INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY, INDORE

MCA (6 Years)

III SEMESTER

JULY-DECEMBER 2012

Sub. Code	Sub. Name	Credit
IC-301	Mathematics-III	4
IC-302	Physics-III	4
IC-303	Digital Electronics	4
IC-304	DS with C++	4
IC-305	Engineering Drawing	4
IC-306	Digital Elex. Lab	2
IC-307	Computer Lab	2
IC-308	Comprehensive Viva	4

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
MCA (6 Years) III SEMESTER
IC-301: Mathematics – III

Aim of Course: To make the students familiar with different methods of solving ordinary and partial differential equations and their application in real life situation.

Objectives:

The course is designed to make students:

- Understand mathematical modeling for practical problems related to Management Science and Technology in terms of differential equations.
- Learn the skill of solving differential equations.

Course Contents:

UNIT I

Differential equations: Meaning of differential equation, formation from primitive, examples. First order linear differential equations, method of solution, separation of variables, homogenous form, and examples. Equations reducible to homogenous form, linear form, reducible to linear form. First order exact differential equations. Condition for exactness, method of solution.

UNIT II

Integrating factor. Rules for determining I.F., examples. Diff Equation of 1^{st} order and higher degree solvable for p, y . Equations solvable for pie, clairauts form. Trajection , orthology trajectory in Cartesian and polar form.

Linear diff equation with constant coefficients. Standard form. Homogenous linear diff equation with variable coefficient. Exact differential equation of higher order condition for exactness.

UNIT III

Method for solving exact diff equators, example. Diff equators of particular forms method of solution when part of c.f. is known. 2^{nd} order linear diff equator with variable coeff method of solution when part of c.f. ic known example. Solution by factorization of operators. Method of variation of. Method of undetermined coeff. Simultaneous linear doff equators with constant coeff.

UNIT IV

Symmetrical form. Total diff equators conditions of inheritability, method of solution. Initial and boundary value problem, approximation by picards method. Series solution of diff Equator simple cases. Solution about single point.Partial diff equations formation of p.d.e

UNIT V

Solution of pdf lagrange method. Standard form I ,II. Standard form III IV. linear partial differential equation with constant coeff, homogenous form.Non homogenous with constant coeff . Non-homogenous Linear Partial differential Equations.

Reference Books:

1. Dr. N.M. Kapoor, Text book of differential equations.
2. P.N. Wartikar, Text book of Applied Maths.
3. Dr. G. Paria, Ordinary diff equations with laplace transform.
4. R.K. Gupta , J.N. Sharma, Differential equations.

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
MCA (6Years) III SEMESTER
IC-302: Physics – III

Aim of Course: The main aim of this course is to import some knowledge of modern physics, like radioactivity, Nuclear Physics, and Relativity to students.

Objectives:

The course is designed to make students:

- Understand concepts of radioactivity, nuclear physics and X-rays.
- Study band theory of solid and get concept of superconductors.
- Understand relativity and its applications.

Course Contents:

UNIT I

Radioactivity: Recursion law of successive disintegration, radioactive Equilibrium, secular and transient equilibrium activity substance units of radioactivity. Theory of alpha -decay, alpha-ray spectra. beta-decay, beta-ray spectra nectrino hypothesis, conservation of nuclear energy modes of beta decay, beta-decay, position emission. Gamma-ray spectra, internal conversion. Nuclear reactions, Rutherfords Experiment Projectile, type of nuclear reactions conservation laws. Kinematics of nuclear reaction. Artificial radioactivity, production half life period, classification application of artificial radioactivity, Radiometric dating, radio carbon age, geological dating

UNIT II

Nuclear Physics: Nuclear constituents, proton electron hypothesis, proton-neutron hypothesis. Nuclear forces, heisenberg theory, yukawa theory. Nuclear spin angular momentum, magnetic moment: magnetic and electric properties of nucleus wave mechanical properties. Shell model and liquid drop model of nucleus. Cyclotron and betatron

UNIT III

Band theory of solid: Introduction bonds between atoms ionic covalent, vanderwall's hydrogen and metallic bonds. Free electron gas ohm's law, fermi gas effect of temperature, density of states. Hall effect measurement of hall voltage and coefficient hall mobility, importance of hall effect. Super conductivity, experimental study occurance. Destruction of super conductivity by magnetic fields. BCS theory of super conductivity. Types of super conductors. Applications of high temperature of super conductors.

UNIT IV

X-Rays: Discovery production of X-rays by rintgen tube. Defects of ronregen tube. Coolidge x-ray tube. Properties of X-rays. The origin of X-rays. Mosley's law derivation of mosley law from Bohr's theory. Importance of mosley's law.X-rays spectrum continuous spectrum line spectrum.X-rays diffraction bragg's condition Bragg's X-ray spectrometer. Measurement of wavelength, lattice constraints. Crystal structure by X-rays. Crystallography by powder method, Industrial application and uses of X-rays.

UNIT V

Relativity: Introduction frames of reference. Galiliean transformations. Invariance of equations. Concept of ether micheleson morley experiment, explanation of negative result. Einstein's special theory of relativity. Lorentz transformation. Tune dilation and its verification. Length contraction and explanation of negative result of m.m experiment. Addition velocity, relativity of mass. Mass-Energy relation, energy momentum relation.

Reference Books:

1. A.S. VASUDAVAS , Modern Engineering Physics.

2. R.K.GOUR,S.L.GUPTA, Engineering Physics.
3. R.P GOYAL, Unified Physics for 3rd year classes

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
MCA (6 Years) III SEMESTER
IC-303: Digital Electronics

Aim of Course: To understand basic concepts of digital logic, its operations, principles and applications.

Objectives:

The course is designed to make students:

- Understand number systems and codes, and Boolean Algebra
- Understand TTL and CMOS circuit characteristics, followed by logic devices such as flip-flops, code converters, counters, multiplexers, and registers.

Course Contents:

UNIT I

Binary Systems and logic circuits. Decimal, Binary, Octal, Hexadecimal numbers and their inter conversions. ASCII, Gray, Excess-3, 8-4-2-1,Error detecting and BCD codes. Logic Gates. Boolean algebra. Demorgon's theorem. Binary addition and subtraction. Unsigned Binary numbers, Signed binary numbers. 2's complement representation and its arithmetic.

UNIT II

Circuit analysis and design.

Boolean laws and theorems. Sum of Product and Product of Sum simplification. Two, three and four variable karnaugh map. NAND and NOR implementation. Other two level implementation. Don't care conditions.

UNIT III

Combinational circuits.

Design procedure. Half adder, full adder, adder-subtractor circuit. Code converters. Various logic circuits. Multilevel NAND circuit. Multilevel NOR circuit.

Data Processing circuits.

Multiplexers, demultiplexers, decoders and encoders. Binary parallel adder, look ahead carry generator, magnitude comparator, ROM, PROM, PLA.

UNIT IV

Sequential circuit.

Flip-flops, triggering of flip-flops. Analysis of clocked sequential circuits, state reduction and assignment, flip-flop excitation tables.

UNIT V

Registers, counters and integrated circuits.

Design of counters, registers, shift registers. Ripple counters, synchronous counters. IC logic families.

Reference Books:

1. M.Morris Mano , Digital Logic and Computer Design.
2. Malvino A.P. and Leach D.P, Digital Principals and Application.
3. Taub H. and Schilling D, Digital Integrated Electronics

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
MCA (6 Years) III SEMESTER
IC-304: Data Structures with C++

Aim of Course: To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.

Objectives:

The course is designed to make students:

- Write programs using object-oriented design principles.
- Understand data structures such as linear lists, stacks, queues. Choose the appropriate data structure and algorithm design method for a specified application.,
- Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and graphs.
- To get a good understanding of sorting and searching techniques.

Course Contents:

UNIT I

Principles of Object-Oriented Programming: Beginning with C++, Functions in C++, Inline functions, Default arguments, Function overloading, Classes and objects. Visibility modifiers, Array of Objects, Pointer to objects, The This pointer, Friend Functions.

Constructors, Destructors and Inheritance basics: Parameterized constructors, Multiple constructors, constructors with default arguments, Dynamic initialization of objects, Copy constructor, Dynamic constructors, Destructors. Introduction to inheritance, various types of inheritance, Polymorphism, Dynamic Binding.

UNIT II

Introduction to Data Structure: Introduction to C++, Definition of data structures and abstract data types. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array. Sparse matrices

UNIT III

Stacks, Queues and Lists: Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples: Infix, postfix, prefix representation Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples: Infix, postfix, prefix representation

Applications: Mathematical expression Evaluation

Definition: Queues & Lists: Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and Singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues, Applications

UNIT IV

Sorting Searching Algorithm, Hashing: Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation, Efficiency of above algorithms, Merge sort, Merging of sorted arrays, merge sort algorithms. Quick sort algorithm, Heap sort algorithm, Radix sort

Straight Sequential Search, Array implementations, Linked List representations, Binary Search, non – recursive Algorithms, recursive Algorithms, Indexed Sequential Search, Hashing, Hash function, Collision Resolution Techniques, Hashing Applications

UNIT V

Trees & Graphs: Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal - preorder, post order, in order traversal, Binary Search Trees,

Implementations, Threaded trees, Balanced multi way search trees, AVL Trees, and their Applications.

Definition of Undirected and Directed Graphs and Networks, The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.

Reference Books:

1. E. Balagurusamy, Object – Oriented Programming with C++, Tata Mcgraw Hill.
2. A. M. Tenenbaum, Langsam, Moshe J. Augentem, Data Structures using C, PHI Publ.
3. A.V. Aho, J.E. Hopcroft and T.D. Ullman, Data Structures and Algorithms, Original edition, Addison-Wesley, 1999, Low Priced Edition.
4. Ellis Horowitz & Sartaj Sahni, Fundamentals of Data structures
5. Robert Kruse, Data Structures and Program Design in C, PHI Pub.
6. Willam J. Collins, Data Structure and the Standard Template library, Tata Mcgraw Hill.

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INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
MCA (6 Years) III SEMESTER
IC-305: Engineering Drawing

Aim of Course: To equip students with basic skills required in engineering drawings, electrical circuit diagrams, and communication

Objectives:

The course is designed to make students:

- To impart and inculcate proper understanding of the theory of projection.
- To improve the visualization skills.
- To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient.
- To learn basics of CAD/CAM software tools.

Course Contents:

UNIT I

Introduction: Drawing & Classification of drawings, Drawing Instruments and their uses, Indian standard for drawing. Geometrical Constructions; Polygon, Circle, Technical Lettering, Dimensioning.

UNIT II

Engineering Scales: Introduction – Engineering Scales, Graphical scale, Representative fraction, Types of scales – Plain, Diagonal, scale of chords.

UNIT III

Engineering Curves: Conic Section – Ellipse, Parabola, Hyperbola, Normal and Tangent to conic sections. Cycloidal Curves – Cycloid, Epi-cycloid, Hypo-cycloid, normal & tangent to Cycloidal curves. Involutes Curves – Involutes of circle, polygon, normal and tangents to involutes. Spirals Curves – Archimedean, Logarithmic, Tangents and Normal to spiral curves.

UNIT IV

Projections: Types: Parallel and non- parallel projections. Orthographic – First and Third angle Projections, convention used, Orthographic Projection of Simple solids, conversion of 3-D view to orthographic views. Isometric Projection– Simple Solids, Isometric view, Conversion of orthographic view to isometric view. Introduction to oblique projection and perspective projection.

UNIT V

Projection of Geometrical features: Points, Straight, lines, Planes and Solids.
Section of Solids: Sections of Prisms, Pyramids, cones and cylinders.
Development of Surfaces: Development of surfaces of Prisms, Pyramids, cones and Cylinders.
Introduction to Computer aided drawings CAD

Reference Books:

1. M. B. Shah & B. C. Rana , Engineering Drawing
2. N. D. Bhatt, Engineering Drawing