INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY, INDORE

MCA (6 Years)

II SEMESTER

JANUARY – MAY 2013

Subject Code	Subject Name	Credits
IC-201	Mathematics-II	4
IC-202	Statistical Methods-II	4
IC-203	Physics-II	4
IC-204	Basic Electronics	4
IC-205	Programming with C++	4
IC-206	Comp Lab Viva	2
IC-207	Electronics Lab Viva	2
IC-208	Comprehensive Viva	4
Total		28

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY, INDORE
MCA (6 Years) II SEMESTER
IC-201: Mathematics-II

Aim of Course: To familiarize the students with advanced mathematical concepts and techniques.

Objectives:

- Understand basic concepts of curve tracing, rectification, groups, cosets, homomorphism and isomorphism.
- Solve mathematical problems based on the course material.
- To develop mathematical skills and methods appropriate for students in the computer science.

Course Contents:

UNIT I

Curve tracing: Introduction, pre-requisites, for the curve tracing, maxima & minima, concavity and convexity of the curve, Singular points, asymptotes, symmetry, tangents, Main points of tracing the curve in Cartesian and polar form, some problems on curve tracing.

Improper integral: Improper Integral definition, types of the improper integral, their convergence, Beta Gamma function and their properties, some important deductions followed by some numerical problems

UNIT II

Rectification: Methods and formula for finding out the length of curve in Cartesian and polar form, numerical, intrinsic equation. Derivation of formula for finding the area under plane curve, followed by some problem solving.

Multiple integrals: Integration of function of two and three variables. Double and triple integral. Drichlet integral. Change of order of integration. Use of double and triple integral in finding the area and volumes of Cartesian curves.

UNIT III

Groups and their general properties : Binary Operation, algebraic structure, definition and example of groups, examples. Order of an element in a group. General properties of a group. Modulo System. Subgroup, complex subgroup, definition and examples, algebra of complexes. Criterion for a complex to be a subset of a group. Union and intersection of subgroups. Cyclic group and subgroups generated by a subset of a group. Theorems generating system of a group

UNIT IV

Coset and coset decomposition : Coset definition, properties of cosets. Cosets decomposition. Partioning of a group. Relation of congruency modulo in subgroups. Lagrange theorem with its corollaries. Index of a subgroup in a group. Fermat and eular theorems. Multiplication of two subgroups. Order of the product of subgroup of finite order.

Normal subgroup & quotient group: Definition, example and theorems on normal subgroup quotient groups. Cener and normalize of a group. Conjugate, self-conjugate elements of different groups.

UNIT V

Homomorphism and isomorphism of groups : Definition of homomorphism of groups, examples, various types of homomorphism, auto-homomorphism, inner automorphism, theorem, maximal normal subgroup. Permutation, Transformation groups and Cayley's thermo.

Ring and integral domain : Definition, examples and properties of ring. Types of rings, sub rings, Ideal, Types of ideals and their properties, Euclidean ring. Homomorphism and isomorphism of rings, Kernel of a ring homomorphism. Theorems on ring homomorphism, Quotient ring fundamental theorem on ring homomorphism.

Integral domain : Integral domain, sudomain, ordered integral domain, theorems. The characteristics of the integral domain, definition and theorems.

Reference Books:

1. Shanti Narayan, Differential Calculus.
2. Gorakh Prasad, Integral Calculus.
3. R.B. Thakur, Advanced Calculus.
4. H.K. Pathak, Calculus For IInd Yr.

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MCA (6 Years) II SEMESTER
IC-202: Statistical Methods-II

Aim of Course: The aim of this course is to make student aware about the statistical methods for research and real life data analysis.

Objectives:

- Understand basic concepts of statistical methods for data analysis.
- Learn Hypothesis testing.
- Learn the application of different tests such as Chi-square, T & F-statistic.

Course Contents:

UNIT I

Estimation: Unbiased-ness, consistency, efficiency and sufficiency, minimum variance unbiased estimator. Cramer-Rao inequality and its application. Maximum likelihood estimator.

Testing of Hypothesis: Simple and composite hypothesis. Test of significance for samples; test for single proportion and for difference of proportion. Test of significance for single mean, test of significance for difference of means.

UNIT II

Interval estimation: Confidence Interval and confidence limits, confidence limits for large samples.

Tests of significance: Procedure for testing of hypothesis. Test of significance for large samples. Test for single proportion and for difference of proportions. Test of significance for single mean, test of significance for difference of means

UNIT III

Test of significance for small samples: Concept of Chi-square, t & F-statistic, test for Chi-square distribution, to test goodness of fit, to test independence of attributes, to test the homogeneity of correlation coefficients.

Test based on t-distribution: t-test for single mean, difference of means , paired t-test, t-test for testing significance of an observed sample correlation coefficient

UNIT IV

Test based on F-distribution: Test for equality of population variance. Test for testing the significance of an observed multiple correlation coefficient.

Non parametric test: Sign-test, median test, run test, Wilcoxon signed rank test.

UNIT V

Analysis of variance and design of experiments: One-way & two-way classification with one observation per cell. Design of experiments, completely randomized design randomized block design and Latin square design.

Reference Books:

1. S.C. Gupta & V. K. Kapoor: Fundamentals of mathematical statistics, S.Chand sons.
2. S.C. Gupta & V. K. Kapoor: Fundamentals of Applied Statistics, S.Chand sons.
3. A.M.Gun, M.K.Gupta, B.Dasgupta: An outline of statistical theory (volume 1)
4. Kapoor & Saxena: Mathematical statistics. S. Chand and sons.

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MCA (6 Years) II SEMESTER
IC-203: Physics-II

Aim of Course: To make students aware of atomic theory and semiconductors.

Objectives:

- Develop and apply knowledge and understanding of physics.
- Develop and understand atomic models, semiconductors and their properties.

Course Contents:

UNIT I

Failure of classical mechanics for explaining photoelectric effect, black-body radiation, Compton effect. Plank's hypothesis and radiation law, properties of photons, explanation of photoelectric effect and black-body radiation on the basis of Plank's theory. Wave particle duality, de-boglie's concept of matter waves, properties of matter waves, Davision and Germers electron diffraction experiment, G.P. Thompson experiment, Heisenberg's uncertainty principle, time-dependent and time-independent Shrodinger wave equation, stationary state solution of shrodinger wave equation, solution of shrodinger wave equation for particle in a box.

UNIT II

Atomic model, Rutherford's Experiment on particle scattering, Rutherfords nuclear atomic model. Bohr's atomic model, Bohr's theory of atom. Electron energy levels in hydrogen atom, special series of hydrogen atom spectrum, Bohr's quantum condition for De-Broglie hypothesis, short comings of Bohr's theory, Sommerfield's correction for atomic model, vector atom model, quantum numbers associated with vector atom model, Pauli's exclusion principle, types of spectra.

UNIT III

Band theory in metals, Intrinsic Semiconductors, electrons and holes, Fermi level, temperature dependence of electron and hole concentrations, Extrinsic semiconductors, doping, N and P type semiconductors, conductivity, mobility, P-N junction diode, biasing of diode, Zener and Tunnel diodes, light emitting diode, Metal-semiconductor junction, transistor and its characteristics in CB and CE mode.

UNIT IV

Power supply: diode as a circuit element, load line concept, half wave, full wave and bridge rectifier, ripple factor, filter circuits such as series inductor and shunt capacitor, Zener diode as voltage regulation, regulated power supply, h-parameters of transistor, field effect transistor N-channel and P-channel, FET characteristics and its constants

UNIT V

Interference of light: the principle of superposition of waves, two slit interference, coherent sources, conditions for interference, fringe width of interference fringes, diffraction of light, half period zone method, zone plate and its multiple foci, polarization, Brewster's law, double refraction , Quarter and half wave plates, Principle of Laser, population inversion, optical pumping, Ruby and He-Ne laser.

Reference Books:

1. W.D. Stanley "Electronic Devices, Circuits and Applications"
2. B.G Stretman "Solid State Electronic Devices
3. R.P. Goyal "Unified Physics part-II and part-III"
4. D.P. Khandelwal "Optics and Atomic Physics"
5. A.K.Ghatak "Quantum Mechanics

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
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MCA (6 Years) II SEMESTER
IC-204: Basic Electronics

Aim of Course: To introduce students with basic concepts of electronics.

Objectives:

- Understand basic components of circuits.
- Understand the use of diodes as power supply rectifiers.
- Understand the operation of transistors as switching circuits.

Course Contents:

UNIT I

Basic Components: Circuit Symbols, Working Principle, Classification according to construction, Specification, and applications of passive components-Resistors & Color coding, Inductors, Transformers, Switches, Relays (Electromagnetic), Thermistor, LDR, Microphone and Loudspeakers.

UNIT II

Capacitors:- Capacitance, Capacitor Specifications, Classification of Capacitor-Fixed(Mica, Paper, Ceramic, Plastic, Electrolytic etc), Variable capacitor (Trimmer, Padder, Gang), Stray capacitance, Leakage Resistance, Testing of Condenser, Area of Application, Problem related to Electrical Energy Storage.

UNIT III

Semiconductors: Conductors, Semiconductors and Insulators, Classification on the basis of Band Theory, Intrinsic and Extrinsic Semiconductors, Diode current equation (Derivation not required), Drift & Diffusion.

UNIT IV

P-N Junction-Forward and reverse bias of Diode. Concept of recombination of carriers, Temperature variation of Forward and Reverse Current through the P-N Junction. Characteristics of Forward & Reverse Bias Diode, Dynamic and Statics Resistances, Voltage dependent Junction Capacitance of a P-N Junction

UNIT V

Special Diodes: Zener Diode, its construction and characteristics, Temperature coefficient of Zener Diode, Zener Diode as Voltage Regulator, Schottky Diode, Power Diode, Tunnel Diode, LED, Solar Cell, Photodiodes.

Reference Books:

1. Malvino A.P., Electronics principal
2. B.L. Theraja, Electrical Technology
3. V.K. Mehta Principal of electronics.
4. Boylstad, Electronics devices and circuit theory.
5. Milliman J. Halkias C, Integrated electronics

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MCA (6 Years) II SEMESTER
IC-205: Programming with C++

Aim of Course: The aim of course is to help students to gain a better understanding of OO design and program implementation by using OO language features.

Objectives:

- Understand object-oriented programming features in C++,
- Apply these features to program design and implementation,
- Understand object-oriented concepts and how they are supported by C++,
- Gain some practical experience of C++,
- Understand implementation issues related to object-oriented techniques,
- Build good quality software using object-oriented techniques

Course Contents:

UNIT I

Principle of Object Oriented Programming and Introduction of C++ : Object-Oriented Terminology, OOP Paradigm, Basic concept of OOP, Benefits of OOP, Application of OOP.
Introduction of C++: Tokens, Keywords, Identifier and constants, Operator, Data Type, Variable Manipulator, Expression and Control structure.

UNIT II

Classes and Function in C++ :
Class: Defining Classes in C++, Classes and Encapsulation, Member functions, Instantiating and Using Classes, Access specifiers, Static Class Members.
Constructor and Destructor: Use of Constructors, Multiple Constructors, Types of constructor, Using Destructors to Destroy Instances.
Function: Function Introduction, Main function, Function Prototyping, inline function, friend function.

UNIT III

Inheritance & Polymorphism: Overview of Inheritance, Defining Base and Derived Classes, Constructor and Destructor Calls, Virtual base classes, Abstract classes.
Overview of Polymorphism
Operator & Function Overloading: Operator Overloading, Working with Overloaded Operator Methods, Introduction to Function overloading.

UNIT IV

Pointer and Virtual Function : Introduction of Pointer, Dynamic memory allocation, Pointers to object, this pointer, Pointers to derived classes, Virtual Functions, Pure virtual function.

UNIT V

Working with files in C++, Exceptions Handling and Templates:
Files: Standard Streams, Manipulators, Unformatted Input and Output, File Input and Output.
Exceptions: Basics of Exception handling, Exception handling mechanism.
Templates: Template Overview, Customizing a Template Method, Standard Template Library Containers.

Reference Books:

1. E. Balagurusamy, Object-Oriented Programming with C++
2. Yashwant Kanitkar ,Let us C++.
3. The Complete Reference - C++, Tata Mcgraw Hill