**SYLLABUS PRESCRIBED FOR**

**FOUR YEAR DEGREE COURSE IN**

**BACHELOR OF ENGINEERING**

**INFORMATION TECHNOLOGY**

**SEMESTER PATTER**

**(CREDIT GRADE SYSTEM)**

**SEMESTER : THIRD**

**3 IT 01/3 KS 01 / 3 KE 01 MATHEMATICS-III**

**SECTION-A**

**UNIT-I:** Ordinary differential equations:- Complete solution, Operator

D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variations of parameters, Cauchy’s and Legendre’s linear differential equations.

**UNIT-II:** Laplace transforms:- definition, standard forms, properties

of Laplace transform, inverse Laplace transform, initial and final value theorem, convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function Solution of Linear differential equations, Simultaneous differential equation by Laplace transform method.

**UNIT-III:** a) Difference equation:- solution of difference equations of first

order Solution of difference equations of higher order with constant coefficients (b) Z-transform:- Definition, standard forms, Z-transform of impulse function, Unit step functions, Properties of Z transforms (linearity, shifting, multiplication by k, change of scale), initial and final values, inverse Z-transforms (by direct division and partial fraction), Solution of difference equation by Z-transforms.

**SECTION-B**

**UNIT-IV:** a) Fourier transforms:- Definition, standard forms, inverse

Fourier transforms, properties of Fourier transforms, convolution theorem, Fourier sine and Fourier cosine transforms and integrals. b) Partial differential equation of first order of following form:- (i) f (p, q)=0; (ii)f (p, q, z)=0; (iii) f (x, p)=g (y, q); (iv) Pp + Qq= R (Lagranges Form); (v) Z = px+qy+f (p,q) (Clairaut form)

**UNIT-V:** Complex Analysis :- Functions of complex variables, Analytic

function, Cauchy-Reimann conditions, Harmonic function, Harmonic conjugate functions, Milne’s method conformal mappings (translation, rotation, magnification and bilinear transformation),singular points, expansion of function in Taylor’s and Laurent’s series.

**UNIT –VI:** Vector calculus:- Scalar and vector point functions, Differentiation of vectors, Curves in space, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point function and their physical meaning, expansion formulae (with out proof), line, surface, volume integrals, irrotational and solenoidal vector fields.

**BOOKS RECOMMENDED:-**

1) Elements of Applied Mathematics, Vol. II by P.N.Wartikar and J.N.Wartikar

2) Applied Mathematics, Vol. III, J.N. Wartikar and P.N. Wartikar, Pune

Vidyarthi Griha Prakashan, Pune.

3) Advancing Engg. Mathematics by E.K.Kreyzig.

4) A Text Book of Applied Mathematics by P.N.Wartikar and J.N.Wartikar.

5) Higher Engg. Mathematics by B.S.Grewal.

6) Control System by Gopal and Nagrath.

7) Integral Transforms by Goyal & Gupta.

**3 IT 02 PROGRAMMING METHODOLOGY**

(8 Hrs. / Unit)

**Unit I:** Introduction to Computer and Languages, OOPS and Software

development: Software Engineering and SDLC. Java Basics: Program Components, Compilation cycle. Introduction to Applet and Application, Data types and Variables

**Unit II :** Operators: Arithmetic operators, relational operators, Assignment operators. Control statement: Selection statement: if, nested if, switch statement. Repetition statements: while, do-while, for, nested loops. Introduction to Math class. Arrays: Basics, One dimensional, Multidimensional, Array of Objects, Passing array to method.

**Unit III:** Introducing classes, class fundamentals, declaring objects, methods, class data,& instance data, constructor, this keyword, access control, Introduction to String and String Buffer classes.

**Unit IV:** Event handling: Event handling mechanism, Delegation Event

model, Event, Event Listener: Action Listener, mouse Listener, mouse Motion Listener, window Listener , Introduction to AWT, AWT classes: Button, Text Field, Label. Working with Graphics, Working with colors. AWT controls Fundamentals: Adding and removing controls, responding to control. Using 93 94 delegation Event model: Handling mouse events

**Unit V:** Applet class and its methods, Adapter classes, Inheritance, Polymorphism, Abstract classes and Interface, Packages. Multithreaded Programming: The java thread model, Creating a thread, Creating multiple threads.

**Unit VI:** Java File I/O: File, File Dialog object, Low and High level File

I/O, the Stream classes, Byte Stream: Input stream, Output stream, File Input stream, File Output stream, Data Input stream, Data Output stream, Print Writer, Exception handling: Exception types, uncaught Exceptions using try and catch, throw, throws, finally. GUI objects programming: Frame class, menus and other GUI objects.

**TEXT BOOK:**

1) Herbert Schildt : Java Complete References(McGraw Hill)

**REFFERENCE BOOKS :**

1) C.Thomas Wu: An Introduction to OOP with Java(McGraw Hill)

2) E. Balaguruswami : Programming with JAVA (4th edition), McGraw Hill

3) Sachin Malhotra : Programming in JAVA, Oxford Press.

**3 IT 03 DISCRETE STRUCTURE**

(7 Hrs. / Unit)

**UNIT I :** Mathematical Logic : Statements & Notation , Connectives , Normal forms , The Theory of Inference for the statement calculus , Predicate calculus , The Theory of the Predicate Calculus.

**UNIT II:** Set Theory : Basic concepts of Set Theory , Representation of Discrete Structure, Relation and ordering, Functions , Recursion.

**UNIT III :** Algebraic Structures : Algebraic Systems , Semi groups and Monoids , Grammars and Languages, Polish expression & their compilation ,Groups , Semi groups.

**UNIT IV :** Lattice & Boolean Algebra : Lattices as Partially ordered sets, Boolean Algebra, Boolean Functions, Representation of Boolean Functions , Minimization of Boolean Functions.

**UNIT V:** Graph Theory : Basic concepts of Graph Theory , Paths , reachability & connectedness, Matrix representation of graphs , Storage Representation and Manipulation of Graphs. Trees :Tree Traversal , Minimal spanning trees. PERT.

**UNIT VI:** Computability theory :Finite state machines , Finite state acceptors and regular grammers. Turning, machines and partial recursive functions.

**TEXT BOOK** :

1. J.P.Trembley, R.Manohar :”Discrete Mathematical Structures with Application to Computer Science” 1988 (Tata McGraw Hill)

**REFERENCE BOOKS:-**

1. S.K. Chakraborty & B.K.Sarkar ;”Discrete Mathematics” OXFORD.

2 Swapan Kumar Sarkar: “A Text Book of Discrete mathematics”

(S.CHAND).

3. Bernard Kolman,Robert C.Busby, Sharon Ross: “Discrete

Mathematical Structures” Third Edition PHI

**3 IT 04 ELECTRONICS DEVICES AND CIRCUITS**

**UNIT I:** Semiconductor Diodes: Forward & Reverse resistance: : PIV, HWR, FWR, BR, and Comparison,. Filter circuits, Inductive, Capacitive & π filter. Voltage stabilization,, Zener diode , characteristics, LED, 7 segment displays ,photodiodes, their principal of operation & application.

**UNIT II: Transistors:** BJT basic principal, BJT connections, CB, CE & CC. Input – Output characteristics, amplification factor. The CE amplifier (Simple analysis), DC load line, Operation point, Stability Factor, Transistor biasing circuit, base resistor method, biasing with feedback resistor, voltage divider method, FET basic principal.

**UNIT III: RC Oscillator:** Basic principal, Barkhausen criterion phase shift oscillator, Wein- Bridge oscillator, Crystal oscillator, Transistor as a switch.

**Introduction to P-spice:** Introduction to PSPICE, Input files, element values, nodes, sources, type of analysis, output variables, output commands, output files, types of output. Finding node voltage & currents.

**UNIT IV: Operational Amplifier:** Block diagram of op-amp, Differential amplifier, DC analysis, constant current source, DC level shifting, Op-amp parameters, transfer characteristics, study of IC uA741. Inverting & non-inverting amplifier,

**UNIT V: Linear & non-linear application of Op-Amp:** voltage follower, Summing amplifier, Subtractor, Integrator, Differentiator, Comparator, Zero crossing detector,. 3 pin IC Voltage regulator 78XX, 79XX series.

**UNIT VI: Timer & PLL:** Block diagram of IC 555, application of Timer IC 555 as astable, monostable multivibrator, phase lock loops: operations of phase lock loop system, transfer characteristics, lock range capture range.

**Text Books**

1. N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta: Basic Electronics &

Linear circuits, (TTTI)

2. M.H. Rasid: SPICE for circuits & electronics Using PSPICE (PHI)

3. Gayakwad R.A.: Op-Amps & Linear Integrated circuits (PHI)

**Reference Books**

1. Malvino: Principals of Electronics(TMH)

2. Millman & Halkins: Electronics Devices & Circuits (MC Graw Hill)

3. K.R.Botkar: Integrated circuits (Khanna P

4. D.Roy Choudhury & Shail Jain: Linear Integrated circuits (NAIL)

**3 IT 05 ASSEMBLY LANGUAGE PROGRAMMING**

**Unit I:** Introduction to Number system (Decimal, Binary, Hexadecimal), Microprocessor 8086 architecture-BIU and EU, pin configuration, Software model of 8086 microprocessor. Memory addresses space and data organization. Data types. Segment registers, memory segmentation. IP & Data registers, Pointer, Index registers. Memory addresses generation,

Maximum and Minimum Modes.

**Unit II:** 8086 Instruction set overview, addressing modes. 8086 instruction formats. 8086 programming: Integer instructions and computations: Data transfer instructions, Arithmetic instructions, and logical instructions. Shift and rotate instructions and their use in 8086 programming

**Unit III:** 8086 Instruction, Logical Instruction: Shift and ritate instruction and their use in 8086 programming, 8086 flag register and Flag control instructions control flow and jump instructions, Loops & loop handling instructions.

. 8086 I/O Address space. Subroutines and related instructions, Concept of Macros and their types. 8086 programming using these instructions

**Unit IV:** Stack and Subroutines, 8086 stack segment and stack related instructions, 8086 I/O Address space. Subroutines and related instructions, Parameter passing, Concept of Macros, Status saving on stack, Concept of recursion at assembly program level, 8086 Programming using subroutins, recursion and macros.

**Unit V:** 8086 I/O: Types of input output, isolated I/O interface, input output data transfers, I/O instructions and bus cycles. Programmable Peripheral Interface 8255 PPI: pin diagram, internal organization, modes of operation. Programmable Interval Timer / Counter 8253: pin diagram, internal organization, modes of operation

**Unit VI:** 8086 Interrupts types, priority and instructions. Interrupt vector table, External hardware-interrupt interface signals & interrupts sequence. Software interrupts, Non-maskable interrupts. Programmable Interrupt Controller 8259: pin diagram, internal organization, modes of operation. Introduction to Intel 32-bit processors.

**TEXT BOOKS:**

1. Avtar Singh & Walter A. Triebel: The 8088 and 8086 Microprocessors, Programming, Interfacing, Software, Hardware, and Applications, PHI, 2003.

**REFERENCES:**

1. Barry B. Brey : The Intel Microprocessor Architecture, Programming

& Interfacing (6/e)(PHI)

2. John P Uffenbeck, “8086/8088 Families: Designing, Programming and

Interfacing”. Prentice Hall

3. D. V. Hall: Microprocessors and Interfacing, TMH.

**3IT06 Programming Methodology Lab.:** Minimum Eight experiments/programming assignments must be completed

based on the 3 IT 02 syllabus covering each of the units.

**3IT07 Electronics Devices & Circuits Lab. :** Minimum Eight

experiments/programming assignments must be completed

based on the 3 IT 03 syllabus covering each of the units. At

least two experiments must be conducted using PSPICE.

**3IT08 Assembly Language Programming Lab. :** Minimum Eight

experiments/programming assignments must be completed

based on the 3 IT 04 syllabus covering each of the units.

**3IT09 Computer Lab-I (Linux,Unix) Lab. :** Minimum Eight

experiments/programming assignments must be completed

based on Linux and /or Unix.

97 98

**SEMESTER : FOURTH**

**4IT01 DATA STRUCTURES**

Unit I: Data structures basics, Mathematical /algorithmic notations & functions, Complexity of algorithms, Subalgorithms. String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms.

Unit-II : Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, Bubble sort, Linear search and Binary search algorithms. Multidimensional arrays, Pointer arrays. Record structures and their memory representation. Matrices and sprase matrices.

Unit-III : Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion operations on linked lists. Header linked lists, Two- way linked lists.

Unit-IV : Stacks and their array representation. Arithmetic expressions:

Polish notation. Quick sort, an application of stacks, Recursion. Tower of Hanoi problem. Implementation of recursive procedures by stacks, Queues. Deques. Priority queues.

Unit-V : Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes : threads. Binary search trees, searching, inserting and deleting in binary trees. Heap and heapsort. Path length & Huffman’s algorithm. General trees, M-way search Trees.

Unit-VI : Graph theory, sequential representations of graphs, Warshalls’ algorithm, Linked representation, operations & traversing the graphs. Posets & Topological sorting. Insertion Sort, Selection Sort. Merging & Merge-sort, Radix sort, Hashing.

**Textbook :**

Seymour Lipschutz : “ Theory & Problems of Data Structures” Schaum’s Outline series (Mc Graw-Hill) International Editions.

**REFERENCES :**

1. Reema Thareja : Data Structures Using C. (Oxford)

2. Ellis Horowitz, Sartaj Sahni – Fundamentals of Data Structures (CBS Publications)

3. Trembley, Sorenson:- An Introduction to Data Structures with Applications.

4. Aho Ullman : Analysis and Design of Algorithms.

5. Bhagat Singh, Naps : Introduction to Data Structures.

**4IT02 COMMUNICATION ENGINEERING**

**Unit I**: AM Transmitters

Modulation, need of modulation, AM Modulation, Frequency spectrum, Principles of DSB-FC, DSBSC, SSB-SC modulation and their comparison, Details of DSBFC Transmitter, Generation of DSB-SC by using balanced modulators (FET & Diodes), DSB-SC Transmitter, Generation of SSB-SC by phase-shift method.

**Unit II:** AM Receivers

TRF receiver, Superhetrodyne receiver, Details of each block such as RF amplifier, mixer oscillator, IF amplifier, Diode detector, Audio Amplifier. Need and type of AGC, Communication Receiver, Selectivity filter method, Phase shift method , sensitivity, Image rejection ration of communication

receiver, Noise calculation in DSB-FC,DSB-SC & SSB-SC

**Unit III**: FM Transmitters

FM Modulation, Frequency Spectrum, Circuits & Analysis for direct FM generation using FET and varactor diode. Circuit & analysis of Indirect FM generation, Narrow Band and Wide Band FM, their comparision, Pre-emphasis and De- emphasis.

**Unit IV**: FM Receivers

Details of FM receiver, blocks such as R.F. amplifier, local oscillator, IF amplifier, Mixer, AudiQ Amp!., AGC, Limiter, FM Discriminator, Single Slope and Balanced slope detector, Analysis of Foster seeley and ratio detectors, Stereo FM receiver, Noise in FM Reception, FM threshold effect.

**Unit V:** Pulse Modulation Technique :

The sampling theorem, Sampling of Band-Pass Signal, Linear and Non linear quantization, Aliasiry effect, Aperture effect, Reconstruction of filter, Time Division Multiplexing, Pulse Amplitude Modulation, Pulse Time Modulation, PCM, DM, ADM

**Unit VI** :Signal Analysis

Fourier Series, Exponential Fourier Series, Fourier Transform, Properties of Fourier Transform, Delta Function, Fourier Transform of Periodic functions, fundamental of Power Spectral Density & Energy Spectral Density, Correlation, auto-correlation, Cross-correlation.

**Text Books**

(1) Kennedy G. : “Electronic Communication System” Tata Mc-Graw

Hill Co.,New Delhi (Third Edition)

(2) Taub and Schilling D.L. : Principles of Communication Systems, Mc-

99 100

Hill Co, Tokeyo, 1994 (II Ed.)

**Reference books:-**

(1) B. P. Latbi : “Modern Digital and Analog Communication Systems”

Oxford University Press, New Delhi.

(2) Hari Bhat: “Analog Communication, 2nd Edition Pearson India, 2010”

(3) S. Kundu: “ Analog & Digital Communication, Pearson India, 2010”

(4) R.P.Singh, S.D. Sapre: Communication System, Anolog and Digital,

Tata Mc-Graw Hill Co., New Delhi.

**4IT03 OJECT ORIENTED TECHNOLOGIES**

**UNIT I :** Introduction to Object Oriented Programming**:** Introduction to procedural, modular, object-oriented and generic programming techniques, Limitations of procedural programming, Need of object-oriented programming, fundamentals of object-oriented programming. Objects &

classes in C++: Declaring & using classes, Constructors, Objects as functions arguments, Copy Constructor, Static class data. Arrays of objects,

**UNIT II :** C++ string Class. Operator overloading :Overloading unary

& binary operators. Data conversion. Pitfalls of operator overloading. Pointers& Arrays. Pointer & functions. New & deleter operators. Pointers For objects.

**UNIT III** : Inheritance in C++ :Derived class & base class, Derived class Constructors, Function overloading, class hierarchies, public and private inheritance, multiple inheritance Containership : classes within classes.

**UNIT IV** : Virtual functions concepts, Abstracts classes & pure virtual

Functions. Virtual base classes, Friend functions, static Functions, Assignment and copy initialization the this pointer. Dynamic type information. Introduction to C++ graphics, creating basic shapes, using colors and styles .

**UNIT V**: Streams & File in C++: Stream classes, stream errors, disk File

I/O with streams File pointers, Error handling in file I/O File I/ O with members functions, overloading the extractions & Insertion operators, Memory as a stream object, command Line arguments. Multifile programs.

**UNIT VI :** Function Template, class templates, Exception syntax Multiple exceptions, exception with arguments. Introduction to the Standard Template Library. Algorithms, Sequential Containers iterators, specialized iteratrors, associative containers Function objects.

**Text Book:**

1. Robert Lafore Object-Oriented Programming in C++ (Galgotia Publications)

**References:**

1. E. Balaguruswamy, “Object Oriented Programming with C++”, Tata

McGraw-Hill Publishing Company Ltd, New Delhi ISBN 0 - 07 - 46203 X.

2. Herbert Schildt C++ : Complete Reference (TMH)

3. BPB Editorial Board Advanced C++(BPB Publications)

4. Lipmann C++ Primer (Addison-Welsley)

**4IT04/4BM04 SOCIAL SCIENCES & ENGINEERING ECONOMICS**

**SECTION - A**

**Unit I :** Study of Social Science : Importance to Engineer, salient features of Indian constitution. Fundamental Rights and Duties. Directive Principles of State Policy. (9)

**Unit II :** Indian Parliament : composition and powers. President of India : Election and Powers. Council of Ministers and Prime Minister (9)

**Unit III :** Impact of Science and Technology on culture and Civilization.

Human Society : Community Groups, Social Control : Meaning, Types and Agencies. Marriage and Family : Functions, Types and problems.

**SECTION - B**

**Unit IV:** Nature and scope of Economics : Special significance of Economics to Engineers. Production : Factors of production, Laws of return, Various Economic systems, Forms of Business Organisation. (9)

**Unit V :** Banking : Functions of Central and Commercial Banks.

Taxation : Principle of taxation, Direct and Indirect taxes. Market : Forms, perfect and imperfect competition, pricing under perfect and imperfect competition, prices discrimination under monopoly. (9)

**Unit VI:** Economics of Development : Meaning, Characterisitcs of under development, obstacles to Economic growth and vicious circle of poverty.

Economic Planning : meaning, objective and salient features of current five years plan of India. Planning horizons, life structuring the alternatives.

Economics of comparision of different alternative projects.(10)101 102

**Books Recommended :**

1. Pylee M.V. : Constitutional Govt. in India, S.Chand and Co.

2. Joshi G.N. : The Constitution of India, Macmillan India Ltd.

3. Mahajan : The Constitution of India, S.Chand, New Delhi.

4. Maclaver and Page : Principle of Sociology.

5. Davis K. : Human Society

6. Dewett and Varma J.D. : Elementary Economic Theory, S.Chand andCo.

7. A.N.Agrawal : Indian Economy, Problem of Development and

Planning (Wiley Eastern Ltd), New Delhi.

8. S.K.Mishra : Indian Economy, Its Development Experience. Himalaya

Pub.House, Bombay.

9. Datt R.K. : Indian Economy, S.Chand and Comp. New Delhi

P.M.Sundharam

10. Dhingra I.C. : Indian Economy

11. E.Kuper : Economics of W.R.Development, McGraw Hill Co.,

12. Jemes L.E., R.R.Lee : Economics of W.R.Planning, McGraw Hill Co.

**4IT05 NUMERICAL METHODS & OPERATION RESEARCH**

**TECHNIQUES**

**Unit I :** Error Analysis, absolute, relative and percentage errors. A error formula and error in series approximation, Solution of Non linear and polynomial equations: Bisection Method, False Position method, secant, Newton Raphson methods.

**Unit II :** Solution of Linear Systems of Equation : Gauss elimination method, Gauss Jorden Method, Gauss Seidel Iterative Method, Gaussian elimination, Matrix Inversion Method, LU factorization method. Regression, Curve fitting: Least Square Method, Correlations.

**Unit III :** Integration and Differential equations : Numerical Integration-

Trapezoidal, Simpsons one third and three eight rules, Romberse Method. Newtons forward and backword interpolation formula. Numerical differentiation : Maximum and minimum values. Lagrange’s Interpolation Method, Euler’s method, Runge Kutta methods, Predictor Corrector method, Taylor Series.

**Unit IV :** Operations Research Models and Dynamic Programming : Operations research models- classification of problems, phases of operation research, scope and limitation of operations research. Dynamic programming : Investment problem Stagecoach Problem, Equipment Replacement problem, conversion of final value problem into an intial value problems.

**Unit V :** Linear Programming and Sequencing: Linear programming –

Concept of Linear Programming, simplex method, Big-M Method, Two Phase Simplex Method, concept of duality, transportation problems, Assignment Problem, Hungarian Method. Sequencing Problem: Two-Machine, N-Jobs, and Three Machine Problem.

**Unit VI :** PERT and CPM : Pert Networks, ET, TE, TL, SE and Critical

path, Probability of completion. Decision theory : Introduction, Minimax decision procedure, Bayes decision procedure with and without data, Regret function Vs. Loss function.

**TEXT BOOKS :-**

1) Computer Oriented Numerical Methods : V.Rajaraman, Second Edition,

Prentice Hall of India Pvt. Ltd., New Delhi.

2) Introduction to Operation Research : Billy, E.Gillett, Tata McGraw

Hill Pub. Co. Ltd., New Delhi.

**REFERENCE BOOKS**

1) Introduction to Methods of Numerical Analysis : S.S.Shastry, Second

Edition, Prentice Hall of India Pvt. Ltd., New Delhi.

2) Optimization Theory and Applications : S.S.Rao, Second Edition, Wiley Eastern Limited, New Delhi.

3) J. N. Kapoor- Mathematical Statistics Tata McGraw Hill Pub. Co. Ltd.

**4IT06 Data Structures Lab :** Minimum Eight experiments/ programming assignments must be completed based on the respective syllabus covering each of the units.

**4IT07 Communication Engineering Lab :** Minimum Eight experiments/programming assignments must be completed based on the respective syllabus covering each of the units.

**4IT08 Object Oriented Technologies Lab :** Minimum Eight experiments/programming assignments must be completed based on the respective syllabus covering each of the units.

**4IT09 Computer Lab-II (HTML) :** Minimum Eight experiments/

programming assignments must be completed based on HTML.

This Lab is based on Web publishing. The topics to be covered include

1. Web Publishing

2. Web Page Design

3. Exposure to IE & NN Browsers

103 104

4. Dynamic HTML.

Each group of 2 students should build their own Website.

**Text Book:** M. Petrovsky : Dynamic HTML in Action (TMH)

\*\*\*\*\*

***Content of the Compulsory Subject***

***“Environmental Studies” are given on Page***

***Nos. ES-1 to ES-4 i.e. at the end of this syllabus.***