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development            Energy Crisis: Renewable Energy Resources, Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics,            Appropriate Technology Movement of Schumacher; later developments Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis.            Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.            Ethics of Profession: Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.            Profession and Human Values: Values Crisis in contemporary society            Nature of values: Value Spectrum of a good life            Psychological values: Integrated personality; mental health            Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution.            Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity            Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.</p>	
<p>Reference</p> <ol style="list-style-type: none"> <li>1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley &amp; Sons, New York 1994 (2<sup>nd</sup>Ed)</li> <li>2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.</li> <li>3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.</li> </ol>	

**Subject Name: Formal Language & Automata Theory**

**Subject code: CS 401**

**Contacts: 3L+1T**

**Credit point: 4**

*Prerequisites of Formal Language & Automata Theory:*



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Elementary discrete mathematics including the notion of set, function, relation, product, partial order, equivalence relation, graph & tree. They should have a thorough understanding of the principle of mathematical induction.

**Module-1: [15 L]**

Fundamentals: Basic definition of sequential circuit, block diagram, mathematical representation, concept of transition table and transition diagram (Relating of Automata concept to sequential circuit concept). Design of sequence detector, Introduction to finite state model [ 2L]

Finite state machine: Definitions, capability & state equivalent,  $k^{\text{th}}$ - equivalent concept [ 1L]

Merger graph, Merger table, Compatibility graph [ 1L]

Finite Memory Machine, Definiteness, Testing Table, Testing Graph [2L]

Deterministic finite automaton and non deterministic finite automaton. [1L]

Transition diagrams and Language recognizers. [1L]

Finite Automata: NFA with lambda transitions - Significance, acceptance of languages. [1L]

Conversions & Equivalence: Equivalence between NFA with and without  $\lambda$  transitions. NFA to DFA conversion. 2L

Minimization of FSM, Equivalence between two FSM's, Limitations of FSM [1L]

Application of finite automata, Finite Automata with output- Moore & Melay machine. [2L]

Learning outcome of Finite Automata: The student will be able to define a system and recognize the behavior of a system. They will be able to minimize a system and compare different systems.

**Module-2: [8 L]**

Regular Languages: Regular sets. [1L]

Regular expressions, identity rules. Arden's theorem state and prove [1L]

Constructing finite Automata for a given regular expressions, Regular string accepted by NFA/DFA [1L]

Pumping lemma of regular sets. Closure properties of regular sets (proofs not required). [1L]

Grammar Formalism: Regular grammars-right linear and left linear grammars. [1L]

Equivalence between regular linear grammar and FA. [1L]

Inter conversion, Context free grammar. [1L]

Derivation trees, sentential forms. Right most and leftmost derivation of strings. (Concept only) [1L]

Learning outcome of Regular Languages and Grammar: Student will convert Finite Automata to regular expression. Students will be able to check equivalence between regular linear grammar and FA.

**Module-3: [9L]**

Context Free Grammars, Ambiguity in context free grammars. [1L]

Minimization of Context Free Grammars. [1L]

Chomsky normal form and Greibach normal form. [1L]

Pumping Lemma for Context Free Languages. [1L]

Enumeration of properties of CFL (proofs omitted). Closure property of CFL, Ogden's lemma & its applications 1L]

Push Down Automata: Push down automata, definition. [1L]

Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. [1L]

Equivalence of CFL and PDA, interconversion. (Proofs not required). [1L]

Introduction to DCFL and DPDA. [1L]

Learning outcome of PDA and context free grammar: Students will be able to minimize context free grammar. Student will be able to check equivalence of CFL and PDA. They will be able to design Turing Machine .

**Module-4: [7L]**

Turing Machine : Turing Machine, definition, model [1L]

Design of TM, Computable functions, Recursive Functions & Sets, Recursively Enumerable Sets, Equivalent Models [2L], Church's hypothesis, counter machine [1L]

Types of Turing machines (proofs not required) [1 L], Universal Turing Machine, Halting problem [2L]

Learning outcome of Turing Machine:

Students will be able to design Turing machine.

**TEXT BOOKS:**

1. "Introduction to Automata Theory Language and Computation", Hopcroft H.E. and Ullman J. D., Pearson education.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

2. “Theory of Computer Science “, Automata Languages and computation”, Mishra and Chandrashekar, 2nd edition, PHI.

3. “Formal Languages and Automata Theory”, C.K.Nagpal, Oxford

**REFERENCES:**

1 “Switching & Finite Automata”, ZVI Kohavi, 2nd Edn., Tata McGraw Hill

2. “Introduction to Computer Theory”, Daniel I.A. Cohen, John Wiley

3. “Introduction to languages and the Theory of Computation”, John C Martin, TMH

4. “Elements of Theory of Computation”, Lewis H.P. & Papadimitrou C.H. Pearson, PHI

**Subject Name: Operating System**

**Subject code: IT 401**

**Contacts: 3L**

**Credit point: 3**

**Introduction [4L]**

Introduction to Operating system. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, timesharing, real-time, distributed, parallel.

**System Structure[3L]** Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

**Process Management [17L]**

Processes [3L]: Concept of processes, process scheduling, operations on processes, co-operating processes, interprocess communication.

Threads [2L]: overview, benefits of threads, user and kernel threads. CPU scheduling [3L]: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization [5L]: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.

Deadlocks [4L]: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

**Storage Management [19L]**

Memory Management [5L]: background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.

Virtual Memory [3L]: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems [4L]: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

I/O Management [4L]: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Disk Management [3L]: disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN) , disk reliability, disk formatting, boot block, bad blocks.

**Protection & Security [4L]** Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

**Text Books / References:**

1. Milenkovic M., “Operating System : Concept & Design”, McGraw Hill.

2. Tanenbaum A.S., “Operating System Design & Implementation”, Practice Hall NJ.

3. Silberschatz A. and Peterson J. L., “Operating System Concepts”, Wiley.

4. Dhamdhere: Operating System TMH

5. Stalling, William, “Operating Systems”, Maxwell McMillan International Editions, 1992. 6. Dietel H. N., “An Introduction to Operating Systems”, Addison Wesley.

**Subject Name: Object Oriented Programming**

**Subject code: IT 402**



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

**Contacts: 3L+1T**

**Credit point: 4**

**Prerequisites of Object Oriented Programming:** The fundamental point in learning programming is to develop the critical skills of formulating programmatic solutions for real problems. It will be based on basic knowledge of algorithms and procedural programming language. Once the basic skill of writing programs using loop, methods and arrays will be clear then the student can develop object oriented software using class encapsulation and inheritance.

**Object oriented design [10 L]** Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

**Object oriented concepts [4 L]** Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism **Basic concepts of object oriented programming using Java [22 L]** Implementation of Object oriented concepts using Java.

*Language features to be covered:* **Class & Object properties [6L]** Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt() , compareTo(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase() ,trim() , valueOf() methods) &StringBuffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods), concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

**Reusability properties[6L]** – Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

**Exception handling & Multithreading [6L]** – Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

**Applet Programming (using swing) [4L]** – Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

**Textbooks/References:** 1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India 2. Ali Bahrami – "Object Oriented System Development" – McGraw Hill 3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – TMH 4. R.K Das – "Core Java For Beginners" – VIKAS PUBLISHING 5. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson 6. Ivor Horton's Beginning Java 2 SDK – Wrox 7. E. Balagurusamy – "Programming With Java: A Primer" – 3rd Ed. – TMH

**Subject Name Operating System Lab**

**Subject Code: IT 491**

**Contacts: 3**

**Credits: 2**

**Managing Unix/Linux Operating System [8P]:**

Creating a bash shell script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands). Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Backup schedules and methods Kernel loading, init and the inittab file, Run-levels, Run level scripts. Password file management, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user-management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users & user groups.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

- 2. Process [4P]:** starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.
- 3. Signal [4P]:** signal handling, sending signals, signal interface, signal sets.
- 4. Semaphore [6P]:** programming with semaphores (use functions semctl, semget, semop, set\_semvalue, del\_semvalue, semaphore\_p, semaphore\_v).
- 5. POSIX Threads [6P]:** programming with pthread functions (viz. pthread\_create, pthread\_join, pthread\_exit, pthread\_attr\_init, pthread\_cancel)
- 6. Inter-process communication [6P]:** pipes (use functions pipe, popen, pclose), named pipes (FIFOs, accessing FIFO), message passing & shared memory (IPC version V).

**Subject Name Object Oriented Programming LAB.**

**Subject Code: IT492**

**Contacts: 3**

**Credits: 2**

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on multithreaded programming
6. Assignments on applet programming

Note: Use Java for programming

**Physics-II Lab.**

**Code: PH-491**

**Contacts: (3P)**

**Credit: (2)**

Group 1: Experiments on Electricity and Magnetism

1. Determination of dielectric constant of a given dielectric material.
3. Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance.
4. Determination of the thermo-electric power at a certain temperature of the given thermocouple.
5. Determination of specific charge (e/m) of electron by J.J. Thomson's method.

Group 2: Quantum Physics

6. Determination of Planck's constant using photocell.
7. Determination of Lande's g factor using Electron spin resonance spectrometer.
8. Determination of Stefan's radiation constant
9. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
10. Determination of Rydberg constant by studying Hydrogen/ Helium spectrum

Group 3: Modern Physics

11. Determination of Hall co-efficient of semiconductors.
12. Determination of band gap of semiconductors.
13. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells.

a) A candidate is required to perform 3 experiments taking one from each group. Initiative should be taken so that most of the

Experiments are covered in a college in the distribution mentioned above. Emphasis should be given on the estimation of error in the data taken.

b) In addition a student should perform one more experiments where he/she will have to transduce the output of any of the above experiments or the experiment mentioned in c] into electrical voltage and collect the data in a computer using phoenix or similar interface.

c) Innovative experiment: One more experiment designed by the student or the concerned teacher or both.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

HU-481 Technical Report Writing Practice 0-0-2-2-1:

Guidelines for Course Execution:

Objectives of this Course: This course has been designed:

1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.

Detailed Course Outlines:

Technical Report Writing:

1. Report Types (Organizational / Commercial / Business / Project )
2. Report Format & Organization of Writing Materials
3. Report Writing (Practice Sessions & Workshops)

Interview Sessions;

- a) Training students to face Job Interviews confidently and successfully
- b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal

situation for effective communication

4. Presentation:

- a) Teaching Presentation as a skill
- b) Strategies and Standard Practices of Individual /Group Presentation
- c) Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids

5. Competitive Examination:

- a) Making the students aware of Provincial /National/International Competitive Examinations
- b) Strategies/Tactics for success in Competitive Examinations
- c) SWOT Analysis and its Application in fixing Target

Books – Recommended:

Nira Konar: English Language Laboratory: A Comprehensive Manual PHI Learning, 2011

D. Sudharani: Advanced Manual for Communication Laboratories & Technical Report Writing Pearson Education (W.B. edition), 2011

**Third Year First Semester**

**Subject Name: Microprocessors & Microcontrollers**

**Subject code: IT 501**

**Contacts: 3L+1T**

**Credit point: 4**

**Module -1:**[8L]:Introduction to Microcomputer based system. History of evolution of Microprocessor and Microcontrollers and their advantages and disadvantages. [1L] Architecture of 8085 Microprocessor, Pin description of 8085.[2L] Address/data bus De multiplexing , Status Signals and the control signals. [1L] Instruction set of 8085 microprocessor, Addressing modes, [3L] Timing diagram of the instructions (a few examples). [1L]

**Module -2:**[9L]: Assembly language programming with examples, Counter and Time Delays, Stack and Subroutine [6L], Interrupts of 8085 processor(software and hardware), I/O Device Interfacing-I/O Mapped I/O and Memory Mapped I/O , Serial (using SID and SOD pins and RIM, SIM Instructions) and Parallel data transfer,

**Module 3:**[10L]: The 8086 microprocessor- Architecture, Addressing modes, InterruptS [3L] Introduction to 8051 Microcontroller –Architecture, Pin Details [3L] Addressing modes, Instruction set, Examples of Simple Assembly Language.[4L]

**Module 4:**[9L] :Memory interfacing with 8085, 8086 [2L] Support IC chips- 8255 ,8251,8237/8257,8259 [4L] Interfacing of 8255 PPI with 8085 and Microcontroller 8051. [2L] Brief introduction to PIC microcontroller (16F877) [1L]

**Subject Name: Software Engineering**



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

**Subject code: IT 502**

**Contacts: 3L+1T**

**Credit point: 4**

**Module I**

Software Engineering – Objectives, Definitions, Software Process models - Waterfall Model, Prototype model, RAD, Evolutionary Model, Spiral Model (3L)

Software Project Management- Feasibility Analysis, Technical Feasibility, Project Planning, Cost- Benefit Analysis, Project Estimation Techniques, COCOMO model, Scheduling, Risk Management, Software Configuration Management [8L]

**Module II**

Structured Analysis, Context diagram and DFD, Physical and Logical DFDs, Data Modeling, ER diagrams, Software Requirements Specification (4L)

**Module III**

Design Aspects : Top-Down And Bottom-Up design; Decision tree, decision table and structured English, Structure chart, Transform analysis Functional vs. Object- Oriented approach. [4L]

**Unified Modeling Language**

Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, implementation diagram. (3L)

**Module IV**

Coding & Documentation – Structured Programming, Modular Programming, Module Relationship- Coupling, Cohesion, OO Programming, Information Hiding, Reuse, System Documentation. [6L]

Testing – Levels of Testing, Unit Testing, Black Box Testing, White Box Testing, Integration Testing, System Testing. (4L)

Software Quality, Reliability, Quality Assurance, Software Maintenance, Software Architecture. [6L]

**Reference Books:**

1. Software Engineering- Rajib Mall (PHI)
2. Software Engineering : A practitioner's approach– Pressman(TM)
3. Software Engineering Principles and Practices-Deepak Jain(Oxford)
4. Software Engineering –Agarwal and Agarwal (PHI)

**Subject Name: Design & Analysis of Algorithm**

**Subject code: IT 503**

**Contacts: 3L+1T**

**Credit point: 4**

**Complexity Analysis:** [2L]

Time and Space Complexity, Different Asymptotic notations – their mathematical significance

Algorithm Design Techniques:

**Divide and Conquer:** [3L]

Basic method, use, Examples – Binary Search, Merge Sort, Quick Sort and their complexity

Heap Sort and its complexity [1L]

**Dynamic Programming:** [3L]

Basic method, use, Examples – Matrix Chain Manipulation, All pair shortest paths, single source shortest path.

Backtracking: [2L]

Basic method, use, Examples – 8 queens problem, Graph coloring problem.

**Greedy Method:** [3L]

Basic method, use, Examples – Knapsack problem, Job sequencing with deadlines, Minimum cost spanning tree by Prim's and Kruskal's algorithm.

**Lower Bound Theory:** [1L]

$O(n \lg n)$  bound for comparison sort.

**Disjoint set manipulation:** [2L]

Set manipulation algorithm like UNION-FIND, union by rank.

**Graph traversal algorithm: Recapitulation** [1L]



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Breadth First Search (BFS) and Depth First Search (DFS) – Classification of edges - tree, forward, back and cross edges – complexity and comparison.

**String matching problem: [3L]**

Different techniques – Naive algorithm, string matching using finite automata, and Knuth, Morris, Pratt (KMP) algorithm with their complexities.

**Amortized Analysis: [3L]**

Aggregate, Accounting, and Potential Method.

**Network Flow: [3L]**

Ford Fulkerson algorithm, Max-Flow Min-Cut theorem (Statement and Illustration)

**Matrix Manipulation Algorithm: [3L]**

Strassen's matrix manipulation algorithm; application of matrix multiplication to solution of simultaneous linear equations using LUP decomposition, Inversion of matrix and Boolean matrix multiplication.

**Notion of NP-completeness: [3L]**

P class, NP class, NP hard class, NP complete class – their interrelationship, Satisfiability problem, Cook's theorem (Statement only), and Clique decision problem.

**Approximation Algorithms: [3L]**

Necessity of approximation scheme, performance guarantee, and polynomial time approximation schemes, vertex cover problem, travelling salesman problem.

**Text Book:**

1. T. H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms".
2. A. Aho, J. Hopcroft and J. Ullman "The Design and Analysis of Algorithms."
3. D.E. Knuth "The Art of Computer Programming", Vol.3.
4. Jon Kleinberg and Eva Tardos, "Algorithm Design."

**Reference:**

1. K. Mehlhorn, "Data Structures and Algorithms"- Vol.I & Vol. II.
2. S. Baase "Computer Algorithms."
3. E. Horowitz and Shani "Fundamentals of Computer Algorithms."
4. E.M. Reingold, J. Nievergelt and N. Deo- "Combinational Algorithms- Theory and Practice ", PHI, 1997.

**Subject Name: Operation Research**

**Subject code IT 504A**

**Contacts: 3L+1T**

**Credit point: 4**

**Module I**

Linear Programming Problems (LPP): Basic LPP and Applications; Various Components of LP Problem Formulation. Solution of Linear Programming Problems: Solution of LPP: Using Simultaneous Equations and Graphical Method;

Definitions: Feasible Solution, Basic and non-basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and explanation with examples. [5L]

Solution of LPP by Simplex Method; Charnes' Big-M Method; Duality Theory. Transportation Problems and Assignment Problems. [12L]

**Module II**

Network Analysis: Shortest Path: Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERT-CPM (Cost Analysis, Crashing, Resource Allocation excluded). [6L]

Inventory Control: Introduction to EOQ Models of Deterministic and Probabilistic; Safety Stock; Buffer Stock. [3L]

**Module III**

Game Theory: Introduction; 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems (statement only) and problems; Games without Saddle Point; Graphical Method; Principle of Dominance. [5L]

**Module IV**

Queuing Theory: Introduction; Basic Definitions and Notations; Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson. Queue Models: (M/M/1): ( $\infty$  / FIFO) and (M/M/1: N / FIFO) and problems. [5L]

**Text Books:**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

1. Ghosh and Chakraborty, “Linear Programming and Theory of Games”, Central Book Agency.
  2. P. M. Karak – “Linear Programming and Theory of Games”, ABS Publishing House.
  3. H. A. Taha, “Operations Research”, Pearson.
  4. Ravindran, Philips and Solberg - “Operations Research”, WILEY INDIA
- References: 1. Kanti Swaroop — “Operations Research”, Sultan Chand & Sons.
2. Rathindra P. Sen—“Operations Research: Algorithms and Applications”, PHI.
  3. R. Panneerselvam - “Operations Research”, PHI.
  4. A.M. Natarajan, P. Balasubramani and A. Tamilarasi - “Operations Research”, Pearson
  5. M. V. Durga Prasad – “Operations Research”, CENGAGE Learning.
  6. J. K. Sharma - “Operations Research”, Macmillan Publishing Company.

**Subject Name: Data Communication**

**Subject code IT 504B**

**Contacts: 3L+1T**

**Credit point: 4**

**Module I:**

Data Communication Fundamentals: Layered Network Architecture; Mode of communication, topology, Data and Signal; Transmission Media: Guided, Unguided; Transmission Impairments and Channel Capacity; Transmission of Digital Data: Interfaces-DTE-DCE, MODEM, Cable MODEM; The telephone network system and DSL technology; [10L].

**Module II:**

Data Link Control: Interfacing to the media and synchronization; Error Control: Error Detection and Correction (Single bit, Multi bit); Flow control: Stop-and-Wait ARQ, Go-Back-N ARQ, Selective-Repeat ARQ Data Link Protocols: Synchronous, Asynchronous Protocols, Point-to-Point Protocol (PPP). [12L]

**Module III:**

Switching Communication Networks: Circuit switching; Packet switching; Routing in packet switched networks; X.25; Frame Relay; ATM, SONET. [07L]

**Module IV:**

Communication Network: Topology; Medium Access Control Techniques; IEEE CSMA/CD based LANs; IEEE Ring LANs; High Speed LANs – Token Ring Based(FDDI); High Speed LANs – CSMA/CD based; Wireless LANs: Bluetooth; [07L] Network Security: Introduction to Cryptography; User Authentication; Firewalls. [04L]

**References:** a) Data Communications and Networking, Behrouz A. Forouzan, TMH b) Data and Computer Communications, William Stallings, PHI c) Computer Networks, Andrew S. Tanenbaum, PHI

**Subject Name: Digital Signal Processing**

**Subject code IT 504C**

**Contacts: 3L+1T**

**Credit point: 4**

**MODULE – I:** [9L] Discrete-time signals: Concept of discrete-time signal, basic idea of sampling and reconstruction of signal, sampling theorem, sequences – periodic, energy, power, unit-sample, unit-step, unit-ramp, real & complex exponentials, arithmetic operations on sequences. 3L LTI Systems: Definition, representation, impulse response, derivation for the output sequence, concept of convolution, graphical, analytical and overlap-add methods to compute convolution supported with examples and exercises, properties of convolution, interconnections of LTI systems with physical interpretations, stability and causality conditions, recursive and non-recursive systems. [6L]

**MODULE –II:** [11L] Z-Transform: Definition, mapping between s-plane and z-plane, unit circle, convergence and ROC, properties of Z-transform, Z-transform on sequences with examples and exercises, characteristic families of signals along with ROCs, convolution, correlation and multiplication using Z-transform, initial value theorem, Parseval’s relation, inverse Z-transform by contour integration, power series & partial-fraction expansions with examples and exercises. 6L Discrete Fourier Transform: Concept and relations for DFT/IDFT, Twiddle factors and their properties, computational burden on direct DFT, DFT/IDFT as linear transformations, DFT/IDFT matrices, computation of DFT/IDFT by matrix method, multiplication of DFTs, circular convolution, computation of circular convolution by graphical, DFT/IDFT and matrix methods, linear filtering using DFT,



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

aliasing error, filtering of long data sequences – Overlap-Save and Overlap-Add methods with examples and exercises. 5L Fast Fourier Transform: Radix-2 algorithm, decimation-in-time, decimation-in-frequency algorithms, signal flow graphs, Butterflies, computations in one place, bit reversal, examples for DIT & DIF FFT Butterfly computations and exercises. 4L **MODULE – III:** [5L] Filter Design: Basic concepts of IIR and FIR filters, difference equations, design of Butterworth IIR analog filter using impulse invariant and bilinear transforms, design of linear phase FIR filters, no. of taps, rectangular, Hamming and Blackman windows. 5L

**MODULE – IV:** [7L ] Digital Signal Processor: Elementary idea about the architecture and important instruction sets of TMS320C 5416/6713 processor, writing of small programs in Assembly Language. 4L FPGA: Architecture, different sub-systems, design flow for DSP system design, mapping of DSP algorithms onto FPGA. [3L ]

**TEXT BOOKS:**

1. Digital Signal Processing – Principles, Algorithms and Applications, J.G.Proakis & D.G. Melonakos, Pearson Ed.
2. Digital Signal processing – A Computer Based Approach, S.K.Mitra, TMH Publishing Co.
3. Digital Signal Processing Signals, Systems and Filters, A. Antoniou, TMH Publishing Co.
4. VLSI Digital Signal Processing Systems Design and Implementation, Wiley International Publication.
5. Digital Signal Processing with Field Programmable Gate Arrays, U.Meyer-Baese, Springer.

**REFERENCE BOOKS:**

- 2 Digital Signal Processing, P. Rameshbabu, Scitech Publications (India).
- 3 Digital Signal Processing, S.Salivahanan, A.Vallabraj& C. Gnanapriya, TMH Publishing Co.
- 4 Digital Signal Processing; A Hands on Approach, C. Schuler &M.Chugani, TMH Publishing Co.
- 5 Digital Signal Processing, A. NagoorKani, TMH Education
- 6 Digital Signal Processing S. Poornachandra& B. Sasikala, MH Education
8. Digital Signal Processing; Spectral Computation and Filter Design Chi-Tsong Chen, Oxford University Press
- 8 Texas Instruments DSP Processor user manuals and application notes.
- 9 Digital Signal Processing – A practical Approach (second Edition) – Emmanuel C. Ifeacher& Barrie W. Jervis, Pearson Education
- 10 Xilinx FPGA user manuals and application notes.

**Subject Name: Circuit Theory & Network**

**Subject code IT 504D**

**Contacts: 3L+1T**

**Credit point: 4**

Resonant Circuits: Series and Parallel resonance [1L], (\*)Impedance and Admittance Characteristics, Q-factor, Half Power Points, Bandwidth [2L], Phasor diagrams, Transform diagrams [1L],

Practical resonant and series circuits, Solution of Problems [Tutorial - 1L].

Mesh Current Network Analysis: Kirchoff's Voltage law, Formulation of mesh equations [1L]

Solution of mesh equations by Cramer's rule and matrix method [2L], Driving point impedance, Transferimpedance [1L], Solution of problems with DC and AC sources [1L].

Node Voltage Network Analysis: Kirchoff's Current law, Formulation of Node equations and solutions [2L], driving point admittance, transfer Admittance [1L], Solution of problems with DC and AC sources [1L].

Network Theorems: Definition and Implication of Superposition Theorem [1L], Thevenin's theorem, Norton's theorem [1L], Reciprocity theorem, Compensation theorem [1L], maximum Power Transfer theorem [1L], Millman's theorem, Star delta transformations [1L], Solutions and problems with DC and AC sources [1L].

Graph of Network: Concept of Tree and Branch [1L], tree link, junctions, (\*) Incident matrix, Tie set matrix [2L], Determination of loop current and node voltages [2L].

Coupled Circuits: Magnetic coupling, polarity of coils, polarity of induced voltage, concept of Self and mutual inductance, Coefficient of coupling, Solution of Problems.

Circuit transients: DC transients in R-L and R-C Circuits with and without initial charge,(\*) R-L-C Circuits, AC Transients in sinusoidal R-L, R-C and R-L-C Circuits, Solution of Problems [2L].

Laplace transform: Concept of Complex frequency [1L], transform of f(t) into F(s) [1L], transform of step, exponential, over damped surge, critically damped surge, damped and un-damped sine functions [2L],

properties of Laplace transform [1L], linearity, real differentiation, real integration, initial value theorem and



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

final value theorem [1L], inverse Laplace transform [1L], application in circuit analysis, Partial fraction expansion, Heaviside's expansion theorem, Solution of problems [1L].

(\*) Laplace transform and Inverse Laplace transform [2L].

Two Port Networks: Relationship of Two port network variables, short circuit admittance parameters, open circuit impedance parameters, transmission parameters, relationship between parameter sets, network functions for ladder network and general network.

**Text Books:**

1. Valkenburg M. E. Van, "Network Analysis", Prentice Hall./Pearson Education
2. Hayt "Engg Circuit Analysis" 6/e Tata McGraw-Hill
3. D.A.Bell- Electrical Circuits- Oxford

**Reference Books:**

1. A.B.Carlson-Circuits- Cengage Learning
2. John Bird- Electrical Circuit Theory and Technology- 3/e- Elsevier (Indian Reprint)
3. Skilling H.H.: "Electrical Engineering Circuits", John Wiley & Sons.
4. Edminister J.A.: "Theory & Problems of Electric Circuits", McGraw-Hill Co.
5. Kuo F. F., "Network Analysis & Synthesis", John Wiley & Sons.
6. R.A.DeCarlo&P.M.Lin- Linear Circuit Analysis- Oxford
7. P.RameshBabu- Electrical Circuit Analysis- Scitech
8. Sudhakar: "Circuits & Networks: Analysis & Synthesis" 2/e TMH
9. M.S.Sukhija&T.K.NagSarkar- Circuits and Networks-Oxford
10. Sivandam- "Electric Circuits and Analysis", Vika s
11. V.K. Chandna, "A Text Book of Network Theory & Circuit Analysis", Cyber Tech
12. Reza F. M. and Seely S., "Modern Network Analysis", Mc.GrawHill .
13. M. H. Rashid: "Introduction to PSpice using OrCAD for circuits and electronics", Pearson/PHI
14. Roy Choudhury D., "Networks and Systems", New Age International Publishers.
15. D.Chattopadhyay and P.C.Rakshit: "Electrical Circuits" New Age

**Subject Name: Computer Architecture**

**Subject code IT 505**

**Contacts: 3L+1T**

**Credit point: 4**

**Pre-requisite:** Concept of basic components of a digital computer, Basic concept of Fundamentals & Program structures. Basic number systems, Binary numbers, representation of signed and unsigned numbers, Binary Arithmetic as covered in Basic Computation & Principles of Computer Programming Second semester, first year. Boolean Algebra, Karnaugh Maps, Logic Gates – covered in Basic Electronics in First year.

**Module – 1:**[8L]

Basic organization of the stored program computer and operation sequence for execution of a program. Role of operating systems and compiler/assembler. Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format. Instruction sets and addressing modes. [7L]

Commonly used number systems. Fixed and floating point representation of numbers. [1L]

**Module – 2:** [8L]

Overflow and underflow. Design of adders - ripple carry and carry look ahead principles. [3L]

Design of ALU.[1L] Fixed point multiplication -Booth's algorithm.[1L] Fixed point division - Restoring and non-restoring algorithms.[2L] Floating point - IEEE 754 standard. [1L]

**Module – 3:** [10L]

Memory unit design with special emphasis on implementation of CPU-memory interfacing. [2L] Memory organization, static and dynamic memory, memory hierarchy, associative memory.[3L] Cache memory, Virtual memory. Data path design for read/write access. [5L]

**Module – 4:** [10L]

Design of control unit - hardwired and micro programmed control. [3L]

Introduction to instruction pipelining. [2L] Introduction to RISC architectures. RISC vs. CISC architectures.[2L]

I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA. [3L]



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**Learning Outcome:** Additional Tutorial Hours will be planned to meet the following learning outcome. Through this course, the students will be exposed to extensive development and use of computer organization based concepts for the future knowledge outcome of Advanced Computer Architecture offered in subsequent semester. The students will be able to understand different instruction formats, instruction sets, I/O mechanism. Hardware details, memory technology, interfacing between the CPU and peripherals will be transparent to the students. Students will be able to design hypothetical arithmetic logic unit.

**Text Book:**

1. Mano, M.M., “Computer System Architecture”, PHI.
2. Behrooz Parhami “ Computer Architecture”, Oxford University Press Reference Book:
3. Hayes J. P., “Computer Architecture & Organisation”, McGraw Hill,
4. Hamacher, “Computer Organisation”, McGraw Hill,
5. N. senthil Kumar, M. Saravanan, S. Jeevananthan, “Microprocessors and Microcontrollers” OUP
6. Chaudhuri P. Pal, “Computer Organisation & Design”, PHI,
7. P N Basu- “Computer Organization & Architecture” ,Vikas Pub

**Subject Name: Microprocessors & Microcontrollers Lab**

**Subject code IT 591**

**Contacts: 3L**

**Credit point: 2**

**Module 1: [ 3P]**

Study of

Prewritten programs on 8085 trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). Or, Familiarization with 8085 simulator on PC. Programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator

**Module 2:[18P]**

Programming using kit or Simulator for:

1. Table look up
2. Copying a block of memory
3. Shifting a block of memory
4. Packing and unpacking of BCD numbers
5. Addition of BCD numbers
6. Binary to ASCII conversion and vice-versa (Using Subroutine Call)
07. BCD to Binary Conversion and vice-versa vii) String Matching, Multiplication

**Module 3: [ 3P]**

Program

using IN/OUT instructions and 8255 PPI on the trainer kit e.g. subroutine for delay, Glowing all the LEDs one by one with particular delay , Reading switches state and glowing LEDs accordingly.

**Module 4: [ 3P]**

Serial communication between two trainer kits.

**Module 5: [ 3P]**

Study of Prewritten programs on 8051 Microcontroller Kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). Or, Familiarization with 8051 Simulator on PC. Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical).

**Subject Name: Operation Research LAB**

**Subject code IT 594A**

**Contacts: 3L**

**Credit point: 2**

**Software based lab using C /C++**

1. Assignment on Transportation problem.
2. Assignment on Assignment problem
3. Assignment on Duality
4. Assignment on Simplex method (Including Charns' Big-M Method)
5. Assignment on Shortest Path by using Dijkstra's or Floyd's Algorithm
6. Assignment on Maximal Flow Problem (Ford-Fulkerson Method).



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

7. Assignment on PERT/CPM
8. Familiarization with O.R package: TORA

**Data Communication Lab**

**Code: IT594B**

**Contact: 3P**

**Credits: 2**

**List of Experiments**

1. To study different types of transmission media
2. Familiarization with Networking cables (CAT5, UTP), Connectors (RJ45, T-connector), Hubs, Switches. Configuration of a HUB/Switch.
3. PC-to-PC Communication with the Data Communication Trainers for File Transfer. Error detection codes, Data Encryption etc.
4. Experiments using LAN Trainer kit for Point-to-Point Communication, Multicast/Broadcast Communication Data Encryption and security protocols
5. To make inter-connections in cables for data communication in LAN and install LAN using (a) Tree topology (b) STAR topology (c) Bus topology (d) Token-Ring topology
6. Study of MODEMS: (a) configure the modem of a computer (b) Study Serial Interface RS-232 and its applications (c) Study the Parallel Interface and its applications

**Digital Signal Processing Lab**

**Code: IT594C**

**Contact: 3P**

**Credits: 2**

**Simulation Laboratory using standard Simulator:**

1. Sampled sinusoidal signal, various sequences and different arithmetic operations.
2. Convolution of two sequences using graphical methods and using commands- verification of the properties of convolution.
3. Z-transform of various sequences – verification of the properties of Z-transform.
4. Twiddle factors – verification of the properties.
5. DFTs / IDFTs using matrix multiplication and also using commands.
6. Circular convolution of two sequences using graphical methods and using commands, differentiation between linear and circular convolutions.
7. Verifications of the different algorithms associated with filtering of long data sequences and Overlap –add and Overlap-save methods.

**Circuits and Networks Lab**

**Code: IT594D**

**Contacts: 3P**

**Credits: 2**

1. Characteristics of Series & Parallel Resonant circuits
  2. Verification of Network Theorems
  3. Transient Response in R-L & R-C Networks ; simulation / hardware
  4. Transient Response in RLC Series & Parallel Circuits & Networks ; simulation / hardware
  5. Determination of Impedance (Z), and Admittance (Y) parameters of Two-port networks
  6. Generation of periodic, exponential, sinusoidal, damped sinusoidal, step, impulse, and ramp signals using MATLAB
  7. Representation of Poles and Zeros in s-plane, determination of partial fraction expansion in s-domain
  8. and cascade connection of second-order systems using MATLAB
  9. Determination of Laplace Transform, different time domain functions, and Inverse Laplace
  10. Transformation using MATLAB
- Note: An Institution / college may opt for some other hardware or software simulation wherever possible in place



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

Syllabus for UG Classes effective from First July,2013

of MATLAB

**Subject Name: computer architecture lab**

**Subject code IT 595**

**Contacts: 3L**

**Credit point: 2**

1. Familiarity with IC-chips, e.g. a) Multiplexer , b) Decoder, c) Encoder b) Comparator Truth Table verification and clarification from Data-book.
2. Design an Adder/Subtractor composite unit .
3. Design a BCD adder.
4. Design of a ‘Carry-Look-Ahead’ Adder circuit.
5. Use a multiplexer unit to design a composite ALU .
6. Use ALU chip for multibit arithmetic operation.
7. Implement read write operation using RAM IC.
8. (a) & (b) Cascade two RAM ICs for vertical and horizontal expansion.

**IT-581 Seminar 0-0-3-3-2:**

Each and every student have to appear in Group Discussion, Self Introduction, Technical seminar & non-technical seminar on very recent topics.

**Third year second semester**

Paper Name:-	PRINCIPLE OF MANAGEMENT
Paper Code:-	HU 601
Contacts:-	3-0-0-3
Credit Point:-	3
<p>Basic concepts of management: Definition – Essence, Functions, Roles, Level.            Functions of Management: Planning – Concept, Nature, Types, Analysis, Management by objectives;            Organization Structure – Concept, Structure, Principles, Centralization, Decentralization, Span of Management;            Organizational Effectiveness.            Management and Society– Concept, External Environment, CSR, Corporate Governance, Ethical Standards.            People Management– Overview, Job design, Recruitment &amp; Selection, Training &amp; Development, Stress Management. Managerial Competencies– Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, Entrepreneurship            Leadership: Concept, Nature, Styles.            Decision making: Concept, Nature, Process, Tools &amp; techniques.            Economic, Financial &amp; Quantitative Analysis– Production, Markets, National Income, Accounting, Financial Function &amp; Goals, Financial Statement &amp; Ratio Analysis, Quantitative Methods – Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control.            Customer Management– Market Planning &amp; Research, Marketing Mix, Advertising &amp; Brand Management.            Operations &amp; Technology Management– Production &amp; Operations Management, Logistics &amp; Supply Chain Management, TQM, Kaizen &amp; Six Sigma, MIS.</p>	
<p>Text Books:            1. Management: Principles, Processes &amp; Practices – Bhat, A &amp; Kumar, A (OUP).            2. Essentials for Management – Koontz, Revised edition, Tata McGraw Hill (TMH)            3. Management – Stoner, James A. F. (Pearson)            4. Management - Ghuman, Tata McGraw Hill(TMh)</p>	

**Subject Name: Database Management System**

**Subject code IT 601**

**Contacts: 3L+1T**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

**Credit point: 4**

**Introduction [4L]** Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS.

**Entity-Relationship Model [6L]** Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

**Relational Model [5L]** Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database.

**SQL and Integrity Constraints [8L]** Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Database security application development using SQL, Stored procedures and triggers.

**Relational Database Design [9L]** Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF

**Internals of RDBMS [7L]** Physical data structures, Query optimization: join algorithm, statistics and cost bas optimization. Transaction processing, Concurrency control and Recovery Management: transaction model properties, state serializability, lock base protocols, two phase locking.

**File Organization & Index Structures [6L]** File & Record Concept, Placing file records on Disk, Fixed and variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree .

**Text Books:**

1. Henry F. Korth and Silberschatz Abraham, “Database System Concepts”, Mc.Graw Hill.
2. Elmasri Ramez & Novathe Shamkant, “Fundamentals of Database Systems”, Benjamin Cummings Pub. Co.

**Subject Name: Computer Networks**

**Subject code IT 602**

**Contacts: 3L+1T**

**Credit point: 4**

**Module I**

**Overview of Data Communication and Networking:** [4L]

Introduction; Data communications: components, data representation (ASCII,ISO etc.), direction of data flow (simplex, half duplex, full duplex); network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN); Internet: brief history, Protocols and standards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

**Physical Level: [6L]**

Overview of data(analog & digital), signal(analog & digital), transmission (analog & digital) & transmission media (guided & unguided); Circuit switching: time division & space division switch, TDM bus; Telephone Network;

**Module II**

**Data link Layer:** [5L]

Types of errors, framing(character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC;

**Medium Access sub layer:** [5L]

Point to Point Protocol, LCP, NCP, Token Ring; Reservation, Polling, Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA Traditional Ethernet, fast Ethernet(in brief);

**Module III**

**Network layer:** [8L]

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing: IP addressing, subnetting; Routing: techniques, static vs. dynamic routing , Unicast Routing Protocols: RIP, OSPF, BGP; Other Procols: ARP, IP, ICMP, IPV6;

**Transport layer:** [4L]

Process to Process delivery; UDP; TCP; Congestion Control: Open Loop, Closed Loop choke packets; Quality of service: techniques to improve QoS: Leaky bucket algorithm, Token bucket algorithm,



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**Module IV**

**Application Layer**

[5L]

Introduction to DNS, SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography (Public, Private Key based), Digital Signature, Firewalls.

**Text Books:**

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.)” – TMH
2. A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
3. W. Stallings – “Data and Computer Communications (5th Ed.)” – PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI
6. Miller, data Communication & Network, Vikas
7. Miller, Digital & Data Communication, Jaico
8. Shay, Understanding Data Communication & Network, Vikas.

**Reference Books:**

1. Kurose and Rose – “Computer Networking -A top down approach featuring the internet” – Pearson
2. Leon, Garica, Widjaja – “Communication Networks” – TMH
3. Walrand – “Communication Networks” – TMH.
4. Comer – “Internetworking with TCP/IP, vol. 1, 2, 3 (4th Ed.)” – Pearson Education/PHI

**Subject Name: Multimedia**

**Subject code IT 603**

**Contacts: 3L**

**Credit point: 3**

Introduction [2L]

Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications

Text and Audio [6L]

Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI

Image and Video (8L)

Image: Formats, Image Color Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.

Synchronization [4L]

Temporal relationships, synchronization accuracy specification factors, quality of service

Storage models and Access Techniques [(4L]

Magnetic media, optical media, file systems (traditional, multimedia) Multimedia devices – Output devices, CD-ROM, DVD, Scanner, CCD

Image and Video Database [8L]

Image representation, segmentation, similarity based retrieval, image retrieval by color, shape and texture; indexing- k-d trees, R-trees, quad trees; Case studies- QBIC, Virage. Video Content, querying, video segmentation, indexing

Document Architecture and Content Management [9L]

Content Design and Development, General Design Principles Hypertext: Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing.

Case study of Applications Multimedia Applications [4L]

Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

**Books:**

1. Ralf Steinmetz and Klara Nahrstedt, Multimedia: Computing, Communications & Applications, Pearson Ed.
2. Nalin K. Sharda, Multimedia Information System, PHI.
3. Fred Halsall, Multimedia Communications, Pearson Ed.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

4. Koegel Buford, Multimedia Systems, Pearson Ed.
5. Fred Hoffstetter, Multimedia Literacy, McGraw Hill.
6. Ralf Steinmetz and Klara Nahrstedt, Multimedia Fundamentals: Vol. 1- Media Coding and Content Processing, PHI.
7. J. Jeffcoate, Multimedia in Practice: Technology and Application, PHI.
8. Prabhat K. Andleigh & Kiran Thakrar, Multimedia Systems Design, PHI.

**Subject Name: Artificial Intelligence**

**Subject code IT 604A**

**Contacts: 3L**

**Credit point: 3**

**Introduction [2] :** Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem.

**Intelligent Agents [2] :** Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.

**Problem Solving [2] :**

Problems, Problem Space & search: Defining the problem as state space search, production system, problem, characteristics, issues in the design of search programs.

**Search techniques [5] :**

Solving problems by searching: problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies.

**Heuristic search strategies [4]:**

Greedy best-first search, A\* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems.

**Adversarial search [3]:** Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.

**Knowledge & reasoning [3L]:** Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation.

**Using predicate logic [2 L] :**

Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

**Representing knowledge using rules [3 L]:**

Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.

**Probabilistic reasoning [3 L] :**

Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.

**Planning [2 L] :** Overview, components of a planning system, Goal stack planning, Hierarchical planning, other planning techniques.

**Natural Language processing [2 L] :** Introduction, Syntactic processing, semantic analysis, discourse & pragmatic processing.

**Learning [3 L] :** Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning.

**Expert Systems [2 L] :** Representing and using domain knowledge, expert system shells, and knowledge acquisition. Basic knowledge of programming language like Prolog & Lisp. [3]

**Books:**

1. Artificial Intelligence, Ritch & Knight, TMH
2. Artificial Intelligence and Soft Computing, Amit Konar, CRC
3. Artificial Intelligence A Modern Approach, Stuart Russel Peter Norvig Pearson
4. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
5. Poole, Computational Intelligence, OUP
6. Logic & Prolog Programming, Saroj Kaushik, New Age International



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

7. Expert Systems, Giarranto, VIKAS
8. Artificial Intelligence, Russel, Pearson

**Subject Name: System Software and Administration**

**Subject code IT 604B**

**Contacts: 3L**

**Credit point: 3**

Note I: There will be one objective type question comprising 10 numbers spread over the entire syllabus and each carrying one mark. Note II: Two questions are to be set from each module out of which five questions are to be answered taking at least one from each module. All questions carry equal marks.

**Module I :**

System Software [15]: Assemblers: General design procedures, Design of two pass assemblers, Cross Assemblers, Macro Processors – Features of a macro facility, (macro instruction arguments, conditional macro expansion, macro calls within macros), Implementation of a restricted facility : A two pass algorithm; Macro Assemblers. Loader schemes: Compile and go loaders, absolute loaders, relocating loader, Linking, Reallocation- static & dynamic linking, Direct linking loaders, Binders, Overlays, dynamic binders; Working principle of Editors, Debuggers.

**System Administration**

**Module II**

Introduction: [3L] : Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The scheduler, init and the inittab file, Run-levels, Run level scripts.

Managing User Accounts: [2L] : Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users.

Managing Unix File Systems: [2L] Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making filesystems, Superblock, I-nodes, Filesystem checker, Mounting filesystems, Logical Volumes, Network File systems, Boot disks

Configuring the TCP/IP Networking : [4L] Kernel Configuration; Mounting the /procFilesystem, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

**Module III**

TCP/IP Firewall : [6L] Methods of Attack, What Is a Firewall? What Is IP Filtering? Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IP Accounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IP Accounting Results

IP Masquerade and Network Address Translation : [4L] Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade.

**Module IV**

The Network Information System : [3L] Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security.

Network file system: [3L] Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.

System Backup & Recovery: [3L] Log files for system and applications; Backup schedules and methods (manual and automated).

**Text Books:**

1. L.L. Beck – “System Software “ (3rd Ed.)- Pearson Education
2. Michel Ticher – “PC System Programming” , Abacus.
3. Kirch – “ Linux network Administrator’s guide (2nd Ed.)” – O’Rielly
4. Maxwell – “Unix system administration” - TMH
5. Limoncelli – “The Practice of System & Network Administration”-Pearson
6. Wells, LINUX Installation & Administration, Vikas

**Reference Books:**

1. W. R. Stevens – “Unix network programming, vol. 1(2nd Ed.)” – Pearson Education/PHI
2. W. R. Stevens – “TCP/IP illustrated, vol. 1” – PHI/Pearson Education



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

3. Comer – “Internetworking with TCP/IP, vol. 1(4th Ed.)” – Pearson Education/PHI

4. E. Nemeth, G. Snyder, S. Seebass, T. R. Hein – “ Unix system administration handbook” – Pearson

**Subject Name: Programming Practices using C++**

**Subject code IT 604C**

**Contacts: 3L**

**Credit point: 3**

**Introduction [3L]:** Programming paradigms, Language translator, Basics of OOP, Structure of C++ program, Class and object, Abstraction and encapsulation, Polymorphism, Inheritance, Static and dynamic binding.

**Declaration, Expression and statements [4L]:** Data types, Variables, Constants, Operator and expression, Operator precedence and associativity. Statements: Labelled, Expression, Compound, Control, Jump, Declaration, Try-throw-catch.

**Array, pointer and function [4L]:** Array, Addresses, Pointer. Function: Declaration, Definition and call, Inline function, Main function argument, Reference variable, Function overloading, Default argument, Parameter passing, Recursion, Scope of variable, Return-by-value and Return-by-reference, Pointer to function

**Data abstraction through classes and user defined data types [6L]:** Class, Members, Constructor and destructor, Copy constructor. Dynamic memory management: Operators new and delete, Malloc and free, Static member, Scope of class names, Scope of variables.

**Operator Overloading [5L]:** Overloading unary and binary operator, Overloaded function calls, Subscripting, class member access, Non-member operator, New and delete, Cast operator.

**Class relationships [6L]:** Introduction, Polymorphism, Coercion, Overloading, Parametric and inclusion polymorphism. Inheritance: direct and indirect superclasses, Multiple inheritance, Virtual base class, Friend, Virtual function, Abstract class, Overriding and hiding, Dynamic binding of functions, Virtual destructor and operators.

**Template and Exception Handling [5L]:** Class template, Member function inclusion, Function template, Specialization, Inheritance, Namespace. Concept of exception handling, Catch block, Nested try-catch block, Condition expression in throw expression, Constructor & destructor, Runtime standard exception

**Standard Library in C++ [3L]:** Standard library function, Input and output, Iostream class hierarchy, Class ios, Other stream classes.

**Object oriented design and modelling [4L]:** Software development, Qualities of software system, Software architecture, Process life cycle, phases, Modularity, OO methodology, Modeling, UML overview, Object oriented design patterns.

**Textbooks/References:**

1. Schildt, H., The Complete Reference C++, McGraw – Hill.
2. C++ object oriented programming paradigm, Debasish Jana, PHI
3. Pooley, R and P. Stevens, Using UML , Addison-Wesley.
4. Programming In C++, Y.I. Shah and M.H. Thaker, ISTE/EXCEL BOOKS
5. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
6. Rajaram: Object Oriented Programming and C++, New Age International

**Subject name: Information Theory & Coding**

**Subject code :IT-604D**

**Contacts: 3L**

**Credits- 3**

**Source Coding [7L]:** Uncertainty and information, average mutual information and entropy, information measures for continuous random variables, source coding theorem, Huffman codes.

**Channel Capacity And Coding [7L]:** Channel models, channel capacity, channel coding, information capacity theorem, The Shannon limit.

**Linear And Block Codes For Error Correction [8L];**

Matrix description of linear block codes, equivalent codes, parity check matrix, decoding of a linear block code, perfect codes, Hamming codes.

**Cyclic Codes [7L]:** Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, Golay codes.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**BCH Codes [8L]:** Primitive elements, minimal polynomials, generator polynomials in terms of minimal polynomials, examples of BCH codes.

**Convolutional Codes [8L]:** Tree codes, trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, the generating function, matrix representation of convolutional codes, decoding of convolutional codes, distance and performance bounds for convolutional codes, examples of convolutional codes, Turbo codes, Turbo decoding.

**Books**

1. Information theory, coding and cryptography - Ranjan Bose; TMH.
2. Information and Coding - N Abramson; McGraw Hill.
3. Introduction to Information Theory - M Mansurpur; McGraw Hill.
4. Information Theory - R B Ash; Prentice Hall.
5. Error Control Coding - Shu Lin and D J Costello Jr; Prentice Hall.

**Subject Name: Distributed Operating System**

**Subject code IT 605A**

**Contacts: 3L**

**Credit point: 3**

**Introduction to Distributed System [2]:** Introduction, Examples of distributed system, Resource sharing, Challenges

**Operating System Structures: [3] :** Review of structures: monolithic kernel, layered systems, virtual machines. Process based models and client server architecture; The micro-kernel based client-server approach.

**Communication [4] :** Inter-process communication, Remote Procedure Call, Remote Object Invocation, Tasks and Threads. Examples from LINUX, Solaris 2 and Windows NT.

**Theoretical Foundations: [2] :** Introduction. Inherent Limitations of distributed Systems. Lamport's Logical clock.

**Global State Distributed Mutual Exclusion:[4] :** Classification of distributed mutual exclusion algorithm. NonToken based Algorithm: Lamport's algorithm, Ricart-Agrawala algorithm. Token based Algorithm: Suzuki-Kasami's broadcast algorithm.

**Distributed Deadlock Detection: [4]:** Deadlock handling strategies in distributed systems. Control organizations for distributed deadlock detection. Centralized and Distributed deadlock detection algorithms: Completely Centralized algorithms, path pushing, edge chasing, global state detection algorithm.

**Protection and Security: [4] :** Requirements for protection and security regimes. The access matrix model of protection. System and user modes, rings of protection, access lists, capabilities. User authentication, passwords and signatures. Use of single key and public key encryption.

**Distributed file systems: [6]:** Issues in the design of distributed file systems: naming, transparency, update semantics and fault resilience. Use of the Virtual File System layer. Examples of distributed systems including Sun NFS, the Andrew filestore, CODA file system and OSF DCE

**Distributed Shared Memory: [4] :** Architecture and motivations. Algorithms for implementing DSM.

**Memory Coherence CORBA: [3] :** The Common Object Request Broker Architecture model and software and its relationship to Operating Systems.

**Books:**

1. Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems Principles and Paradigms, PHI
2. Singhal, Mukesh & Shivaratri N. G., Advanced Concepts in Operating Systems, TMH
3. Tanenbaum, A. S. Distributed Operating Systems, (ISBN 0-131-439-340), Prentice Hall 199
4. Tanenbaum, A. S. Modern Operating Systems, 2nd Edition (ISBN 0-13-031358-0), Prentice Hall 2001.
5. Bacon, J., Concurrent Systems, 2nd Edition, (ISBN 0-201-177-676), Addison Wesley 1998.
6. Silberschatz, A., Galvin, P. and Gagne, G., Applied Operating Systems Concepts, 1st Ed. Wiley 2000.
7. Coulouris, G. et al, Distributed Systems: Concepts and Design, 3rd Ed, (ISBN 0-201- 61918-0), Addison Wesley
8. Galli, D.L., Distributed Operating Systems: Concepts and Practice (ISBN 0-13-079843-6), Prentice-Hall 2000.

**Subject Name: Discrete Mathematics**

**Subject code IT 605B**

**Contacts: 3L**



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

**Credit point: 3**

**Module I:**

**Introduction to Propositional Calculus:** Propositions, Logical Connectives, Conjunction, Disjunction, Negation and their truth table. Conditional Connectives, Implication, Converse, Contrapositive, Inverse, Bi conditional statements with truth table, Logical Equivalence, Tautology, Normal forms-CNF, DNF; Predicates and Logical Quantifications of propositions and related examples. [10L]

**Module II:**

Theory of Numbers: Well Ordering Principle, Divisibility theory and properties of divisibility; Fundamental theorem of Order, Relation and Lattices: POSET, Hasse Diagram, Minimal, Maximal, Greatest and Least elements in a POSET, Lattices and its properties, Principle of Duality, Distributive and Complemented Lattices. 10L

**Module III:**

Counting Techniques: Permutations, Combinations, Binomial coefficients, Pigeon-hole Principle, Principles of inclusion and exclusions; Recurrence relations: Formulation/Modelling of different counting problems in terms of recurrence relations, Solution of linear recurrence relations with constant coefficients (upto second order) by (i) The iterative method (ii) Characteristic roots method (iii) Generating functions method. [10L]

**Module IV:**

Graph Coloring: Chromatic Numbers and its bounds, Independence and Clique Numbers, Perfect Graphs-Definition and examples, Chromatic polynomial and its determination, Applications of Graph Coloring.

Matchings: Definitions and Examples of Perfect Matching, Maximal and Maximum Matching, Hall's Marriage Theorem (Statement only) and related problems. [6L]

**Texts:**

1. Russell Merris, Combinatorics, Wiley-Interscience series in Discrete Mathematics and Optimisation
2. N. Chandrasekaran and M. Umaparvathi, Discrete Mathematics, PHI
3. Gary Haggard, John Schlipf and Sue Whitesides, Discrete Mathematics for Computer Science, CENGAGE Learning
4. Gary Chartrand and Ping Zhang – Introduction to Graph Theory, TMH
5. Sharma, Discrete Mathematics, Macmillan
6. Winfried Karl Grassmann and Jean-Paul Tremblay, Logic and Discrete Mathematics, PEARSON.
7. S. K. Chakraborty and B. K. Sarkar, Discrete Mathematics, OXFORD University Press.
8. Douglas B. West, Introduction to graph Theory, PHI

**Subject Name: ERP**

**Subject code IT 605C**

**Contacts: 3L**

**Credit point: 3**

**Module 1: Overview of ERP (Lectures : 9)**

**1. The evolution of ERP systems: A historical perspective :** Evolution through Payroll system, Inventory Control system, Materials Requirement Planning (MRP I) system, Manufacturing Resource Planning (MRP II) system, Their advantages and disadvantages. Definition and Concept of ERP, Business reasons for rise and popularity of ERP system - Benefits of an ERP system

**2. Business processes supported by ERP systems:** Various business functions in an Organization – Purchasing, Materials Management, Manufacturing, Sales & Distribution, Plant Maintenance, Quality Management, Finance & Accounting including Costing, Human Resources etc.

ERP market place – SAP, Oracle, PeopleSoft, JD Edwards, Baan, Microsoft's suit of products etc.

Business modules in these ERP packages – a brief comparative description of business function modules and sub-modules. Overview of key end-to-end business processes supported in two major ERP systems (preferably SAP and Oracle) – Order to Cash, Procure to Pay, Plan to Produce and Dispatch.

**Module 2 : Information Technology and ERP systems (Lectures : 9)**

**1. The evolution of Information Technology (IT): A historical perspective :** Evolution of computer generations (hardware and software) – Operating systems, File systems to Database Management systems, Communication Networks. Enabling of ERP systems by IT evolution.

**2. The evolution of ERP systems architecture :** Client-Server based architecture, Multi-Tier architecture –



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Presentation layer, Application layer, and Database layer (On-line Transaction Processing – OLTP). Brief discussion on Extended ERP systems - Web-enabled ERP architecture, Service-Oriented Architecture and Cloud Computing. Open Source ERP.

**3. Related technology concepts :** ERP and Supply Chain Management (SCM), and Customer Relationship Management (CRM), ERP and Business Intelligence (some of the popular tools like Cognos, Business Objects should be mentioned), ERP and Data warehousing (Data Mart, Data Mining and On-line Analytical Processing - OLAP), ERP and E-business.

**Module 3 : Implementation of ERP system (Lectures : 11)**

Types of services required in implementation – Consulting, Configuration, Customization and Support

**1. ERP implementation approach :** Single vendor versus Best-of Breed ERP implementation, Big Bang versus Phased (by module/ site) implementation, Using ERP of Application Service Provider (ASP).

**2. ERP implementation life cycle :**

Planning different aspects (Economic viability, Senior Management commitment, Resource requirements, Change management etc.), Understanding requirements and Process preparation – Gap analysis and Business Process Engineering, User Acceptance criteria, Design, Configuration, Customization (difference between Configuration and Customization, advantages and disadvantages), Extensions, Data migration, End-user training, User Acceptance, Going live, Roll-out. Differences between ERP implementation life cycle and Custom Software development phases. Drawbacks of ERP system.

**3. Organizing implementation:** Interaction with Vendors, Consultants, and Users. Contracts with Vendors, Consultants, and Employees. Project Management and Monitoring. ERP Project Organization – Formation of Steering Committee and different User Groups. Top Management Commitment and Steering Committee meetings. Change Management, Risks and Challenges in ERP implementation.

**4. Post-implementation Support, Review, Maintenance and Security of ERP systems :** A typical Support Cycle (Planning, Stabilization, Ongoing and Upgrade phases). Post-implementation Review of ERP systems – measures of review (Efficiency, Effectiveness, and Competitive Advantage), and approaches for review (User attitude survey, Cost/benefit analysis, Compliance audit, Budget performance review, Service level monitoring, Technical review, Product review, Integration review etc.). System maintenance and ERP system maintenance. Software upgrade (patch, release, version). Security and Access control of ERP systems.

**Module 4 : Emerging Trends and Future of ERP systems (Lectures : 7)**

**1. Emerging Technologies and ERP : Service-oriented Architecture (SOA):** Enterprise SOA layers – Business processes, Business services, Components and Integration services, Advantages and Drawbacks of SOA, When to use SOA, Difference between multi-layered Client-server architecture and SOA, basic awareness of Net Weaver from SAP, Web sphere from Oracle and .Net from Microsoft.

*Enterprise Application Integration (EAI):* Basic understanding of the concept, Types of EAI (levels) – User Interface, Method (logic), Application Interface, Data.

EAI architecture – Typical framework (Business Processes, Components & Services, Messaging service, and Transport service. Mention of some of the leading EAI vendors – IBM, Microsoft, Oracle, SAP, TIBCO. *Radio Frequency Identification (RFID) and ERP:* awareness of RFID technology, Benefits of RFID integrated with ERPs.

*M-Commerce:* basic concept and applications, difference with E-Commerce, benefits of integration with ERPs.

**1. Future of ERP :** Technology transformation to SOA, more E-Commerce features, Growing mobile applications, Economical and Easy models of ERP deployment etc.

Books Recommended:

1. Enterprise Resource Planning – A Managerial Perspective by D P Goyal, Tata McGraw Hill Education, 2011
2. Enterprise Resource Planning by Ashim Raj Singla, Cengage Learning, 2008

References:

1. Enterprise Resource Planning, 2<sup>nd</sup> Edition by Alexis Leon, Tata McGraw Hill Education, 2008

**Subject Name: Compiler Design**

**Subject code IT 605D**

**Contacts: 3L**

**Credit point: 3**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

**Module I**

Introduction to Compiling [2L] : Compilers, Analysis-synthesis model, The phases of the compiler, Cousins of the compiler.

Lexical Analysis [5L]: The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of tokens, Finite automata, From a regular expression to an NFA, From a regular expression to NFA, From a regular expression to DFA, Design of a lexical analyzer generator (Lex).

**Module II**

Syntax Analysis [8L] : The role of a parser, Context free grammars, Writing a grammar, Top down Parsing, Non-recursive Predictive parsing (LL), Bottom up parsing, Handles, Viable prefixes, Operator precedence parsing, LR parsers (SLR, LALR), Parser generators (YACC). Error Recovery strategies for different parsing techniques.

Syntax directed translation [4L] : Syntax directed definitions, Construction of syntax trees, Bottom-up evaluation of S attributed definitions, L attributed definitions, Bottom-up evaluation of inherited attributes.

**Module III**

Type checking [3L] : Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions. Run time environments [4L] : Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Parameter passing (call by value, call by reference, copy restore, call by name), Symbol tables, dynamic storage allocation techniques.

**Module IV**

Intermediate code generation [3L] : Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).

Code optimization [4L] : Introduction, Basic blocks & flow graphs, Transformation of basic blocks, Dag representation of basic blocks, The principle sources of optimization, Loops in flow graph, Peephole optimization.

Code generations [3L] : Issues in the design of code generator, a simple code generator, Register allocation & assignment.

**Subject Name: Database Management System Lab**

**Subject code IT 691**

**Contacts: 3L**

**Credit point: 2**

Structured Query Language 1. Creating Database

- Creating a Database
- Creating a Table
- Specifying Relational Data Types
- Specifying Constraints
- Creating Indexes
- 2. Table and Record Handling
  - INSERT statement
  - Using SELECT and INSERT together
  - DELETE, UPDATE, TRUNCATE statements
  - DROP, ALTER statements
- 3. Retrieving Data from a Database
  - The SELECT statement
  - Using the WHERE clause
  - Using Logical Operators in the WHERE clause
  - Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause
  - Using Aggregate Functions
  - Combining Tables Using JOINS
  - Subqueries
- 4. Database Management
  - Creating Views
  - Creating Column Aliases



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

- Creating Database Users
- Using GRANT and REVOKE Cursors in Oracle PL / SQL
- Writing Oracle PL / SQL Stored Procedures

**Subject Name Computer Network Lab**

**Subject Code: IT-692**

**Contact: 3**

**Credits: 2**

1. IPC (Message queue)
2. NIC Installation & Configuration (Windows/Linux)
3. Familiarization with o Networking cables (CAT5, UTP) o Connectors (RJ45, T-connector) o Hubs, Switches
4. TCP/UDP Socket Programming
5. Multicast & Broadcast Sockets
6. Implementation of a Prototype Multithreaded Server
7. Implementation of o Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window)
8. Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check)
9. Data Link Layer Error Control Mechanism (Selective Repeat, Go Back N)

**Subject Name Multimedia lab**

**Subject code IT 693**

**Contacts: 3P**

**Credit point: 2.**

1. Sound capturing & editing using tools like SOUNDFORGE
2. Image editing using tools like Adobe Photoshop
3. Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier)
4. Creation of Content using HTML (basic tags, table form, frame, link to other Image)
5. Creating stylesheet using DHTML
6. Home Page creation using HTML, DHTML.

**Books :**

1. Adobe , Adobe Photoshop 6.0: Classroom in a book Pearson Ed.
2. AnushkaWirasinha , Flash in a Flash- Web Development , PHI
3. Macromedia Flash5 fast and easy Web Development, Design, PHI
4. Castro, HTML4 for the World Wide Web, Pearson Ed.
5. Schurman&Purdi , Dynamic HTML in Action, Second Edition , PHI
6. Lozano, Multimedia- Sound & Video , PHI

**Fourth Year First Semester**

**Subject Name: Internet Technology**

**Subject code IT 701**

**Contacts: 3L**

**Credit point: 3**

**Module I[6L]**

Introduction (1L): Overview, Network of Networks, Intranet, Extranet and Internet.

World Wide Web (1L): Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP.

Review of TCP/IP (1L): Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP

Subnetting and addressing (1L): Classful and Classless Addressing, Subnetting.NAT, IP masquerading, IP tables.

Internet Routing Protocol (1L): Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast.

Electronic Mail (1L): POP3, SMTP.

**Module II-[9L]**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

HTML (3L): Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue.

Image Maps (1L): map, area, attributes of image area. Extensible Markup Language (XML) (4L):

Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief.

CGI Scripts (1L): Introduction, Environment Variable, GET and POST Methods.

**Module III-[10L]**

PERL (3L): Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling.

JavaScript (4L): Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation.

Cookies (1L): Definition of cookies, Create and Store a cookie with example.

Java Applets (2L): Container Class, Components, Applet Life Cycle, Update method; Parameter passing applet, Applications.

**Module IV-[4L]**

Client-Server programming In Java (2L): Java Socket, Java RMI.

Threats (1L): Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks.

Network security techniques (2L): Password and Authentication; VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH).

Firewall (1L): Introduction, Packet filtering, Stateful, Application layer, Proxy.

**Module V-[5L]**

Internet Telephony (1L): Introduction, VoIP.

Multimedia Applications (2L): Multimedia over IP: RSVP, RTP, RTCP and RTSP. Streaming media, Codec and Plugins, IPTV.

Search Engine and Web Crawler (2L): Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

**Reference:**

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.

**Subject Name: Soft Computing**

**Subject code IT 702**

**Contacts: 3L**

**Credit point: 3**

**Module-I [2L]:** Introduction: Introduction to soft computing; introduction to fuzzy sets and fuzzy logic systems; introduction to biological and artificial neural network; introduction to Genetic Algorithm.

**Module-II [10L]:** Fuzzy sets and Fuzzy logic systems: Classical Sets and Fuzzy Sets and Fuzzy relations: Operations on Classical sets, properties of classical sets, Fuzzy set operations, properties of fuzzy sets, cardinality, operations, and properties of fuzzy relations. Membership functions: Features of membership functions, standard forms and boundaries, different fuzzification methods. Fuzzy to Crisp conversions: Lambda Cuts for fuzzy sets, fuzzy Relations, Defuzzification methods. Classical Logic and Fuzzy Logic: Classical predicate logic, Fuzzy Logic, Approximate reasoning and Fuzzy Implication Fuzzy Rule based Systems: Linguistic Hedges, Fuzzy Rule based system – Aggregation of fuzzy Rules, Fuzzy Inference System- Mamdani Fuzzy Models – Sugeno Fuzzy Models. Applications of Fuzzy Logic: How Fuzzy Logic is applied in Home Appliances, General Fuzzy Logic controllers, Basic Medical Diagnostic systems and Weather forecasting

**Module-III [10L] : Neural Network:** Introduction to Neural Networks: Advent of Modern Neuroscience, Classical AI and Neural Networks, Biological Neurons and Artificial neural network; model of artificial neuron. Learning Methods :Hebbian, competitive, Boltzman etc., Neural Network models: Perceptron, Adaline and Madaline networks; single layer network; Back-propagation and multi layer networks. Competitive learning networks: Kohonenself organizing networks, Hebbian learning; Hopfield Networks. Neuro-Fuzzy modelling: Applications of Neural Networks:

**Module-IV[10L]:** Genetic Algorithms: Simple GA, crossover and mutation, Multi-objective Genetic Algorithm (MOGA). Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**Module-V [4L]** Other Soft Computing techniques: Simulated Annealing, Tabu search, Ant colony optimization (ACO), Particle Swarm Optimization (PSO).

**Text Books:**

1. Fuzzy logic with engineering applications, Timothy J. Ross, John Wiley and Sons.
2. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI
3. Principles of Soft Computing , S N Sivanandam, S. Sumathi, John Wiley & Sons
4. Genetic Algorithms in search, Optimization & Machine Learning by David E. Goldberg
5. Neuro-Fuzzy and Soft computing, Jang, Sun, Mizutani, PHI
6. Neural Networks: A Classroom Approach, 1/e by Kumar Satish, TMH,
7. Genetic Algorithms in search, Optimization & Machine Learning by David E. Goldberg, Pearson/PHI
8. A beginners approach to Soft Computing, Samir Roy & Udit Chakraborty, Pearson

**Reference Books:**

1. Fuzzy Sets and Fuzzy Logic: Theory and Applications, George J. Klir and Bo Yuan, Prentice Hall
2. Neural Networks: A Comprehensive Foundation (2nd Edition), Simon Haykin, Prentice Hall.

**Subject Name: Computer Graphics**

**Subject code IT 703**

**Contacts: 3L**

**Credit point: 3**

**Module I:** Introduction to computer graphics & graphics systems [6L]: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

Scan conversion [8L]: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham’s line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

**Module II:** 2D transformation & viewing [15L]: Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port coordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. Cohen and Sutherland line clipping, Sutherland-Hodgeman Polygon clipping, Cyrus-beck clipping method.

3D transformation & viewing [5L]: 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.

**Module III:**

Curves [3L]: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

Hidden surfaces [3L]: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter’s algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry.

Color & shading models [2L]: Light & color model; interpolative shading model; Texture.

Introduction to Ray-tracing: [3L] Human vision and color, Lighting, Reflection and transmission models.

**Books:**

1. Hearn, Baker – “Computer Graphics (C version 2nd Ed.)” – Pearson education
2. Z. Xiang, R. Plastock – “Schaum’s outlines Computer Graphics (2nd Ed.)” – TMH
3. D. F. Rogers, J. A. Adams – “Mathematical Elements for Computer Graphics (2nd Ed.)” – TMH

**Subject Name Data Warehousing & Data Mining**

**Subject code IT 704A**

**Contacts: 3L**

**Credit point: 3**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**Module 1:** Overview and Concepts of Data Warehousing (9L): Overview of Data warehousing Strategic information and the need for Data warehousing, Defining a Data warehouse, Evolution of Data warehousing, Data warehousing and Business Intelligence , The Building Blocks of Data warehouse

Defining features – Subject-oriented data, Integrated data, Time-variant data, Nonvolatile data, Data granularity Data warehouses and Data marts Architectural Types – Centralized, Independent data marts, Federated, Hub-and-Spoke, Data mart bus Overview of components - Source Data, Data Staging, Data Storage, Information Delivery, Metadata, and Management and Control components 6. Business Requirements and Data warehouse Dimensional nature of Business data and Dimensional Analysis, Dimension hierarchies and categories, Key Business Metrics (Facts), Requirement Gathering methods and Requirements Definition Document (contents) Business Requirements and Data Design – Structure for Business Dimensions and Key Measurements, Levels of detail Business Requirements and the Architecture plan Business Requirements and Data Storage Specifications Business Requirements and Information Delivery Strategy

**Module 2 :** Data warehouse Architecture and Infrastructure (Lectures : 8) 6. Architectural components Concepts of Data warehouse architecture – Definition and architecture in the areas of Data acquisition, Data storage, and Information delivery Distinguishing characteristics – Different objectives and scope, Data content, Complex analysis for faster response, Flexible and Dynamic, Metadata-driven etc Architectural Framework – supporting flow of data, and the Management and Control module Technical architecture – Data acquisition, Data storage, and Information delivery Overview of the components of Architectural Types introduced in Module 1. 7. Infrastructure for Data warehousing Distinction between architecture and infrastructure, Understanding of how data warehouse infrastructure supports its architecture Components of physical infrastructure, Hardware and Operating systems for data warehouse, Database Software, Collection of Tools, Data warehouse Appliances – evolution and benefits 8. The role of Metadata Understanding the importance of Metadata Metadata types by functional areas – Data acquisition, Data storage, and Information delivery Business Metadata – overview of content and examples Technical Metadata – overview of content and examples Metadata Requirements, Sources of Metadata, Metadata management – challenges, Metadata Repository, Metadata integration and standards

**Module 3 :** Data Design and Data Preparation [9L] Principles of Dimensional Modeling Data Design – Design decisions, Basics of Dimensional modeling, E-R modeling versus Dimensional modeling The STAR schema – illustration, Dimension Table, Fact Table, Factless Fact Table, Data granularity STAR schema keys – Primary, Surrogate, and Foreign Advantages of the STAR schema, STAR schema examples , Data Extraction, Transformation, and Loading. Overview of ETL, Requirements of ETL and steps Data extraction – identification of sources and techniques Data transformation – Basic tasks, Transformation types, Data integration and consolidation, Transformation for dimension attributes Data loading – Techniques and processes, Data refresh versus update, Procedures for Dimension tables, Fact tables : History and incremental loads ETL Tool options 5. Data Quality Importance of data quality, Challenges for data quality, Data quality tools, Data cleansing and purification, Master Data Management

**Module 4 :** Information access and delivery (10L). Matching information to classes of users Information from Data warehouse versus Operational systems, Users of information – their needs and how to provide information. Information delivery – queries, reports, analysis, and applications Information delivery tools – Desktop environment, Methodology and criteria for tool selection, Information delivery framework, Business Activity Monitoring, Dashboards and Scorecards 6. OLAP in Data warehouse Overall concept of Online Analytical Processing (OLAP), OLAP definitions and rules, OLAP characteristics Major features and functions of OLAP – General features, Dimensional analysis, Hypercubes, Drill Down and Roll Up, Slice and Dice, Rotation, Uses and Benefits Familiarity with OLAP models – Overview of variations, MOLAP, ROLAP, HOLAP, DOLAP, Database OLAP, Web OLAP 7. Data Warehouse and the web Web-enabled Data Warehouse – adapting data warehouse for the web Web-based information delivery – Browser technology for data warehouse and Security issues OLAP and Web – Enterprise OLAP, Web-OLAP approaches, OLAP Engine design 8. Data Mining Overview of Data mining – Definition, Knowledge Discovery Process (Relationships, Patterns, Phases of the process), OLAP versus Data mining Some aspects of Data mining – Association rules, Outlier analysis, Predictive analytics etc) Concepts of Data mining in a Data warehouse environment

Major Data Mining techniques – Cluster Detection, Decision Trees, Memory-based Reasoning, Link Analysis, Neural Networks, Genetic Algorithms etc Data Mining Applications in industry – Benefits of Data mining, Discussion on applications in Customer Relationship Management (CRM), Retail, Telecommunication, Biotechnology, Banking and Finance etc



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**Books Recommended:** Data Warehousing Fundamentals for IT Professionals, Second Edition by PaulrajPonniah, Wiley India

**References:**

1. Data Warehousing, Data Mining, & OLAP – Second Edition by Alex Berson and Stephen J. Smith, TMH
2. Data warehouse Toolkit by Ralph Kimball, Wiley India

**Subject Name Mobile computing**

**Subject code IT 704B**

**Contacts: 3L**

**Credit point: 3**

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. [5L ]:**General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes. Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard,

**Mobile IP. [5L]:** 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. [7L]:** Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000,

**Quality of services in 3G. [7L]:** Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology,

**Blue tooth Protocols. [7L]** Server-side programming in Java, Pervasive web application architecture, Device independent example application [8L]

**Text books:**

1. “Pervasive Computing”, Burkhardt, Pearson
2. “Mobile Communication”, J. Schiller, Pearson
3. “Wireless and Mobile Networks Architectures”, Yi-Bing Lin &ImrichChlamtac, John Wiley & Sons, 2001
4. “Mobile and Personal Communication systems and services”, Raj Pandya, Prentice Hall of India, 2001.

**Reference :**

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

**Subject Name Cloud Computing**

**Subject code IT 704C**

**Contacts: 3L**

**Credit point 3**

**Module 1:**

Definition of Cloud Computing and its Basics (Lectures : 9)

1. Definition of Cloud Computing: Defining a Cloud, Cloud Types – NIST model, Cloud Cube model, Deployment models (Public , Private, Hybrid and Community Clouds), Service models – Infrastructure as a Service, Platform as a Service, Software as a Service with examples of services/ service providers, Cloud Reference model Characteristics of Cloud Computing – a shift in paradigm Benefits and advantages of Cloud Computing
2. Cloud Architecture: A brief introduction on Composability, Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients
3. Services and Applications by Type IaaS – Basic concept, Workload, partitioning of virtual private server instances, Pods, aggregations, silos PaaS – Basic concept, tools and development environment with examples SaaS - Basic concept and characteristics, Open SaaS and SOA, examples of SaaS platform Identity as a Service (IDaaS) Compliance as a Service (CaaS)



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**Module 2 :**

Use of Platforms in Cloud Computing (Lectures : 12)

1. Concepts of Abstraction and Virtualization ,Virtualization technologies : Types of virtualization (access, application, CPU, storage), Mobility patterns (P2V, V2V, V2P, P2P, D2C, C2C, C2D, D2D) Load Balancing and Virtualization: Basic Concepts, Network resources for load balancing, Advanced load balancing (including Application Delivery Controller and Application Delivery Network), Mention of The Google Cloud as an example of use of load balancing Hypervisors: Virtual machine technology and types, VMware vSphere Machine Imaging (including mention of Open Virtualization Format – OVF) Porting of applications in the Cloud: The simple Cloud API and AppZero Virtual Application appliance

2. Concepts of Platform as a Service Definition of services, Distinction between SaaS and PaaS (knowledge of Salesforce.com and Force.com), Application development Use of PaaS Application frameworks.

3. Use of Google Web Services Discussion of Google Applications Portfolio – Indexed search, Dark Web, Aggregation and disintermediation, Productivity applications and service, Adwords, Google Analytics, Google Translate, a brief discussion on Google Toolkit (including introduction of Google APIs in brief), major features of Google App Engine service.

4. Use of Amazon Web Services Amazon Web Service components and services: Amazon Elastic Cloud, Amazon Simple Storage system, Amazon Elastic Block Store, Amazon SimpleDB and Relational Database Service

Use of Microsoft Cloud Services Windows Azure platform: Microsoft's approach, architecture, and main elements, overview of Windows Azure AppFabric, Content Delivery Network, SQL Azure, and Windows Live services

**Module 3:**

Cloud Infrastructure (Lectures : 7)

1. Types of services required in implementation – Consulting, Configuration, Customization and Support 1. Cloud Management An overview of the features of network management systems and a brief introduction of related products from large cloud vendors, Monitoring of an entire cloud computing deployment stack – an overview with mention of some products, Lifecycle management of cloud services (six stages of lifecycle)

2. Concepts of Cloud Security Cloud security concerns, Security boundary, Security service boundary Overview of security mapping Security of data: Brokered cloud storage access, Storage location and tenancy, encryption, and auditing and compliance Identity management (awareness of Identity protocol standards)

**Module 4 :**

**Concepts of Services and Applications (Lectures : 8)**

1. Service Oriented Architecture: Basic concepts of message-based transactions, Protocol stack for an SOA architecture, Event-driven SOA, Enterprise Service Bus, Service catalogs

2. Applications in the Cloud: Concepts of cloud transactions, functionality mapping, Application attributes, Cloud service attributes, System abstraction and Cloud Bursting, Applications and Cloud APIs

3. Cloud-based Storage: Cloud storage definition – Manned and Unmanned

4. Webmail Services: Cloud mail services including Google Gmail, Mail2Web, Windows Live Hotmail, Yahoo mail, concepts of Syndication services

**Books Recommended:**

1. Cloud Computing Bible by Barrie Sosinsky, Wiley India Pvt. Ltd, 2013

2. Mastering Cloud Computing by RajkumarBuyya, Christian Vecchiola, S. ThamaraiSelvi, McGraw Hill

3. Cloud computing: A practical approach, Anthony T. Velte, Tata Mcgraw-Hill

4. Cloud Computing, Miller, Pearson

5. Building applications in cloud: Concept, Patterns and Projects, Moyer, Pearson

**References:**

1. Cloud Computing – Second Edition by Dr. Kumar Saurabh, Wiley India

**Subject Name Sensor networks**

**Subject code IT 704D**

**Contacts: 3L**

**Credit point: 3**

**Module I: Introduction and Overview [4L]**

**Learning Objective: To provide an overview about sensor networks and emerging technologies.**

Overview of wireless networks, types, infrastructure-based and infrastructure-less, introduction to MANETs



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

(Mobile Ad-hoc Networks), characteristics, reactive and proactive routing protocols with examples, introduction to sensor networks, commonalities and differences with MANETs, constraints and challenges, advantages, applications, enabling technologies for WSNs.

**Module II: Architectures [9L]**

**Learning Objective: To study about the node and network architecture of sensor nodes and its execution environment.**

Single-node architecture - hardware components, design constraints, energy consumption of sensor nodes, operating systems and execution environments, examples of sensor nodes, sensor network scenarios, types of sources and sinks – single hop vs. multi hop networks, multiple sources and sinks – mobility, optimization goals and figures of merit, gateway concepts, design principles for WSNs, service interfaces for WSNs.

**Module III: Communication Protocols [9L]**

**Learning Objective: To understand the concepts of communication, MAC, routing protocols and also study about the naming and addressing in WSN.**

Physical layer and transceiver design considerations, MAC protocols for wireless sensor networks, low duty cycle protocols and wakeup concepts - S-MAC, the mediation device protocol, wakeup radio concepts, address and name management, assignment of MAC addresses, routing protocols- classification, gossiping, flooding, energy-efficient routing, unicast protocols, multi-path routing, data-centric routing, data aggregation, SPIN, LEACH, Directed-Diffusion, geographic routing.

**Module IV: Infrastructure Establishment [9L]**

**Learning Objective: To learn about topology control and clustering in networks with timing synchronization for localization services with sensor tasking and control.**

Topology control, flat network topologies, hierarchical networks by clustering, time synchronization, properties, protocols based on sender-receiver and receiver-receiver synchronization, LTS, TPSN, RBS, HRTS, localization and positioning, properties and approaches, single-hop localization, positioning in multi-hop environment, range based localization algorithms – location services, sensor tasking and control.

**Module V: Sensor Network Platforms and Tools [9L]**

**Learning Objective: To study about sensor node hardware and software platforms and understand the simulation and programming techniques.**

Sensor node hardware, Berkeley motes, programming challenges, node-level software platforms, node-level simulators, state-centric programming, Tiny OS, nesC components, NS2 simulator, TOSSIM.

**TEXT BOOKS**

1. Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier,

**REFERENCES**

1. Kazem Sohrawy, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.
3. Thomas Haenselmann, "Sensor Networks", available online for free, 2008.
4. Edgar Callaway, "Wireless Sensor Networks: Architectures and Protocols", Auerbach, 2003.

**Subject Name Image Processing and GIS**

**Subject code IT 705A**

**Contacts: 3LCredit point: 3**

**Introduction [3L]:** Background, Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing - Image Acquisition, Storage, Processing, Communication, Display.

**Digital Image Formation [4L] :** A Simple Image Model, Geometric Model- Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization - Uniform & Non uniform.

**Mathematical Preliminaries [9L]:** Neighbour of pixels, Connectivity, Relations, Equivalence & Transitive Closure; Distance Measures, Arithmetic/Logic Operations, Fourier Transformation, Properties of The Two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

**Image Enhancement [8L]** : Spatial Domain Method, Frequency Domain Method, Contrast Enhancement -Linear & Nonlinear Stretching, Histogram Processing; Smoothing - Image Averaging, Mean Filter, Low-pass Filtering; Image Sharpening. High-pass Filtering, Highboost Filtering, Derivative Filtering, Homomorphic Filtering; Enhancement in the frequency domain - Low pass filtering, High pass filtering.

**Image Restoration [7L]**: Degradation Model, Discrete Formulation, Algebraic Approach to Restoration - Unconstrained & Constrained; Constrained Least Square Restoration, Restoration by Homomorphic Filtering, Geometric Transformation - Spatial Transformation, Gray Level Interpolation.

**Image Segmentation [7L]** Point Detection, Line Detection, Edge detection, Combined detection, Edge Linking & Boundary Detection - Local Processing, Global Processing via The Hough Transform; Thresholding - Foundation, Simple Global Thresholding, Optimal Thresholding; Region Oriented Segmentation - Basic Formulation, Region Growing by Pixel Aggregation, Region Splitting & Merging.

**Books:**

1. Digital Image Processing, Gonzalves, Pearson
2. Digital Image Processing, Jahne, Springer India

**Subject Name Pattern Recognition**

**Subject code IT 705B**

**Contacts: 3L**

**Credit point: 3**

**Module – I:** Introduction – Definitions, data sets for Pattern Recognition [2], Different Paradigms of Pattern Recognition [1], Representations of Patterns and Classes [2], Metric and non-metric proximity measures [2].

**Module – II:** Feature extraction [2], Different approaches to Feature Selection [1], Nearest Neighbour Classifier and variants [2], Efficient algorithms for nearest neighbour classification [2]

**Module – III:** Different Approaches to Prototype Selection [2], Bayes Classifier [3], Decision Trees [3], Linear Discriminant Function [3].

**Module – IV;** Support Vector Machines [2], Clustering [3], Clustering Large datasets [2], Combination of Classifiers [2], Applications – Document Recognition [2].

**REFERENCES**

1. Devi V.S.; Murty, M.N. (2011) Pattern Recognition: An Introduction, Universities Press, Hyderabad.
2. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification, Wiley, 2000.

**Subject Name: Cryptography and Network Security**

**Subject Code: IT 705C**

**Contacts: 3L**

**Credit point: 3**

**Module1:** Attacks on Computers & Computer Security (5L): Introduction, Need for Security, Security approaches, Principles of Security, Types of attack.

**Module2:** Cryptography: Concepts & Techniques (7L): Introduction, Plaintext & Cipher text, Substitution Techniques, Transposition Techniques, Encryption & Decryption, Symmetric & Asymmetric key Cryptography, Key Range & Key Size

**Module3:** Symmetric Key Algorithm (8L): Introduction, Algorithm types & Modes, Overview of Symmetric Key Cryptography, DES (Data Encryption Standard) algorithm, IDEA (International Data Encryption Algorithm) algorithm, RC5 (Rivest Cipher 5) algorithm.

**Module4:** Asymmetric Key Algorithm, Digital Signature and RSA (5L): Introduction, Overview of Asymmetric key Cryptography, RSA algorithm, Symmetric & Asymmetric key Cryptography together, Digital Signature, Basic concepts of Message Digest and Hash Function (Algorithms on Message Digest and Hash function not required).

**Module5:** Internet Security Protocols, User Authentication (6L) : Basic Concepts, SSL protocol, Authentication Basics, Password, Authentication Token, Certificate based Authentication, Biometric Authentication.

**Module6 :** Electronic Mail Security (4L) : Basics of mail security, Pretty Good Privacy, S/MIME.

**Module7:** Firewall (3L) : Introduction, Types of firewall, Firewall Configurations, DMZ Network

**Text Books:**

1. “Cryptography and Network Security”, William Stallings, 2nd Edition, Pearson Education Asia



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

2. “Network Security private communication in a public world”, C. Kaufman, R. Perlman and M. Speciner, Pearson
3. Cryptography & Network Security: Atul Kahate, TMH.

**Reference :**

1. “Network Security Essentials: Applications and Standards” by William Stallings, Pearson

**Subject Name Microelectronics and VLSI design**

**Subject code IT 705D**

**Contacts: 3L**

**Credit point: 3**

**Module 1: Introduction to VLSI Design:** VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structural, Physical), Y-Chart, Digital VLSI Design Steps.

**Module 2: MOS structure:** E-MOS & D-MOS, Charge inversion in E-MOS, Threshold voltage, Flat-band voltage, Potential balance & Charge balance, Inversion, MOS capacitances.

**Module 3: Terminal MOS Structure:** Body effect. **Four Terminal MOS Transistor:** Drain current, I-V characteristics. Current-voltage equations (simple derivation).

**Scaling in MOSFET:** Short Channel Effects, General scaling, Constant Voltage & Field scaling.] .

**CMOS:** CMOS inverter, Simple Combinational Gates - NAND gate and NOR Gate using CMOS.

**Module 4: Micro-electronic Processes for VLSI Fabrication:** Silicon Semiconductor Technology- An Overview, Wafer processing, Oxidation, Epitaxial deposition, Ion-implantation & Diffusion Cleaning, Etching, Photolithography – Positive & Negative photo-resist

**Basic CMOS Technology –** (Steps in fabricating CMOS), Basic n-well CMOS process, p-well, CMOS process, Twin tub process, Silicon on insulator

**Layout Design Rule:** Stick diagram with examples, Layout rules.

**Module 5: Hardware Description Language –** VHDL or Verilog Combinational & Sequential Logic circuit Design.

**Subject Name Advanced Data communication and Coding**

**Subject code IT 705E**

**Contacts: 3L**

**Credit point: 3**

Advanced Data Communication and Coding [40L]

1. Prerequisites: Data and signals, Classification of signals, Communications systems, analog and digital communication systems, Applications of communication systems. [2L]

2. Digital Communication: Nyquist Sampling theorem, Inter-symbol interference and its removal, line codes (polar, unipolar, bipolar, Manchester), Detection error probability (polar, unipolar, bipolar), Digital Modulation techniques (ASK, FSK, BPSK, QPSK, QAM, PCM, DPCM, Delta Modulation, Adaptive Delta Modulation), Digital Transmission and Transmission Impairments. [10L]

3. Optical Networks: WDM, Telecommunication Infrastructure, Switching, SONET, PDH and SDH, bit interleaving, Architecture of Optical Transport Network, Link Management Protocols, Solutions. [8L]

4. Satellite Communication: Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design Of Down Links, Domestic Satellite Systems Using Small Earth Stations, Uplink Design, Design Of Satellite Link For Specified (C/N). Multiple Access Techniques, Frequency Division Multiple Access (FDMA), TDMA, CDMA, Estimating Channel Requirements, Practical Demand Access Systems, Random Access, Multiple Access With On Board Processing, VSAT. [10L]

5. Mobile Communications: Mobile telephone service, Transmission protocols, Introduction to GSM, GPRS, CDMA, Switching techniques, Fading, Quality of service (QOS). [8L]

Books Recommended:

- [1] Advanced Communication Systems by Wayne Tomasi; Pearson. [2] Digital Communication by Proakis; PHI
- [3] Optical Networks by Uyles Black; Pearson



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

[4] Satellite Communication by Timothy Pratt; Addison Wesley.

**Subject Name Internet Technology lab**

**Subject code IT 791**

**Contacts: 3P**

**Credit point: 2.**

Applet

1. Create a banner using Applet
2. Display clock using Applet
3. Create different shapes using Applet
4. Fill colors in shapes using Applet
5. Goto a link using Applet
6. Create an event listener in Applet
7. Display image using Applet
8. Open a link in a new window using Applet
9. Play sound using Applet
10. Read a file using Applet
11. Write to a file using Applet

JavaScript

12. Validate the fields of a form using JavaScript.
13. Guess a number based on user input.
14. Program on image rollover using JavaScript.
15. Display clock using JavaScript.
16. Prompt, alert, array, looping in JavaScript.
  
17. Calculator using JavaScript.
18. Validate e-mail, phone no. using reg-ex in JavaScript.

Perl

19. Write a perl script to implement associative array.
20. Write a perl script to implement the regular expression as follows:
  - a). If a string contains any vowel, count the total number of vowels.
  - b). If a string starts with MCA and end with bw, print 1 else 0.
  - c). If string starts with 0 or any no. a's, then print 1 else 0.
21. Write an html code to call a perl script from cgi-bin.
22. Implement the following with regular expression in Perl:
  - a). a\*bc
  - b). a\* at least 2 b's
  - c). a\*exactly 3 b's
23. A simple File operation using Perl.

Client Server Programming

24. Write a socket program to get the current date and time from the server.
25. Write a socket program where the client will send lowercase letters and the server will return uppercase letter.
26. Write a server and a client program to implement TCP chat server-client.
27. Create a simple calculator application using Java RMI.

HTML

1. Start your web page with an <html> tag
  - i) Add a heading.
  - ii) Add a title.
  - iii) Start the <body> section.
  - iv) Add the following text using <H1> and </H1> tags:  
This Web page was designed by (your name)
  - v) Add the following text using <H2> and </H2> tags: My HTML assignment
  - vi) Add a horizontal line



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

vii) Insert an image to your web page.

Note: You should then refer to your image with just the filename, and NOT the entire pathname to the file.

viii) Add another horizontal line.

ix) Enter a paragraph of text.

Write about things you have learned in html.

Make sure the text in this paragraph is a color other than black, but something one can see. Add a link that takes you to your favorite webpage.

x) Start a new paragraph. Add a three item ordered list. Make it creative (don't just say item 1, item 2, etc... and keep it clean)!

xi) Close out your body and html tags.

2. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body> section.

iv) Start a new paragraph.

Use alignment attribute,

Use bold, italic, underline tags,

Use font tag and associated attributes,

Use heading tags,

Use preserve tag,

Use non breaking spaces (escape character).

3. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body> section.

iv) Start a new paragraph.

Create Hyperlinks:

(a) Within the HTML document.

(b) To another URL.

(c) To a file that can be rendered in the browser.

4. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body> section.

Create an unordered list,

Create an ordered list,

Use various bullet styles,

Created nested lists,

Use the font tag in conjunction with lists,

Create definition lists,

Use graphics as bullets.

5. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body> section.

a) Create a simple table

Create borders and adjust border size. Adjust table cell spacing. Change border color.

Change table background color. b) Align a new table on HTML page. Perform cell text alignment,

Create multi-column tables,

Display information about your academic qualification into this table.

6. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

iii) Start the <body> section.

Create a frameset:

Use frame tags,

Create vertical (column) frames,

Create horizontal (row) frames,

Create complex framesets,

Use the hyperlink tag to target displaying an HTML page to another frame.

7. Start your web page with an <html> tag

i) Add a heading.

ii) Add a title.

iii) Start the <body> section.

Create a simple HTML form.

Use the input tag to create a: text box; text area box; check box; list box; radio button; password field; popup menu; hidden field. Use submit and reset buttons. Create an admission form using the above information.

8. Create a web page that will include an image. Then create image map to watch different parts of that image closely.

9. Using frames as an interface, create a series of web pages where the theme is to provide resources (internet, intranet, static HTML pages) pertaining to the subject of HTML. Ideally, your goal is to create a resource that you can use long after this module when needing information on HTML. As a minimum requirement to this assignment your webpage should:

- Consist of at least 3 frames.
- Contain at least 5 URLs to internet and/or intranet sites that you can reference as part of your job.
- Contain at least 5 references to documents that you have created that you use on a regular basis.
- Contain at least 5 references to documents others have created that you use on a regular basis.
- Be organized in a fashion that is logical and intuitive to you.
- Is done with enough quality that you would not be opposed to it being a link at another site.

10. Create a web page as you wish and the html elements of the page will be styled by CSS.

XML

1. Write a XML program that will create an XML document which contains your mailing address.

2. Write a XML program that will create an XML document which contains description of three book category.

3. Create an XML document that contains the name and price per pound of coffee beans.

i) In your XML document mention all properties of XML declaration.

ii) The root element has name <coffee\_bean>

iii) Create nested elements for different types of coffee.

iv) Validate the document and if any parsing error is present, fix them.

4. Create an XML document that contains airline flight information.

i) In your XML document mention all properties of XML declaration.

ii) The root element has name <airlines>

iii) Create three nested <carrier> elements for three separate airlines. Each element should include a name attribute.

iv) Within each <carrier> nest at least two <flight> ,each of which contains departure\_city, destination\_ city, fl\_no, dept\_time.

v) Validate the document and if any parsing error is present fix them.

5. Create an XML version of your resume. Include elements such as your name and position desired. Nest each of your former employers within an <employer> element. Also, nest your educational experience within an <education> element. Create any other nested elements that you deem appropriate, such as <references> or <spcl\_skills> elements.

6. Create a DTD on product catalog.

**Subject Name Soft Computing Lab**  
**Subject code IT 792**



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

**Contacts: 3P**

**Credit point: 2**

In this laboratory the students need to implement the soft computing tools in Matlab. Some exposure in C also can be used for neural network and Genetic Algorithm. A sample assignment list is given below:

1. Write a Matlab program to implement the different Fuzzy Membership functions.
2. Write a Matlab program to implement Fuzzy set operations and its properties.
3. Write a Matlab code to implement composition of Fuzzy and Crisp Relations.
4. Write Matlab code to implement Fuzzy Information System (develop the system using command line and GUI based Fuzzy toolbox) Neural network:
5. Write Matlab code to implement McCulloh-Pitts neural network for generate AND, OR functions.
6. Write Matlab code to implement Perceptron learning for particular set of problem.
7. Write Matlab code for OR function with bipolar inputs and targets using Adaline network.
8. Write Matlab code for XOR function with bipolar inputs and targets using Madaline network.
9. Write C program to implement McCulloh-Pitts model to generate AND, OR functions. Genetic Algorithm
10. Write a Matlab code for maximizing  $F(x)=x^2$ , , where x ranges from say 0 to 31 using Genetic Algorithm.
11. Use of Genetic Algorithm toolbox in matlab for optimization problem solving.
12. Implantation Simple Genetic Algorithm in C for solving optimization problem.

IT-781 Industrial Training Evaluation 0-0-3-3-2:

Student has to deliver a seminar on Industrial Training conducted after 6<sup>th</sup> semester

IT-782: Project-I 0-0-3-3-2:

A preliminary / short project to be carried out after discussions with project supervisor. Four clusters are formed among the students on the basis of their respective results. Four students are chosen at random , one from each cluster, and a group is formed. The main focus is to form a balanced group , so that each and every student gets equal opportunity.

**IT-783: Group Discussion: 0-0-3-3-2:** Student has to appear in **Group Discussion** as assigned.

- a) Teaching Strategies of **Group Discussion**
- b) Introducing Different Models & Topics of **Group Discussion**
- c) Exploring Live /Recorded **Group Discussion** Sessions for mending students' attitude/approach & for taking remedial measure

**Fourth Year Second Semester**

Paper Name:-	Financial Management & Audit/Accounts
Paper Code:-	HU801
Contacts:-	3-0-0-3
Credit Point:-	3
<p>Introduction: Financial Management, Financial Planning and Capitalization- definitions, objectives, changing roles and functions, Financial Decision.</p> <p>Capital Budgeting: Nature of Investment decision, Importance of Capital Budgeting, The Capital. Budgeting Process - Investment Criterion, Pay-back period, Accounting, ROR (Rate of Return) Method, Discounting Cash flow method, Net - present value method, IRR (Internal Rate of Return) method, The benefit-Cost Ratio method.</p> <p>Management of Working Capital: Various concepts, Elements, Classification, Financing and importance of working capital, Investment analysis, Cash flow determination, cost of capital, capital budgeting methods.</p> <p>Budgeting Control Technique: Concepts of Budget, budgeting and budgetary control, Objectives, Functions, Uses, Advantages, Limitations; Master Budget and Report.</p>	



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July,2013**

Cost - Volume - Profit Analysis: Classification of costs, Allocation, apportionment and absorption, Cost centers, different costing systems, Cost analysis for managerial decisions, Meaning of Linear CVP analysis, Objectives, Assumptions, Break- Even analysis, determining the Break-Even point profit, Volume graph profit, Volume ratios margin of Safety.

Introduction to Accounting: Basic accounting concepts, important definitions, uses, limitations, advantages; types of Accounting, Financial statements, introduction to Journal Accounting; different types of Vouchers, double entry bookkeeping, different types of transactions related to Financial Accounting.

Financial Control: Posting of Ledgers and preparation of Trial Balance; preparation of Balance Sheet and Profit and Loss Accounts; Controlling other departments by Financial Accounting (A practical Approach).

**Reference**

1. Financial Management and Accounting - P. K. Jain, S. Chand & Co.
2. Management & Accounting: Principles and Practice- R. K. Sharma & Shashi Kumar Gupta, Kalyani
3. Advanced Management Accounting - Kaplan & Atkinson, PHI.
4. Fundamentals of Financial Management - Van Home, PE.
5. Financial Mgmt Accounting, Gupta, Pearson
6. Financial Mgmt, I.M. Pandey, Vikas
7. Financial Mgmt., Khan & Jain, TMH
8. Financial Mgmt , Mcmenamin, OUP
9. Financial Mgmt & Policy, Van Horne, PHI
10. Financial Mgmt, Kulkarni & Satyaprasad, Himalaya

**Subject Name: E-Commerce**

**Subject code IT 801**

**Contacts: 3L**

**Credit point: 3**

Introduction to E-Commerce [6L]: Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce. Business to Business E-Commerce [7L]: Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational Ecommerce. Legal issues [5L]: Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract. Security Issues [6L]: Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security. Business to Consumer E-Commerce [8L]: Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL. E-business [7L]: Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.

**Books:**

1. E-Commerce-Strategy, Technologies & Applications by David Whitley, TMH
2. E-Commerce- The cutting edge of business by Kamlesh K. Bajaj, TMH
3. E-Commerce through ASP by W Clarke- BPB 6. Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS by Mathew Reynolds, Wrox Publishers
4. Global Electronic Commerce- Theory and Case Studies by J. Christopher Westland and Theodore H. K Clark, University Press

**Subject Name Cyber law and Security Policy**

**Subject code IT 802A**



**Department of Information Technology**  
Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)  
Jalpaiguri – 735102

Syllabus for UG Classes effective from First July, 2013

**Contacts: 3L**

**Credit point: 3**

**Module – 1**

A: Introduction of Cybercrime: [4] What is cybercrime?, Forgery, Hacking, Software Piracy, Computer Network intrusion  
Module – 1B: Category of Cybercrime: [4] how criminals plan attacks, passive attack, Active attacks, cyber stalking.

**Module – 2:**

Cybercrime Mobile & Wireless devices: [8] Security challenges posted by mobile devices, cryptographic security for mobile devices, Attacks on mobile/cellphones, Theft, Virus, Hacking. Bluetooth; Different viruses on laptop.

**Module -3:**

Tools and Methods used in Cyber crime: [8] Proxy servers, password checking, Random checking, Trojan Horses and Backdoors; DOS & DDOS attacks; SQL injection: buffer over flow.

**Module – 4**

A: Phishing & Identity Theft: [4] Phishing methods, ID Theft; Online identity method. Module – 4B: Cybercrime & Cybersecurity: [4] Legal aspects, Indian laws, IT act, Public key certificate

**Text books:**

Cyber security by Nina Gobole & Sunit Belapune; Pub: Wiley India.

**Subject Name: Natural Language Processing**

**Subject code IT 802B**

**Contacts: 3L**

**Credit point: 3**

**Module I**

Regular Expressions and Automata (Recap) [2L] Introduction to NLP, Regular Expression, Finite State Automata Tokenization [5L] Word Tokenization, Normalization, Sentence Segmentation, Named Entity Recognition, Multi Word Extraction, Spell Checking – Bayesian Approach, Minimum Edit Distance Morphology [4L] Morphology – Inflectional and Derivational Morphology, Finite State Morphological Parsing, The Lexicon and Morphotactics, Morphological Parsing with Finite State Transducers, Orthographic Rules and Finite State Transducers, Porter Stemmer

**Module II**

Language Modeling [4L] Introduction to N-grams, Chain Rule, Smoothing – Add-One Smoothing, Witten-Bell Discounting; Backoff, Deleted Interpolation, N-grams for Spelling and Word Prediction, Evaluation of language models. Hidden Markov Models and POS Tagging [4L] Markov Chain, Hidden Markov Models, Forward Algorithm, Viterbi Algorithm, Part of Speech Tagging – Rule based and Machine Learning based approaches, Evaluation

**Module III**

Text Classification [4L] Text Classification, Naïve Bayes' Text Classification, Evaluation, Sentiment Analysis – Opinion Mining and Emotion Analysis, Resources and Techniques Context Free Grammar [5L] Context Free Grammar and Constituency, Some common CFG phenomena for English, Top-Down and Bottom-up parsing, Probabilistic Context Free Grammar, Dependency Parsing

**Module IV**

Computational Lexical Semantics [4L] Introduction to Lexical Semantics – Homonymy, Polysemy, Synonymy, Thesaurus – WordNet, Computational Lexical Semantics – Thesaurus based and Distributional Word Similarity Information Retrieval [5L] Boolean Retrieval, Term-document incidence, The Inverted Index, Query Optimization, Phrase Queries, Ranked Retrieval – Term Frequency – Inverse Document Frequency based ranking, Zone Indexing, Query term proximity, Cosine ranking, Combining different features for ranking, Search Engine Evaluation, Relevance Feedback

**Books:**

1. Speech and Language Processing, Jurafsky and Martin, Pearson Education
2. Foundation of Statistical Natural Language Processing, Manning and Schütze, MIT Press
3. Multilingual natural language Processing Applications from Theory to Practice: Bikel, Pearson.



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

Advanced Computer Architecture

IT 802C

Contracts: 3L

Credits- 3

Computer Architecture and Organization-Review, Fundamentals of Computer Design, Technology Trends Cost Performance Analysis (3L)

Parallel Processing Architectures- Taxonomy- SISD, MISD, SIMD, MIMD, PRAM models (3L), Data and Resource Dependencies, Program Partitioning and Scheduling, Control Flow vs. Data Flow (3L)

Network topologies-Static, Dynamic, Types of Networks (3L)

RISC vs. CISC, Memory Hierarchy, Virtual Memory (4L)

Concepts of Pipelining, Instruction Pipelining, dynamic pipelining, arithmetic pipelines. (4L)

Multiprocessors- Multistage Networks, Cache Coherence, Synchronization, Message- passing (4L)

Vector Processing Principles- Instruction types, Compound, Vector Loops, Chaining (4L)

Array Processors- Structure, Algorithms (3L)

Data Flow Architecture- Graphs. Petri Nets, Static and Dynamic DFA, VLSI Computations (4L)

Parallel Programming Models, Languages, Compilers (4L)

Books:

1. Computer Architecture and Parallel Processing- Kai Hwang and A. Briggs International Edition, McGraw Hill
2. Advanced Computer Architecture: D. Sima, T. fountain, P. Kacsuk, Pearson
3. Parallel Computer Architecture: D. Culler, J.P.Singh, A.Gupta, Elsevier

**Subject Name: Parallel Computing**

**Subject code IT 802D**

**Contacts: 3L**

**Credit point: 3**

**Module I**

Introduction.-Parallel Processing Environment- Pipelining and Data Parallelism, Scalability, Flynn's Taxonomy,. (3L) Parallel Processing organization- Mesh, Hyper-tree, Pyramid, Butterfly, Hypercube network (4L)

**Module II**

Parallel Algorithms –Structure, cost, Analysis ;Elementary Algorithms: Broadcast, Prefix sums, All sums (4L) Algorithms on Selection problem, Merging-Odd-even merging network, CREW Merging, N-ary searching (6L) Matrix Transposition ,Matrix Multiplications- 2D Mesh SIMD ,Hypercube SIMD, Shuffle-Exchange SIMD models. Discrete Fourier Transform, Fast Fourier Transform (6L) .

**Module III**

Linear system of equations- Gaussian Elimination, Gauss-Seidel algorithm, Jacobi algorithm (3L) Sorting – Enumeration sort, Odd-even transposition sort, Bitonic merge, Ellis's Algorithm (3L)

**Module IV**

Graph Algorithms, Spanning Tree Algorithms, (4L) Parallel Programming Languages –FORTRAN 90, OCCAM(4L)

**Books for reference:**

1. Parallel Computing –Theory and Practice -Michael J. Quinn (McGraw Hill Inc.)
2. Design and Analysis of Parallel Algorithms- S.G. Akl (PH)

**Subject Name: E Commerce Lab.**

**Subject code IT891**

**Contacts: 3L**

**Credit point: 2**

Following E-Commerce experiments are to be implemented using either VB, ASP, SQL or JAVA, JSP, SQL. • Creating E-Commerce Site [3P]: Designing and maintaining WebPages. Advertising in the Website, Portals



**Department of Information Technology**  
**Jalpaiguri Govt. Engg. College, (A Govt. Autonomous College)**  
**Jalpaiguri – 735102**

**Syllabus for UG Classes effective from First July, 2013**

and Vortals. E-Commerce Interaction [6P]: Comparison Shopping in B2C, Exchanges Handling in B2B, Interaction Examples: Virtual Shopping Carts. • E-Commerce Applications [6P]: Online Store, Online Banking, Credit Card Transaction Processing. Books: 1. E-Commerce through ASP by W Clarke- BPB 2. Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS by Mathew Reynolds, Wrox Publishers 3. Professional Java Server Programming J2EE 1.3 Edition By Allamaraju et al, SPD.

**IT- 881: Grand - Viva : 0-0-0-0-4:** Each student has to appear for final viva.

**IT- 882: Project-II: 0-0-9-9-6:** A final / detailed project to be completed, a Thesis on that topic to be submitted and to be appeared in a seminar to defend the submitted final project. With the respective group leaders, being involved in their respective tasks, all the projects develop at a rapid rate. The respective mentors assign different agenda to the group leaders. The group leader then conveys the information to the respective group members. It's the group leader's responsibility to assign task to every group member. This gives a brilliant opportunity to every group leader to show their leadership qualities and gives every member a chance to show their co-ordination skills.

\*\*\*\*\*