# Syllabus
# Diploma in Computer Engineering
# (Day Course)
# w.e.f.-2012

**Computer Engineering Section, University Polytechnic**
**Faculty of Engineering and Technology**
**Jamia Millia Islamia**
**New Delhi-110025**

## First Semester

| S. No | Code No | Subject | Credit Hrs | Sessional | Univ. Exam | Total | Periods/ Week |
|-------|---------|---------|------------|-----------|------------|-------|---------------|
| *Theory Courses* | | | | | | | |
| 1 | DCOS 101 | Communication Skill - I | 4 | 40 | 60 | 100 | 4 |
| 2 | DCOM 102 | Applied Maths-I | 4 | 40 | 60 | 100 | 4 |
| 3 | DEE 103 | Electrical and Electronics Engg. | 4 | 40 | 60 | 100 | 4 |
| 4 | DME 104 | Elements of Mechanical Engg. | 4 | 40 | 60 | 100 | 4 |
| 5 | DCO 105 | Fundamental of Computers | 4 | 40 | 60 | 100 | 4 |
| *Practical Courses* | | | | | | | |
| 1 | DEE 113 | Electrical and Electronics Engg. | 2 | 30 | 20 | 50 | 2 |
| 2 | DME 116 | Workshop Practice | 2 | 30 | 20 | 50 | 3 |
| 3 | DME 117 | Engineering Drawing-I | 2 | 30 | 20 | 50 | 3 |
| 4 | DCO 115 | P.C.Software Lab. | 2 | 30 | 20 | 50 | 2 |
| | | *Total* | *28* | *320* | *380* | *700* | *30* |

## Second Semester

| S. No | Code No | Subject | Credit Hrs | Sessional | Univ. Exam | Total | Periods/ Week |
|-------|---------|---------|------------|-----------|------------|-------|---------------|
| *Theory Courses* | | | | | | | |
| 1 | DCOM 201 | Applied Maths-II | 4 | 40 | 60 | 100 | 4 |
| 2 | DCOP 202 | Applied Physics | 4 | 40 | 60 | 100 | 4 |
| 3 | DEL 203 | Electronics Devices and Application | 4 | 40 | 60 | 100 | 4 |
| 4 | DCOC 204 | Engineering Chemistry & Environmental Science | 4 | 40 | 60 | 100 | 4 |
| 5 | DCO 205 | Programming in C | 4 | 40 | 60 | 100 | 4 |
| *Practical Courses* | | | | | | | |
| 1 | DCOP 212 | Applied Physics | 2 | 30 | 20 | 50 | 2 |
| 2 | DEL 213 | Electronics Devices and Application | 2 | 30 | 20 | 50 | 2 |
| 3 | DCOC 214 | Engineering Chemistry | 2 | 30 | 20 | 50 | 2 |
| 4 | DCO 215 | Programming in C | 2 | 30 | 20 | 50 | 2 |
| | | *Total* | *28* | *320* | *380* | *700* | *28* |

## Third Semester

| S. No | Code No | Subject | Credit Hrs | Sessional | Univ. Exam | Total | Periods/ Week |
|---|---|---|---|---|---|---|---|
| *Theory Courses* | | | | | | | |
| 1 | DCO 301 | Computer Oriented Numerical Methods | 4 | 40 | 60 | 100 | 4 |
| 2 | DCO 302 | Object Oriented Programming | 4 | 40 | 60 | 100 | 4 |
| 3 | DEE 303 | Signals & Systems | 4 | 40 | 60 | 100 | 4 |
| 4 | DCO 304 | Computer Architecture | 4 | 40 | 60 | 100 | 4 |
| 5 | DEL 306 | Digital Electronics | 4 | 40 | 60 | 100 | 4 |
| *Practical Courses* | | | | | | | |
| 1 | DCO 312 | Object Oriented Programming | 2 | 30 | 20 | 50 | 2 |
| 2 | DCO 314 | Computer Workshop | 2 | 30 | 20 | 50 | 2 |
| 3 | DCO 315 | Computer System & Maintenance | 2 | 30 | 20 | 50 | 2 |
| 4 | DEL 316 | Digital Electronics Lab | 2 | 30 | 20 | 50 | 2 |
| | | *Total* | *28* | *320* | *380* | *700* | *28* |

## Fourth Semester

| S. No | Code No | Subject | Credit Hrs | Sessional | Univ. Exam | Total | Periods/ Week |
|---|---|---|---|---|---|---|---|
| *Theory Courses* | | | | | | | |
| 1 | DCOS 401 | Communication Skills - II | 4 | 40 | 60 | 100 | 4 |
| 2 | DCO 402 | Database Management System | 4 | 40 | 60 | 100 | 4 |
| 3 | DCO 403 | Operating System | 4 | 40 | 60 | 100 | 4 |
| 4 | DCO 404 | Data Structures | 4 | 40 | 60 | 100 | 4 |
| 5 | DEL 405 | Microprocessor & Microcontroller | 4 | 40 | 60 | 100 | 4 |
| *Practical Courses* | | | | | | | |
| 1 | DCO 412 | Database Management System | 2 | 30 | 20 | 50 | 2 |
| 2 | DCO 413 | Operating System | 2 | 30 | 20 | 50 | 2 |
| 3 | DCO 414 | Data Structures. | 2 | 30 | 20 | 50 | 2 |
| 4 | DEL 415 | µP Programming | 2 | 30 | 20 | 50 | 2 |
| | | *Total* | *28* | *320* | *380* | *700* | *28* |

## Fifth Semester

| S. No | Code No | Subject | Credit Hrs | Sessional | Univ. Exam | Total | Periods/ Week |
|-------|---------|---------|------------|-----------|------------|-------|---------------|
| *Theory Courses* | | | | | | | |
| 1 | DCO 501 | Computer Graphics | 4 | 40 | 60 | 100 | 4 |
| 2 | DCO 502 | Web Technology | 4 | 40 | 60 | 100 | 4 |
| 3 | DCO 503 | Data Communication & Computer Networks | 4 | 40 | 60 | 100 | 4 |
| 4 | DCO 504 | Software Engg. | 4 | 40 | 60 | 100 | 4 |
| 5 | DCO 505 | Java Programming | 4 | 40 | 60 | 100 | 4 |
| *Practical Courses* | | | | | | | |
| 1 | DCO 511 | Computer Graphics & Multimedia | 2 | 30 | 20 | 50 | 2 |
| 2 | DCO 512 | Web Technology | 2 | 30 | 20 | 50 | 2 |
| 3 | DCO 513 | Computer Networks | 2 | 30 | 20 | 50 | 2 |
| 4 | DCO 515 | Java Programming | 2 | 30 | 20 | 50 | 3 |
| 5 | DCO 520 | Minor Project | 1 | 25 | - | 25 | - |
| | | *Total* | *29* | *345* | *380* | *725* | *29* |

## Sixth Semester

| S. No | Code No | Subject | Credit Hrs | Sessional | Univ. Exam | Total | Periods /Week |
|-------|---------|---------|------------|-----------|------------|-------|---------------|
| *Theory Courses* | | | | | | | |
| 1 | DCO 601 | Advanced RDBMS | 4 | 40 | 60 | 100 | 4 |
| 2 | DCO 602 | Visual Programming | 4 | 40 | 60 | 100 | 4 |
| 3 | DCO 603 | Information Security & Cyber Law | 4 | 40 | 60 | 100 | 4 |
| 4 | DCO 604/605/ 606 | *Elective | 4 | 40 | 60 | 100 | 4 |
| 5 | DCO 608 | ICT Management & Entrepreneurship Development | 4 | 40 | 60 | 100 | 4 |
| *Practical Courses* | | | | | | | |
| 1 | DCO 611 | RDBMS | 2 | 30 | 20 | 50 | 2 |
| 2 | DCO 612 | Visual Programming | 2 | 30 | 20 | 50 | 2 |
| 3 | DCO 620 | Project | 8 | 120 | 80 | 200 | 6 |
| 4 | DCO 630 | Industrial Training & Visits | 1 | 25 | - | 25 | - |
| | | *Total* | *33* | *405* | *420* | *825* | *30* |

*Elective: - 1. 604: Embedded System, 2. 605: Artificial Intelligence , 3. 606: Mobile Computing.*

**NOTE: Project Topics (DCO 620) shall be assigned to the students at the commencement of 5th Semester.**

# COMMUNICATION SKILLS -I

## DCOS-101

| UNIT | Topic | Marks |
|------|-------|-------|
| I. | Reading<br><br>*a. Comprehension ( Beginner )* | 10 |
| II. | Grammar<br><br>*a. Tenses , Active , Passive*<br>*b. Vocabulary* | 20 |
| III. | Structure<br><br>*a. Sentence Formation*<br>*b. Word Formation* | 10 |
| IV. | Writing - I<br><br>*a. Report Writing*<br>*b. Curriculum Vitae* | 10 |
| V. | Writing - II<br><br>*a. Application*<br>*b. Business Letter* | 10 |

# APPLIED MATHEMATICS-I
## DCOM-102

**UNIT I:**      **ALGEBRA**

Arithmetic progression, its nth term, sum to n terms. Geometric progression, its nth term, sum to n terms and sum of infinite terms. Binomial theorem (without proof) for any index, General and middle term, terms independent of x, First and second binomial approximation.

**UNIT II**      **DETERMINANTS**

Determinants (upto $3^{rd}$ order only), minors, co-factors, Properties of determinants, solution of linear simultaneous equations in three variables by Cramer's rule.

**UNIT III**      **MATRICES**

Definition and examples of matrices, types of matrices, basic operations, equality of matrices, addition, multiplication and scalar multiplication of matrices, transpose of a matrix, symmetric, skew-symmetric matrices, singular and non-singular matrices, cofactor matrix, adjoint of a matrix, inverse of a matrix, solutions of simultaneous equations in three variables by matrix inverse methods.

**UNIT IV**      **CO-ORDINATE GEOMETRY OF TWO DIMENSIONS**

Definition of locus with problems, Equations of straight lines in various forms. Angle between two lines, Perpendicular distance formula, Conic sections, Circle, Parabola, Ellipse and Hyperbola.

**UNIT V**      **VECTORS**

Scalar and vectors, addition and subtraction of vectors and their simple applications, multiplication of vector by scalar, Scalar and vector product of two vectors. Scalar product of three vectors, Geometrical interpretation.

## ELECTRICAL & ELECTRONICS ENGINEERING
## DEE-103

**UNIT-I          D C CIRCUIT:**

Laws of resistance, Effect of temperature on resistance, Ohm's law, series & parallel combination of resistances grouping of cells, series, parallel, and mixed  combinations, Series and parallel combination of Inductors.

**UNIT-II          ELECTROSTATICS & CAPACITANCE:**

Concept of capacitance & its ratings, parallel plate ,spherical ,& cylindrical capacitor & their capacities, energy stored in capacitor, concept of dielectric, dielectric constant, dielectric breakdown, series & parallel combination of capacitor, numerical problems

**UNIT-III          ELECTROMAGNETISM:**

Analogy between electric & magnetic circuit ,force on a moving charge & current in a magnetic field, force between two current carrying parallel conductor, magnetic field around current carrying straight conductor, Faradays laws, Lenz's law, Fleming's rule, principle of self & mutual induction, numerical problems.

**UNIT-IV          A C CIRCUITS:**

Concept of alternating current and voltage equation of instantaneous values , a c through pure resistance, pure  inductance & pure capacitance, concept of conductance, susceptance & admittance, R L, R C , R L C ,series parallel circuits ,different  methods of solving a c series & parallel circuits , numerical problems

**UNIT-V          ELECTRONICS & ELECTRONICS COMPONENTS:**

Active & Passive Component current and voltage source, conversion of voltage source to current source or vice-versa, semiconductors, n-p-n & p-n-p transistor, configuration (CB,CE, &CC) numerical problems.

## UNIT – I TRANSMISSION OF POWER:

Different modes of power transmission Belt drive :Material of belt, flat belt  V belt open and cross belt device, length of belt (without derivation),Velocity ratio, slip, angle of contact, derivation of tension ratio for flat belt., Power transmitted through belts.

Advantage of V-belt over flat belt. Simple numerical problems. $T1/T2 = e^{\mu\emptyset}$

Chain Drive: Classification Clutch: Principle of clutch, comparison between chain and belt drive.

Pulleys: Introduction, types of pulleys.

Gears: Spur, helical, bevel, spiral, worm gear, rack and pinion, Gear trains: simple & Compound gears train and simple numerical problems.

## UNIT-II

Steam generators: Introduction, classification, Differentiation between fire tube and water Tube boilers. Simple vertical boiler, Babcock & Wilcox boiler, Cocharan boiler, Boiler accessories and mountings,

Turbines: Introduction & classification of steam turbine, concept of reaction and   Simple impulse turbine, comparison between impulse & reaction turbines, losses in steam turbine.

Hydraulics turbine**:** Classification, construction, working of pelton wheel, Francis turbine and application of reaction and impulse turbine.

## UNIT –III Internal Combustion Engines:

1. Classification & application of I.C. engine commonly used spark ignition engine and compression engines.

2. Working principles of two stroke petrol and diesel  engine

3. Ignition system in petrol engine.

4. Simple carbonator

5. Cooling and lubrication system of IC engines.

Lubricants:  Introduction, method of lubrication: Petrol System, mixed, Splash, force system,

## UNIT-IV

Pumps Construction and Working of reciprocating, centrifugal and gear pump, Air compressor: Working of various type of air compressor and their application  Material Handling  :Tower and bridge crane, jaw Crushers, Hydraulic jack and hydraulic Lift.

**UNIT-V**

Refrigeration and Air Conditioning System: Introduction, unit of refrigeration, coefficient of performance, vapour compression cycle, simple vapour absorption cycle. Applications. Air conditioning System: Purpose of air conditioning,  Factor affecting air conditioning ,Some definition relating to psychometric parameters like dry bulb temp., wet bulb temp., humidity etc. Window air conditioner and desert cooler.

## FUNDAMENTAL OF COMPUTERS

## DCO-105

### UNIT–I

Digital Computer systems, Characteristics, Digital vs. Analog computer Systems, History, Computer Generations, Types of computers & their classifications, Application of Computer in various fields, Computer Hardware & Software, Elements of computer hardware-CPU, I/O devices, storage and media used in PCs, Computer Software-Types of Software, System Software, Application Software.

### UNIT-II

Types of PC e.g. Desktops, Workstations, Laptops, Notebooks, Palmtops, Memory System of a PC, Primary Memory, RAM (Random Access Memory, ROM(Read Only Memory), Secondary Memory, Types of Secondary Storage, Access Mechanism of storage Devices, PC setup and ROM-BIOS, Advanced Input/output Devices and their use MICR, OCR, Scanners, Light pen, Plotters.

### UNIT–III

Number System - decimal, binary, octal and hexadecimal, Conversion from Decimal to Binary, Conversion from Binary to Decimal, Octal and Hexadecimal number system, representation of integers, floating point number, signed number representation, Binary Arithmetic-addition, subtraction, multiplication and division.

### UNIT–IV

Basic concept & functions of an operating system, textual Vs GUI Interface, type of Operating Systems, concept of multiprogramming, multitasking, multiprocessing, Introduction to disk operating system (DOS), Commands and utilities, working with MS Windows, Unix and Linux, Working knowledge of PC Software Word Processor.

# WORKSHOP PRACTICE –I
## DME-116

**Carpentry shop:**

Introduction of tools. Making of various joints**- Cross** lap joint,  Half lap joint, Mortise and tenon joint, Dovetail  joint.

**Fitting shop:**

Introduction of tools

Cutting and filing practice as per drawing

Drilling

**Smithy Shop:**

Introduction of tools

Hot working and cold working

Making of U clamp, fan hook

Making of sheet metal Joints

**Welding Shop**:  A/C welding and gas welding

Preparation of lap joint and but joints

Preparation of Oxy acetylene gas welding joints

# ENGINEERING DRAWING-I

## DME-117

**Unit-I  Introduction:**

**a.**      **Drawing Instruments:** Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards.

**b.**      **Lines, Lettering and Dimensioning :**

Different types of lines and  freehand  Sketching **,** Different types of lines in engineering drawing as per BIS Specifications**,**   Practice in free hand sketching of vertical , horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles,  parabolas', curves and ellipses .

**Unit-II Lettering techniques and Practice**:  Instrumental single stroke vertical  and inclined ) lettering of 3to 7.mm. height. Instrumental double stroke lettering of 35 mm height in the ratio of 7:4 vertical

**Unit-III Dimensioning**:  Necessity of dimensioning, terms and notations- methods and principles, dimensioning small components as in 4.2. below( mainly theoretical instructions) ,  Dimensioning  of overall sizes, circles thread holes,  chamfered  surfaces, angles tapered surface holes equally spaced on PCD counter sunk hole counter bored  holes, cylindrical parts narrow. Space and gaps radii curves and arches chain and parallel dimensioning.

**Unit-IV Scale:**  Scales and their need  and importance, Definition  of representative  fraction (RF) find  RF of a given scale , Types of scales , Construction of plain and diagonal scales.

**Unit-V** Constructions  of  curves  such  as  ellipse,  parabola ,  hyperbola, cycolise   epicycloid hypocycloid and involute .

# APPLIED MATHEMATICS-II

## DCOM-201

### UNIT-I        DIFFERENTIAL CALCULUS

Limit and continuity (without problems), Differentiation of functions by First Principle, Differential of sum, product and quotient functions, Differential of a function of a function (Chain rule), Logarithmic differential, Higher order derivatives.

### UNIT-II        INTEGRAL CALCULUS

Indefinite integral, Integration of a function, standard formulae, the fundamental laws of integration, Integration by substitution method, by parts method and partial fractions method.

### UNIT-III        APPLICATIONS OF CALCULUS

Maxima and minima, Tangent and normal, Evaluation of definite integral. Properties of definite integral, Area bounded by a curve between two ordinates and x-axis.

### UNIT-IV        DIFFERENTIAL EQUATIONS

Differential equation, Order and degree of differential equations, Solution of differential equations of first order and first degree, variable separable, Homogeneous and linear differential equations, Solution of linear differential equations of 2nd order with constant co-efficient.

### UNIT-V        COMPLEX NUMBERS

Complex Number, representation of a complex number (Argand Diagram), Complex number in rectangular, polar and exponential forms, Conversion from one form to another form. De Moiver's Theorem, Roots of complex number.

# APPLIED PHYSICS

## DCOP-202

### Unit- I

Coulomb's law, electric field and potential at a point due to a point charge, potential difference, equipotential surface. Electric field at a point due to uniforms charged thin sheet; capacitor, capacitors in series and parallel. motion of charge particle under electric and magnetic fields, Biot-savart law, magnetic field around a current carrying conductor, and at the center of circular loop, force experienced by a current carrying conductor, Torque**:** on current loop, working and principle of moving coil galvanometer, conversion of galvanometer into ammeter and voltmeter,.

### UNIT –II

**Semi-Conductor Physics:-** Intrinsic semi conductors- conductivity, atomic and crystal structure of germanium and silicon, covalent bonds, generation and recombination, effect of temperature on conductivity of intrinsic semi-conductor, energy level diagrams of conductor, insulator and intrinsic semi-conductors. Extrinsic semi-conductor materials. Doping of impurity, P and N type semi-conductors and their conductivity. Minority and Majority charge carriers. Drifts and diffusion current.

### UNIT -III

**Current Electricity:-**concept of current, factors on which resistance depends, specific resistance, Kirchhoff's law, application of Kirchhoff's law to wheat stone bridge, meter bridge, P.O.Box potentio meter, heating effect of current, heat produced by electric current in a conductor and Joule's law of electrical heating, determination of value of 'J' by electrical method.

### Unit - IV

Magnetic properties of materials and magnetic circuit, Para, dia, ferromagnetic substances, magnetic circuits, magneto motive force(mmf), reluctance, permeance, ohm's law of magnetic circuit, reluctance in series, reluctance in parallel, relation between mmf and magnetizing force(H), magnetic circuit due to a solenoid and hysteresis loop, generation and propagation of electromagnetic waves, complete electromagnetic spectrum, electromagnetic radiation and earth's atmosphere.

### UNIT- V

**Atomic models:-** J.J Thomson model, Rutherford model, Bohr's model and its shortcoming, X ray;- production, properties and uses, LASERS;- properties and applications.

**Natural radioactivity:-** half life, mass defect & binding energy, nuclear stability, fusion, fission, energy generated in reactors and radiation hazard.

# ELECTRONIC DEVICES AND APPLICATION

## DEL 203

## UNIT - I

### Introduction

Fundamentals of Electronics and Applications. Introduction to active and passive components. Voltage and Current source. PN Junction diode, V-I characteristics, static and dynamic resistances.

## UNIT -II

### Diode Applications

Diode as half wave, full wave, and bridge rectifier. Ripple factor, and its value for half and full wave rectified output. Calculation of DC voltage, RMS voltage, and efficiency.

### Filter Circuits

Capacitor input filter, choke input filter, LC filter, RC filter and Pie filter. Brief idea and applications of power diodes, Zener diode, and Varactor diode.

## UNIT -III

### Introduction to the Bipolar Junction Transistors

Concept of bipolar transistor as to junction three terminal device, PNP and NPN transistors their symbols and mechanism of current flow, explanation of fundamental current relations, concept of leakage current, effect of temperature on leakage current. CB, CC & CE configuration: input and output characteristics. Determination of different transistor parameters. Transistor as an amplifier in CE configuration, DC load line, concept of power gain. Transistor biasing. Effect of fixing operating point in cut-off, saturation, and active region on the performance of the amplifier.

## UNIT - IV

### Introduction to FETS

Introduction to JFET and MOSFETs operation, characteristic and parameters. Comparisons between BJT and FET. Basic BJT and FET amplifier. CMOS. Simple FET amplifier circuit and its working principles.

**UNIT** - V

**Opto Electronics**

Working principle and characteristic of Photo resistors, Photo diode, and Phototransistors Photovoltaic cells, LCDs and Opto-Couplers, Seven-Segment Displays. Simple applications
**Integrated Circuits**

Importance of ICs in modem electronics, classification of ICs, Some examples of ICs and their functions/applications. Brief introduction to fabrication of BJT. Difference between SSI, MSI, LSI, VLSI. Mention of different IC packages. Brief introduction to different IC technologies and their comparison.

**Books Recommended:**

1. Electronic Devices and Circuit Theory          Robert Boylested/Louis Nashelsky

2. Basic Electronics and Linear Circuits          N. N. Bhargava

3. Applied electronics          R. S. Sedha

4. Electronics Devices and Circuits          Sanjeev Gupta

5. Electronic Principles          Malvino

6. Electronic Principles          Sahdev

# ENGINEERING CHEMISTRY AND ENVIRONMENTAL SCIENCE
## DCOC-204

**Unit I: Volumetric and Gravimetric analysis**

1. Molecular mass, mole, weak and strong electrolytes Equivalent mass and

   Gram-equivalent

2. Strength, Normality and Molarity of a solution, Normality equation

3. Problems based on Volumetric and Gravimetric analysis.


**Unit II : Water Chemistry**

1. Impurities in water, Hardness, Units of Hardness and Calcium carbonate equivalent.

2. Estimation of Dissolved Oxygen, Alkalinity and Hardness by EDTA method


**Unit III: Corrosion and Lubricants**

1. Dry and Wet corrosion, Galvanic corrosion, Concentration corrosion, Pitting corrosion

   and Stress corrosion.

2. Protection of corrosion by Proper designing, Alloying, Cathode protection and Coating

   methods

3. Types and Mechanism of Lubricants, Characteristics of lubricants like Viscosity, Acid

   value, Saponification value, Cloud point, Pour point, Flash point and Fire point.


**Unit IV: Metal and Alloys**

1. Cast iron, Steel and Heat treatment

2. Necessity of making alloys, Composition, properties and uses of Brass, Bronze, Gun

   metal, Invar and Duralumin


**Unit V:        Polymers and Management of Waste Materials**

1. Polymers, addition and condensation polymerization, co-polymerization. Examples
2. e-waste materials, disposal, recycling and their harmful effects.

# PROGRAMMING IN C

## DCO-205

**UNIT-I**

Computer Languages, Generation of Languages, Translators- Assemblers, Interpreters, Compilers, Algorithm, Pseudo-code, Flowcharts- rules & symbols, Structured Programming concepts, various techniques of programming, Use of programming.

**UNIT– II**

Introduction to 'C', importance of C, basic structure of a C program, constants, variables and data types, Operators and expressions, managing I/O operators, Control Statement: 'IF' statement and its various forms, goto statement, for, while and do- while loops, Switch Decision making statement.

**UNIT–III**

**Arrays:** Array notation, storage and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, String, **Functions:** User defined functions and their use.

**UNIT IV**

**Pointers:** Introduction to Pointers, address operator and pointers, declaring and initializing pointers, assignment through pointers, pointers and arrays, **Structures:** Purpose and usage of structures, declaring structures, assigning of structures, File Handling – sequential and random file, Memory allocation, Command Line Parameters.

# COMPUTER ORIENTED NUMERICAL METHODS

## DCO-301

**UNIT-I**

Introduction: Number and their accuracy, Computer Arithmetic, Mathematical Preliminaries, Errors and their Computation, General error formula, Error in a series Approximation. Solution of Algebraic and Transcendental Equation: Bisection Method, Iteration Method, Method of false Position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of Convergence of Iterative methods, Polynomial Equations.

**UNIT-II**

Interpolation: Finite Differences, Difference Tables, Polynomial Interpolation: Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, Sterling's, Bessel's formula, Interpolation with unequal intervals: Lagrange's Interpolation, Newton Dividend difference formula, Hermite's Interpolation.

**UNIT-III**

Numerical Integration and Differentiation: Introduction, Numerical differentiation

Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.

**UNIT-IV**

Solution of differential Equations and Statistical Computation: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Methods, Predictor Corrector Methods Frequency chart, Curve fitting by method of least squares, fitting of straight lines, Polynomials, exponential curves Data fitting with cubic splines.

# OBJECT OREINTED PROGRAMMING

## DCO-302

**UNIT- I**

Structured Verses Object Oriented Development, Elements of Object Oriented Programming, Introduction to Objects, Classes, Encapsulation and data abstraction, Inheritance Polymorphism, Overloading. C++ Data types, Variables, Operator and expression. Statements and Blocks, if statement, Loops, switch statements.

**UNIT- II**

Introduction, Classes, Class definition, Class member, member function, Public and Private Variables, Derived Classes, Constructors and Destructors, Exception Handling.

**UNIT- III**

Scope of Variables, Inline function, Friend function, Friend class, Parameter passing. Inheritance, types of inheritance, Virtual functions.

**UNT- IV**

Polymorphism, Overloading, Operator Overloading of Unary and Binary operators, Function Overloading. Templates, File Handling and Graphics.

# SIGNALS AND SYSTEMS
## DEE-303

**Unit - I** **Signals & Systems**

Transformation of Independent Variable, Continuous and Discrete Time Signals, Systems, Properties of the System, Linear Time-Invariant Systems, Representation of Signals and Block Diagram Representation, simple problems.

**Unit II** **Modulation**

Continuous Time Sinusoidal Amplitude, ,Modulation and its Applications, Pulse Amplitude Modulation and Time Division Multiplexing Single Sideband Amplitude Modulation, Continuous Time Frequency Modulation, Simple Problems.

**Unit-III** **Sampling**

Representation of a Continuous Time Signal, Recognition of a Signal, Effect of Under sampling, Discrete-Time Processing of Continuous-Time Signals, Sampling in Frequency Domain, and Discrete Time-Signals, Discrete Time Decimation, and Interpolation, Simple Problems

**Unit-IV** **Linear Feedback Systems**

Some Applications and Consequences of Feedback, Root Locus Analysis, Nyquist Stability Criterion, Gain and Phase Margins, Simple Problems.

# COMPUTER ARCHITECTURE

## DCO-304

### UNIT-I

Central Processing Unit, General Register and Stack Organization , Instruction formats, Addressing Modes, Data Transfer and Manipulation, Program Control, RISC and CISC, Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic Mircro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit, Instruction codes, Computer Registers ,Computer instructions –Instruction cycle.

### UNIT- II

Computer Arithmetic, Addition and Subtraction, Multiplication and Division Algorithms, Floating Point and Decimal Arithmetic operations, Booth Multiplication Pipelining-Arithmetic, Instruction and Arithmetic Pipelining, Vector Processing, Array Processors.

### UNIT -III

Memory Organization, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Cache and Virtual Memory, Control memory, Address sequencing, design of control unit, Hard wired control. Micro-programmed control

### UNIT-IV

Input-Output Organization, Peripheral devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access, I/O Processor-Serial Communications.

# DIGITAL ELECTRONICS
## DEL-306

**Unit-I**

**Number System:**

The Binary system, binary to decimal conversion and decimal to binary conversion. Octal and hexadecimal system, negative numbers: signed magnitude representation, l's compliment and 2's complement representation. Binary codes: BCD code, grey code and excess-3 code.

Logic Gates:

Symbols and truth tables of inverter, AND, OR, NAND, NOR, EX-OR, EX-NOR, Application of NAND and NOR as universal gate. Laws and theorems of Boolean algebra and their application. DeMorgan's theorem, logic families: DTL, TTL, ECL, etc, Basic difference and their characteristics.

**Unit - II**

**Combinational Circuits**

Half and full adder, half and full subtractor, multiplexer and demultiplexer circuits, encoder and decoder circuits, Parity bit generator.

Flip flop Circuit:

Difference between combination and sequential circuits, working and application of RS and JK flip flop, Master - Slave JK flip flop, D-type and T -type flip flop.

**Unit - III**

**Counters:**

Asynchronous counters: four stage binary ripple counter. Decade counter, Up down counter, 5-Bits synchronous counter with series carry, up down synchronous counter with parallel carry. Application of counters.

**Unit - IV**

**Shift Registers:**

Buffer register, serial and parallel shift register.

**Semiconductor Memories:**

'ROM, RAM circuits and their applications, Introduction of PROM, EPROM and EEPROM

**Unit- V**

**Display Systems:**

Seven segment display system, dot matrix display system: 3x5 dot matrix and 5x7 dot matrix, Nixie tube, LED, LCD.

***A/C* and D/C converters:**

A/D converters: parallel comparator type ADC, counter type ADC, successive approximation type and dual slope integration type ADC.

DA converters: binary weight resistance DAC, ladder network DAC. Application of ADC and DAC.

**COMMUNICATION SKILLS-II**
**DCOS-401**

| UNIT | Topic | Marks |
|------|-------|-------|
| I. | Reading<br><br>*a. Comprehension ( Advanced )* | 10 |
| II. | Grammar<br><br>*a. Direct & Indirect* | 5 |
| III. | Writing<br><br>*a. Dialogue*<br>*b. Paragraph* | 15 |
| IV. | Speaking - I<br><br>*a. Presentation Skills* | 15 |
| V. | Speaking - II<br><br>*a. Interview* | 15 |

# DATABASE MANAGEMENT SYSTEM

## DCO-402

**UNIT- I**

An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence  and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

**UNIT- II**

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

**UNIT- III**

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, Introduction to SQL: Characteristics of SQL, Advantage of SQL, SQL data types and literals, Types of SQL commands, Aggregate functions, Insert, update and delete operations, Joins, Unions, and intersections in SQL.

**UNIT- IV**

Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

# OPERATING SYSTEM

## DCO-403

**UNIT-I**

Introduction: Operating System and Function, Evolution of Operating System, Batch,

Interactive, Time Sharing and Real Time System, Operating System Structure: System Components, System Structure.

**UNIT-II**

Process Concept, Critical Section Problem, Synchronization, Semaphores, Process Generation, Process Scheduling. CPU Scheduling:  Scheduling Concept, deadlock Characterization, Prevention, Avoidance and Detection, Recovery from Deadlock

**UNIT–III**

Memory Management: Multiprogramming with Fixed Partition, Multiprogramming With Variable Partition, Multiple Base Register, Paging, Segmentation, Paged Segmentation, Virtual  memory Concept, Demand Paging, Performance, Paged Replaced Algorithm, Allocation of Frames, Thrashing,

**UNIT-IV**

File System: File Concept, File Organization and Access Mechanism, File Directories, File Sharing, Implementation Issues, Disc scheduling.

# DATA STRUCTURES

## DCO-404

**UNIT-I**

Concepts of data type and data structures, array and pointer variables: 1-D array, 2-D array, view of array and pointers at implementation level, concept of dynamic variable and implementation, Introduction to Stacks and Queues.

**UNIT-II**

Introduction to Pointers, self-referential Structures, dynamic memory allocation, Study of linked list, Circular list, doubly linked list, Stack, queue; Sequential and linked list implementation of stack and queue.

**UNIT-III**

Introduction to complexity, Concept of divide and conquer, sorting and searching algorithms and their efficiency consideration; Sorting and searching algorithms: Insertion sort, bubble sort, selection sort, quick sort, linear search, binary search algorithm.

**UNIT-IV**

Non linear data structure: Graph, tree: binary tree, complete binary tree, binary search tree; Tree traversal algorithms: Inorder, preorder, postorder traversal ; graph traversal algorithms: depth first search, breadth first search.

# MICROPROCESSOR & MICROCONTROLLER

## DEL - 405

## UNIT 1:-

ARCHITECTURE AND PROGRAMMING MODEL:-Architecture block diagram, register and flags, Interrupts, Main future of 8085.address space portioning, address decoding concept timing diagram for fetch, read write operation.

## UNIT 2:-

INSTRUCTION SET:-Instruction classification of 8085: Concept of instruction. opcode and operand, single, two and three byte instruction according to operation .data transfer group ,arithmetic and logical group , stacks control, transfer group .assembly language and machine language formats. Assembly language programming concepts, programming exercises.

## UNIT 3:-

INTERRUPTS & I /O:-Synchronous and Asynchronous data transfer DMA data transfer Mask able and non-mask able interrupts, vectored interrupt scheme of 8085.RIM & SIM instructions concept of interfacing, interfacing slow peripherals, I/O ports

## UNIT 4:-

MICROCONTROLLER & PERIPHERAL INTERFACE CHIPS:-Features, block diagram, operating modes, microcontroller 8085, interfacing chip PPI8255.DMA controlled 8257.programmable interrupt controllers 8259, keyboard and display interface chip 8279 & programmable interval timer 8253.

## UNIT 5:-

INTERFACING REAL-WORLD SIGNALS :-ADC& DAC concepts, interfacing 8- bit ADC, interfacing 8 bit DAC development tools .MDS & its role in system development. Logic analysers & its uses.

# COMPUTER GRAPHICS

## DCO-501

**UNIT – I**

Introduction to Computer Graphics, Graphics hardware, I/O devices, Display devices Random scan displays, Raster scan displays.

**UNIT-II**

Points and lines, Line drawing algorithms, Circle generating algorithms, Mid-point circle generating algorithm, Graphic standards, applications, simple and symmetric DDA, Bresenham algorithm.

**UNIT – III**

Transformations: Basic transformation, Matrix representations and homogenous coordinates. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms-Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Polygon clipping – Sutherland Hodgeman polygon clipping.

**UNIT – IV**

Three Dimensional:  3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.

# WEB TECHNOLOGY

## DCO-502

### UNIT-I

Introduction to web, protocols governing the web, web development strategies, web applications, web project, web team, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development.

### UNIT-II

Introduction to Hyper Text Markup Language (HTML), HTML elements, Tables, Images, Forms, Frames, XHTML syntax and Semantics, extensible Markup Language (XML), XML schemes, Object Models, Presenting XML, Using XML Processors, element, attributes, entity declarations, DTD (Document type definition )files and basics of Cascading Style Sheet (CSS List).

### UNIT-III

Java script: Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script, documents, forms, statements, functions, objects, Event and event handling; introduction to AJAX, VB Script, CGI , PERL.

### UNIT-IV

Evaluation of web applications, type of web documents, feature of web pages, multitier web applications, introduction to Apache web server. Security in application: authentication, authorization, auditing, security issues, security on the web, proxy server, Firewall, Web Servers ,Web server and its deployment, Web client, services of web server, mail server, proxy server, multimedia server.

# DATA COMMUNICATION AND COMPUTER NETWORKS

## DCO-503

### UNIT-I

Data Communication:  Data Transmission, Analog Transmission, Digital Transmission, Data Encoding: Digital Data- digital signals, Digital Data- analog signals, Analog Data-Digital Signals, Analog Data- Analog Signals, Synchronous and Asynchrous Transfer. Transmission media: Twisted pair, Coaxial Cable, Optical Fibers, Wireless Transmission, Microwave, Radio Waves, and Infrared.

### UNIT-II

Introduction to Computer network: Goals and Applications of Networks, Network structure and architecture, Protocols, OSI reference models, TCP/IP protocol suit. Data link control and protocol: Flow Control - Stop and Wait, Sliding window,  Error Detection, Error Control, HDLC.

### UNIT- III

LAN  architecture, LAN topologies - BUS/Tree LAN, Ring  LAN, Star  LAN,  Wireless  LAN, Ethernet and  Fast  Ethernet  (CSMS/CD), Token ring and FDDI. Network layer: Introduction, Routers, Routing Algorithms, Congestion control algorithm, Addressing, Internet working.

### UNIT-IV

Transport Layer protocols, Transport services, TCP, UDP. Wide area networks, Circuit switching, Packet switching, Frame relay, ATM, ISDN. Application Layer:  domain name system, simple network management protocol, File Transfer, Access and Management, Electronic mail, HTTP, WWW, web browsing, multimedia file transfer.

# SOFTWARE ENGINEERING

## DCO-504

### UNIT-I

Introduction to Software Engineering, software components, software characteristics, software crisis, software processes, similarity and differences from conventional engineering processes, software quality attributes. Software development life Cycle (SDLC) models: Waterfall model, Prototype model, Spiral model, Evolutionary development models, Iterative enhancement models.

### UNIT-II

Requirements Elicitation: Interviews, brainstorming sessions, the use case approach.

Requirement Analysis: Data flow diagram, data dictionaries, entity-relationship diagram.

Requirements documentation: Nature of SRS, characteristics of good SRS, organization of the SRS and case study.

### UNIT-III

Size estimation, cost estimation, static, single variable models, constructive cost models (COCOMO), software risk management, software risk assessment and estimation models (SRAEM). Basic concept of software design, Modularization, flow charts, coupling and cohesion measures, Top –Down and Bottom-Up design.

### UNIT-IV

Software testing: Testing objectives, testing process, various terminologies, functional testing, Structural testing: path testing, Cyclomatic complexity, graph matrices, data flow testing and mutation testing. Levels of testing: unit testing, integration testing and system testing and software quality.

# JAVA PROGRAMMING

## DCO-505

### UNIT-I

Java Features, Constant, Variables and Data Types, Scope of variable, Type casting, standard default values, Operator and Expression, Decision making and Looping :The While statement, The do statement, The for statement, Jumps in Loops, Labelled Loops. Classes, Object and Methods Defining a class, Creating object, Accessing class members, Constructor, Methods Overloading, Static Variables.

### UNIT-II

Inheritance: Extending a Class and implementing interfaces, Overriding Methods, Final variable and Methods, Final Classes, Abstract method and Classes, Visibility Control, Array, Strings and Vectors, String, Wrapper Classes.

### UNIT-III

Packages ,Multi-Threading: Extending a thread class, Life cycle of thread, Using thread method, Thread exceptions, Thread priority, Synchronization, Implementing a 'Runnable'' Interface, Managing Errors and Exceptions, Types of errors, Exception, Multiple catch statement, using finally statement.

### UNIT-IV

Applet Programming :Local and remote applets, Building applet code, Applet life cycle, Creating an Executable Applet, Designing a Web page, Applet tag, Adding Applet to HTML file, Running the Applet, Passing parameter to applet Graphics Programming : The Graphics Class, Lines and rectangle, Circle and Ellipse, Drawing Arcs, Drawing Polygons, Line Graphs, Using control loops in Applets, Drawing Bar charts.

# ADVANCED RDBMS

## DCO-601

**UNIT-I**

Introduction to database model, database architecture, Relational Database, RDBMS, Database Normalization, schema.

**UNIT-II**

SQL, SELECT queries, Action Queries, Locking and Execution Plans, Query-Performance, Analysis, Database tuning, T-SQL/PL-SQL, XML, Views, procedure, function, trigger, advanced query techniques.

**UNIT-III**

Server administration, installing and configuring server, creating database, tables, indexing, snapshots, partitioning, security and policy based management, data recovery- backup and restore, Failover Clustering, Database Mirroring, Log Shipping, Replication

**UNIT-IV**

Introduction to Universal Data Access, ODBC, RDO, OLE DB, DAO, ADO- Model, ADO .Net, Connection, Command , Properties Methods & events, Cursor Type, Updating and Batch Updating, Transaction Process, Database connectivity using ADO.NET with XML, Retrieving and Displaying Data using Forms & Grid, Data forms and reports.

# VISUAL PROGRAMMING

## DCO-602

**UNIT – I**

Introduction to .NET framework, window applications, CLR, JIT compiler, Languages under .NET, Introduction to Visual programming languages: VB, C#, Visual Java, Elements for GUI programming controls, properties, methods, events, VB and C# data types and languages syntax, event driven programming, WCF, WPF.

**UNIT – II**

Basic .NET concept, user interface design control, array, structure, conditions, loops, procedures, functions, object oriented programming with VB.NET, classes, inheritance, polymorphism, namespace, error handling and exceptions, deploying window applications.

**UNIT- III**

ASP.NET, web applications with ASP.NET using C#, web form display data and user input, web form control variables and sessions, controlling website access, web form security, user login, automatic user account creation, database connectivity using ADO.NET with XML.

**UNIT – IV**

Introduction to ADO Technology - ADO vs. ADO.NET - Types of ADO.NET operations and Namespaces, System. Data, System.Data.Odbc, System.Data.OleDb, ADO.NET classes-xxxConnection classes, xxxCommand classes, xxxDataReader classes, xxxDataAdapter classes, Data tables, Data set, Data retrieval methods, Connected, Disconnected, Data Binding with controls.

# INFORMATION SECURITY AND CYBER LAW

## DCO-603

**UNIT-I**

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, authentication Service Security, Security Implication for organizations, Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

**UNIT-II**

Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges.

**UNIT-III**

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies.

Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Virtual Private Networks- Need, Use of Tunnelling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

**UNIT-IV**

Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy, Cyber Crime Types & overview of Cyber Crimes.

# EMBEDDED SYSTEM

## DCO-604

**UNIT-I**

Introduction to embedded systems, Categories of embedded systems, overview of embedded system architectures, specialties of embedded systems recent trends in embedded systems, Communication interfaces: RS232/UART, RS422/RS485.

**UNIT-II**

Survey of software Architectures: Round Robin, Round Robin with interrupts, Function Queue scheduling Architecture, RTOS Architecture, Architecture selection, Introduction to RTOS, Task and task states, Task and data, Semaphore and shared data, More operating system services, Message Queues, Mail boxes and pipes, Timer functions, events, Memory Management, Interrupt routine in an RTOS environment.

**UNIT-III**

Basic Design using an RTOS: Principle, Encapsulating Semaphores and Queues, Hard Real-time Scheduling considerations, saving memory space, saving power,

**UNIT-IV**

Embedded Software Development Tools Host and Target Machines, Linker/Locator for Embedded Software ,Getting Embedded Software into the target system, Debugging Techniques, Testing on your host machine, Instruction set Simulators, The Assert Macro using Laboratory tools.

# ARTIFICIAL INTELLIGENCE

## DCO-605

### UNIT-I

Introduction to Artificial Intelligence, Definitions, Goals of AI, AI Approaches, AI Techniques, Branches of AI, Applications of AI, Simulation of sophisticated & Intelligent Behavior in different area, problem solving in games, natural language, automated reasoning visual perception, heuristic algorithm versus solution guaranteed algorithms.

### UNIT-II

Reasoning, Symbolic reasoning, Statistical reasoning, General problem solving, Search and control strategies, Exhaustive searches, Heuristic search techniques, Constraint satisfaction problems (CSPs), models.

### UNIT-III

Knowledge representation, KR using predicate logic, KR using rules, First order predicate calculus, Horn Clauses, Introduction to PROLOG, Semantic Nets, Partitioned Nets, Minskey frames, Case Grammar Theory, Production Rules Knowledge Base, The Inference System, Forward & Backward Deduction.

### UNIT-IV

Introduction to expert system, Knowledge acquisition, Knowledge base, Working memory, Inference engine, Expert system shells, Explanation, Application of expert systems, Existing Systems (DENDRAL, MYCIN), domain exploration, Meta Knowledge, Expertise Transfer, Self Explaining System. Programming Language: Introduction to programming Language, LISP, PROLOG

# MOBILE COMPUTING

## DCO-606

**UNIT I**

Wireless Communication Fundamentals: Introduction , Wireless transmission , Frequencies for radio transmission , Signals,  Antennas, Signal Propagation, Multiplexing, Modulations,  Spread spectrum, MAC, SDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks.

**UNIT II**

Telecommunication systems, GSM, GPRS,DECT, UMTS, IMT-2000, Satellite Networks – Basics, Parameters and Configurations,  Capacity Allocation,  FAMA and DAMA, Broadcast Systems , DAB, DVB.

**UNIT III**

Wireless LAN, IEEE 802.11- Architecture, services, MAC, Physical layer, IEEE 802.11a - 802.11b standards, HIPERLAN, Blue Tooth.

**UNIT IV**

Mobile IP, Dynamic Host Configuration Protocol – Routing, DSDV, DSR, Alternative Metrics, Transport And Application Layers:  Traditional TCP – Classical TCP improvements , WAP, WAP 2.0.

# ICT MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT
## DCO –608

## UNIT – I

Management, Different Functions of Management: Planning, Organizing, Co-ordination and Control, Information and Communication Technology (ICT), Information Systems (IS), ICT Management, Role of ICT and IS in modern industry. Project Management and Research Methodology, Project Management techniques and tools for managing any type of project, Case studies and live examples to illustrate the problems associated with badly managed projects.

## UNIT – II

ICT Infrastructure and Services, methodologies and principles of ICT Service Management, IT Security and Audit, principles and policies governing information protection, Data Integrity and Control in a large installation, Data Centre Management- techniques for maintaining sanity, data currency, and system availability, Modern tools for running a Data Centre for corporate success, Standard for IT Service Management (ISO 20000).

## UNIT – III

Concept of ethics, Concept of professionalism, Need for professional ethics, Code of professional ethics, typical problems of professional engineers. Factors determining motivation, Characteristics of motivation, Methods for improving motivation, Incentives, Pay, Promotion, Rewards, Job satisfaction and Job enrichment. Need of leadership, Function of a leader, Factors to be considered for accomplishing effective leadership, Manager as a leader, Types of production, Job, Batch and mass production, E.O.Q. (Economic order quantity), Concept of quality production, Concept of total quality management, JIT (Just in time), ISO-9000 & ISO-14000, Concepts of intellectual property rights & patents.

## UNIT – IV

Concept of Entrepreneurship, Importance and need of entrepreneurship in context of prevailing employment conditions in the country, Qualities of successful entrepreneurs, Career options, Scanning of business environment, Small scale sector, Types and forms of entrepreneurs and enterprises, Government assistance, Steps in setting up enterprises, Social responsibility of an entrepreneur. Project identification techniques, Selection of a project, conducting a market survey, Preparation of project report and project appraisal.