Jabalpur Engineering College, Jabalpur

(Declared Autonomous by MP Govt., Affiliated to RGPV, Bhopal)

(AICTE Model Curriculum Based Scheme)

Bachelor of Technology (B.Tech.) III Semester (Information Technology)

w.e.f. July 2023

S.No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
				Theory			Practical						
				End. Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem.	Lab Work		L	T	P	
1	MA33	BSC	Mathematics-III	70	20	10	-	-	100	3	1	-	4
2	CH32	HSMC	Energy & Environmental Engineering	70	20	10	-	-	100	3	1	-	4
3	IT33	PCC	Data Structure and Algorithm	70	20	10	30	20	150	3	-	2	4
4	IT34	PCC	Object Oriented Concept on C++	70	20	10	30	20	150	3	-	2	4
5	IT35	PCC	Electronics and Digital Circuits	70	20	10	30	20	150	3	-	2	4
6	IT36	ESC	Software Lab-I	-	-	-	30	20	50	-	-	4	2
			Total	**350**	**100**	**50**	**120**	**80**	**700**	**15**	2	**10**	**22**
7	IT37	DLC	Self-Learning Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	-	-	-	-	8
8	IT38	MC	NSS/NCC/Swatchhata Abhiyan/Rural Outreach	Qualifier									
Additional Course for Honours or Minor Specialization				Permitted to opt for maximum two additional MOOC courses in subject code IT37 for the award of Honours (Minor Specialization).									

Note: MOOC/NPTEL subjects shall be taken with permission of HOD/Coordinator

1 hour lecture (L) = 1 credit	1 hour Tutorial (T) = 1 credit	2 hour Practical (P) = 1 credit

BSC: Basic Science Course, HSMC: Humanities & Social Sciences including Management Course, PCC: Professional Core Course, ESC: Engineering Science Course, MC: Mandatory Course, DLC: Distance Learning Course

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(AICTE Model Curriculum Based Scheme and Syllabus)

Bachelor of Technology (B.Tech.) III Semester, Branch (CS/IT/AI&DS)

COURSE CONTENT **w.e.f. July 2023**

Subject Code	Subject Name	Maximum marks Allotted			Total marks	Hours/Week			Total Credit
MA33	MATHEMATICS-III	Theory			100	L	T	P	4
		End Sem	Mid-Sem Exam	Quiz/ Assignment		3	1	0	
		70	20	10					

Module 1: Numerical Methods-I (08 hours)

Solution of polynomial and transcendental equations – Bisection method, Newton –Raphson method and Regula – Falsi method. Finite differences, Relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Module 2: Numerical Methods-II (10 hours)

Numerical differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of simultaneous Linear Algebraic equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's Method, Gauss-Seidal, and Relaxation method. Solution of Ordinary differential equations: Taylor's series, Euler and modified Euler's method, Runge-Kutta method of fourth order Milne's and Adam's predicator – corrector methods.

Module 3: Basic Probability (08 hours)

Probability spaces, Counting techniques, Probability measure, Conditional probability and Baye's theorem, Random variable and distribution function, Moment, Expected value and Variance of Random variables, Chebychev Inequality, Moment generating function. Bivariate discrete and continuous random variables, Independence of random variables.

Module 4: Probability Distribution (08 hours)

Measures of Central tendency: Moments, Skewness and Kurtosis. Discrete Distributions (Binomial, Poisson's distribution), Continuous Distributions (Normal, Exponential Distribution.

Module 5: Applied Statistics (06 hours)

Curve fitting by the method of least squares- Fitting of straight lines, Second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, Difference of proportions, Single mean, Difference of means and difference of standard deviations.

Books References:

1. B. S. Grewal, Numerical Method in Engineering and Sciences, Khanna Publishers
2. B. V. Ramanna, Higher Engineering Mathematics, TMH Publishers.
3. Prasanna Sahoo, Probability and Mathematical Statistics, Louisville KY40292 USA.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Edition, Wiley 1968. Statistics.
5. Introductory Statistics, Vol.1 of 2, ISBN: 978-1-304-89164-8, Open Stax College Rice University Houston, texax77005.
6. B.S.Grewal,Higher Engineering Mathematics,Khanna Publishers,35thEdition, 2010.

Course Outcomes:

At the end of the course the students will able to :

1. Understand mathematical tools for numerical solution of algebraic & transcendental equations.
2. Estimate the numerical values of function by interpolation techniques.
3. Determine derivative and integrals by various numerical methods.
4. Understand the concept of basic probability.
5. Apply probability distribution and statistics in various techniques dealing with engineering problems.

Dr. O.P. Chauhan
H.O.D.
Deptt. of App. Mathematics

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Bachelor of Technology (B.Tech.) III Semester
Branch- Common to (CE/EE/EC/CSE/IT/IP/AI&DS /MT)
COURSE CONTENTS

w.e.f. July 2023

Subject Code	Subject Name	Maximum Marks Allotted			Total Marks	Hours/Week			Total Credits
CH32	Energy & Environmental Engineering	Theory							
		End Sem	Mid-sem Exam	Quiz/ Assignment		L	T	P	4
		70	20	10	100	3	1	-	

Module 1:

A. **Introduction to Energy Science:**
World & Indian Energy Scenario, Overview to Energy Systems, Energy sustainability and Environment. Fossil Fuels. Alternatives for fossil fuels: biomass, wind, solar, nuclear, wave, tidal, hydrogen & geothermal energy.

B. **Batteries:**
Classification of Batteries, Important Applications, Lead-Acid battery, Ni-Cd battery & Li battery. Fuel Cell: Hydrogen-Oxygen Fuel cell.

Module2: Environmental Pollution A:

I. **Air Pollution**
Causes, Effects & Control Measures of Air Pollution: Primary and Secondary air pollutants and photo-chemical smog. Climate changes, Global warming, Ozone layer depletion. Pollution case studies: Bhopal gas Disaster and London smog Disaster.

II. **Water Pollution**
Definition, Causes, Effects and Control Measures (Primary & Secondary waste water treatment), Acid Rain and Marine pollution. Pollution case studies: Minamata Tragedy, Ganga Action Plan, Major oil spills of the 20th & 21st century. Water conservation, Rain water harvesting and Water Shed Management.

III. **Noise Pollution**
Causes, Effects & Control Measures.

Module3: Environmental Pollution B:

I. Sources, Adverse effects and Control measures of Soil Pollution, Thermal Pollution, Nuclear Pollution & Nuclear hazards. Major case studies.

II. Solid waste management: Municipal Solid Waste (MSW), Collection and disposal methods. Disaster Management.

III. Introduction to carbon footprint, ways to reduce carbon footprint, Carbon trading.

Module 4: Ecosystem & Biodiversity:

Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction ,Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: Biodiversity at global & National levels; India as a mega-diversity nation; Hot-spots of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and Endemic species of India; Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity. Environment Protection Act.

Module 5: Corrosion & its prevention:

Theories of Corrosion and Mechanism – Dry (Direct Chemical attack), Wet (Electro Chemical Theory) Atmospheric corrosion, Galvanic Series, Galvanic and Concentration Cell Corrosion, Corrosion by sea water. Factors Influencing and Control of Corrosion – Proper Design, Use of pure metal and metal alloys, passivity, cathodic protection – Sacrificial anode and Impressed Current. Modifying the environment, Use of inhibitors.

Protective coatings:

Hot dipping, Electroplating, Metal spraying metal cladding & cementation.

TEXT BOOKS

1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.
3. A text book of Environmental Chemistry and Pollution control by S.S. Dara & Dr. D. D. Mishra, S. Chand & Co, New Delhi
4. Energy,Environment Ecology and Society by Dr.Pushpendra,Vayu Education of India New Delhi
5. Energy, Environment Ethics and Society, by Dr.S.Deswal & Dr.A.Deswal Dhanpat Rai Publishing Company, New Delhi

REFERENCE BOOKS

1. J.C. Kuriakose and J. Rajaram, "Chemistry in Engineering and Technology", Vol.1 & 2, Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi
2. Mars G. Fontana, "Corrosion Engineering", Tata Mcgraw Hill Publishing Company (P) Ltd., New Delhi.
3. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
4. J.P.Gupta, A Text book of Energy, Environment Ethics & Society" Dhanpat Rai Publishing Company.

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COURSE OUTCOME: At the end of the course the student will be able to

CO1	Apply the concept of sustainability of renewable energy to overcome the shortcoming of energy from non-renewable sources. Understanding of Energy devices.
CO2	Develop an understanding related to Water, Air and Noise pollution.
CO3	Understand the importance of Soil, Thermal and Nuclear pollution. Illustrate municipal practices in solid waste management. Define carbon footprints.
CO4	Understand the interrelationship of different species in variety of ecosystems. Conservation of Biodiversity & awareness of Environmental protection Act.
CO5	Recognize the origin as well as types of corrosion and apply appropriate protection mechanism to control corrosion.

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COURSE CONTENT

Subject Code	Subject Name and Title	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 33	Data Structure And Algorithm	70	20	10	30	20	150	3	-	2	4

Module I

Introduction Data, data type, data object. Types of data structure – primitive &n non-primitive, linear & non- linear. Operations on data structures – traversing, searching, inserting, deleting. Complexity analysis – worst case, best case, average case. Time – space trade off, algorithm efficiency, asymptotic notations – big oh , omega , theta.

Module II

Arrays & Structure Introduction , declaration of arrays , operations on arrays – inserting , deleting , merging of two arrays , 1 dimensional & 2 dimensional arrays, row & column major representation , address calculation in array , storing values in arrays , evaluation of polynomial – addition & representation. Searching & sorting – Introduction, sequential search, binary search, Fibonacci search , indexed sequential search, hashed search. Types of sorting with general concepts – bubble, heap, insertion, selection, quick, heap, shell, bucket, radix and merge sort.

Module III

Stacks & Queues Basic concept of stacks & queues, array representation of stacks, operation on stacks – push and pop , create , getTop , empty , linked representation of stack , multiple stack. Application of stack – Conversion: infix , prefix , postfix and evaluation of arithmetic expression. Linked representation of queue, operations on queue – insertion & deletion. Types of queue with functions – circular, deque, priority queue. Applications of queues –job scheduling, Josephus problem.

Module IV

Linked List Introduction – basic terminology , memory allocation & deallocation for linked list. Linked list variants – head pointer , head node , types linked list – linear & circular linked list. Doubly linked list , creation of doubly list, deletion of node from doubly linked list, insertion of a node from doubly linked list, traversal of doublylinked list. Circular linked list – singly circular linked list , circular linked list with header node , doubly circular linked list. Applications of linked list – polynomial representation & garbage collection.

Module V

Trees Basic terminology – general tree , representation of general tree, types of trees, binary tree- realization and properties , traversal in binary trees – inorder , preorder , postorder , applications of trees. Graph- Basic Terminologies and representations, Graph search and traversal algorithms.

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Reference Books :

1. Varsha H. Patil "Data Structure Using C++" Oxford.
2. Rajesh K. Shukla "Data Structures Using C & C++" Wiley India.
3. Reema Thareja " Data Structure Using C " Oxford.
4. D. S Malik "Data Structure Using C++ " Second Edition Cengage. 5
5. Kushwaha and Mishra "Data Structure: A programming Approach with C", PHI Learning.
6. A. K Sharma "Data Structure Using C" Pearson.
7. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures",

Course Outcomes:

CO 1. To impart the basic concepts of various data structure and algorithms efficiency.

CO 2. To develop the skills to understand and design the searching and sorting algorithms using arrays and compare their performance.

CO 3. To analyze application of stacks and queues.

CO 4. To develop applications using linked lists.

CO 5. To understand the applications of the data structure in solving real life problems using trees and graphs.

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		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 34	Object Oriented Concept on C++	70	20	10	30	20	150	3	-	2	4

Module I

Concept of Object Oriented methodology: Role of programming methodology in software development, Comparison the concepts of structured-oriented programming (SOP) and object-oriented programming (OOP). Need for object oriented programming. Fundamental concepts of object-oriented programming (OOP): abstraction,encapsulation, modularity, data hierarchy through inheritance, Information Hiding, polymorphism and typing, parallelism and stability.

Module II

Elements of object oriented**:** Object, Class, message passing. Relationships among objects:- links, aggregation. Relationships among classes:- association, aggregation, using, instantiation, meta-class.

Module III

Beginning with C++: What is C++, Difference between C and C++. C++ program life cycle. Functions in C++: Different forms of functions, function prototyping, call by value; call by Reference, Inline and friend Functions. Command Line Arguments

Module IV

Encapsulation and Abstraction in C++: Classes and Objects in C++, defining classes, defining member functions, declaration of objects to class, access to member variables from objects etc, Initialization and assignment for objects. Different forms of member functions, dependence on access specifiers (i.e. Private, public, protected), static data members. Constructor and Destructor in C++: constructors, parameterized constructors Multiple constructors in class dynamic initialization of objects destructors.

Implementation of relationship.

Inheritance in C++: Introduction, types of inheritance, single inheritance, multiple inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance etc, virtual base class, abstract class, constructors in derived class.

Module V

Polymorphism in C++: type of polymorphism, function overloading, operator overloading- introduction, defining operator overloading, overloading -(unary, binary operators), overloading binary operators using friends, Rules for overloading operators. Function overriding- introduction to pointers, pointers to objects, this pointer, pointers to derived class, virtual functions, abstract class, pure virtual functions. Introduction to C++ templates.

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References Books:

1. Herbert Schildt, " C++ the complete reference", III edition, TMH 1999
2. Balagurusamy, Entrepreneurial, "object oriented programming with C++", TMH

List of experiments:

1. Program to demonstrate use of function overloading.
2. Write a function which accepts object as a parameter and returns object.
3. Write a program to demonstrate the virtual base class.
4. Write a program to demonstrate use of polymorphism (virtual function).
5. Write a program to overload++ operator to increment age of person by one month.
6. Write a program to illustrate the use of scope resolution operator.
7. Write a program to find the square root using inline function. 8. Write a program to illustrate the use of friend function.
9. Create two employee objects and display each object's yearly salary.
10. Give each employee a 10% raise and display each Employee's yearly salary again.
11. Write C++ program to create five object of book, get information of book using getdata() function including name. price, publication and author.

Course Outcomes:

CO 1. To understand the principles used in OOP and its elements.

CO 2. To introduce the OO programming concepts using C++.

CO 3. To understand functions in C++.

CO 4. To discuss the encapsulation, inheritance and abstraction in C++.

CO 5. To familiarize with the polymorphism and overloading.

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Subject Code	Subject Name and Title	Maximum Marks Allotted						Hours/Week			Total Credits
		Theory			Practical		Total	L	T	P	
		End Sem	Mid Sem Exam	Quiz Assignment	End Sem	Lab Work					
IT 35	Electronics and Digital Circuits	70	20	10	30	20	150	3	-	2	4

Module I

Semiconductor device, theory of P-N junction, temperature dependence and break down characteristics, junction capacitances. Zener diode, Transistors BJT, FET, MOSFET, types, workingprincipal, characteristics, and region of operation, load line biasing method. Transistor as an amplifier, Feedback amplifier, negative feedback, voltage-series, voltage shunt, current series and current shunt feedback.

Module II

Switching characteristics of diode and transistor, turn ON, OFF time, reverse recovery time, transistor as switch, Multivibrators, Bistable, Monostable, Astable multivibarators. Operational amplifier characteristics, slew rate, full power bandwidth, offset voltage, bias current, application , inverting , non inverting amplifier , summer , averager , differentiator, integrator, differential amplifier, instrumentation amplifier , log and antilog amplifier , voltage to current and current to voltage converters , comparators.

Module III

Number systems & codes, Binary arithmetic, Boolean algebra and switching function. Minimization of switching function, Concept of prime implicant , Karnaugh map method, Quine & McCluskey's method, Cases with don't care terms, Multiple output switching function.

Module IV

Introduction to logic gates, Universal gate, Analysis and design procedure of Combinational circuits,Half adder, Half subtractor, Full adder, Full subtractor circuits, Series & parallel addition, BCD adders, Look ahead carry generator. Decoders, Encoders, Multiplexers, Demultiplexers, Introductionto various semiconductor memories & designing with ROM and PLA.

Module V

Analysis and design procedure of synchronous Sequential circuits, Introduction to Shift Registers, Counters, Synchronous & asynchronous counters.

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Text Books:

1. Digital Design, PHI, 2/e and digital logic and computer design, PHI, by M. Morris Mano
2. Microprocessor Arch. Programming & Application with 8085 by R.S. Gaonkar
3. Digital Computer & Electronics by A.P. Malwino and J.A. Brown, TMH, 3/e
4. 0000 to 8085 Introduction to Microprocessors by P.K. Ghosh & P.R. Sridhar, PHI, 2/e
5. Logic Design Theory, by N.N. Biswas, PHI
6. Milliman Hallkias -Integrated Electronics; TMH Pub.
7. Gayakwad; OP-amp and linear Integrated Circuits; Pearson Education

Course Outcomes:

CO1 To understand semiconductor devices.

CO2: To understand diode, transistor.

CO3: Getting command of number system and K-map.

CO4: To understand logic gate and devices.

CO5: Understanding sequential circuits.

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