Jabalpur Engineering College, Jabalpur

Bachelor of Engineering (Computer Science and Engineering) IV sem (CBCS)

S. NO.	Subject Category	Subject Code	Subject Name	Maximum Marks allotted									Hours/Week			Total Credits
				Theory						Practical						
				End Sem	Minor-I	Minor-II	Quiz	Assignments	Tutorials/ Problem solving	End Sem	Lab Work	Viva Voce/	L	T	P	
1.		CS-241	Numerical Computation and Queuing theory	60	10	10	5	5	10	-	-	-	3	1	-	4
2.		CS-242	Database management System	60	10	10	5	5	10	10	20	20	2	1	2	4
3.		CS-243	Computer System Organization	60	10	10	5	5	10	10	20	20	2	1	2	4
4.		CS-244	Analysis and Design of Algorithm	60	10	10	5	5	10	10	20	20	2	1	2	4
5.		CS-245	Theory of Computation	60	10	10	5	5	10	-	-	-	3	1	-	4
6.		CS-247	Computer Programming-II Java Technology	-	-	-	-	-	-	10	20	20	-	-	4	2
7.		CS-246	Open Electives	60	10	10	5	5	10	-	-	-	3	1	-	4
			Total	360	60	60	30	30	60	40	80	80	15	6	10	26

Total Marks : 800 HU248 NSS/NCC

Open Elective:

1. Industrial Engineering and Management
2. Industrial Economics
3. Introduction to Nano Electronics
4. Fiber Optics and Laser Equipments

9/9/16

IV

BE FOURTH SEMESTER(COMPUTER SCIENCE AND INFORMATION TECHNOLOGY)

COURSE CONTENT

SUB. CODE	SUB. NAME	L	T	P	MAX. MARKS	CREDITS
~~MA 215~~ CS-241	Numerical Computation and Queuing Theory	3	1	0	60	4

Roots of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, iteration method, Graffes root squaring method.

Solution of system of linear equations: Gauss elimination method, Gauss Jordan method, LU decomposition method, relaxation method, Jacobi and Gauss-Seidel methods.

Interpolation: Finite difference operator and their relationships, difference tables, Newton, Gauss, Bessel and Stirling's interpolation formulae, Divided differences, Lagrange Interpolation and Newton's divided difference interpolation.

Numerical differentiation and Integration: First and second order derivatives by various interpolation formulae, Trapezoidal, Simpsons 1/3rd and 3/8th rules with errors and their combinations, Gauss Legendre 2-points and 3-points formulae.

Numerical Solution of ordinary differential equations: Solution of ODE by Taylor series, Picard's method, Modified Euller method, Runge-kutta Method, predictor corrector method.

Numerical solution of Partial Differential Equations :Classification, Finite –difference approximation to derivatives, solution of Laplace's equation by Jecobi's and Gauss Seidel method, parabolic equation, Iterative method for the solution of equations, Hyperbolic equation and its numerical solution.

Markov Analysis: Stochastic process, Markove process, transition probability, Transition probability matrix, Markov chain, Some theorems and problems.

Queuing Theory: Queuing systems, Transient and steady state, traffic intensity, Distribution of queuing systems, classifications of queuing models (M/M/1: infinity/FCFS, M/M/1: N / FCFS, M/M/1: infinity/SIRO, M/M/S: infinity/ FCFS, M/M/C: infinity/FCFS, M/M/R: (k/GD); K<R, Power supply model)

References books

1. Numerical Methods in Engineering and science by B.S. Grewal, Khanna Publishers.
2. Numerical Methods by E. Balagurusamy, Tata Mc Graw- Hill Publishing CompanyLtd., New Delhi.
3. Numerical Methods for Scientific and Engineering Computation by Jain, M. K. , Iyengar, S. R. K. and Jain, R. K., New Age Pvt. Pub.New Delhi.
4. Operation Research, Taha H.A; PHI.
5. Introduction to OR, Hiller and Lieberman; TMH.

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14-6-16

14/06/2016

14/06/16

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Course Content						
Subject Code	**Subject Name**	**L**	**T**	**P**	**Max Marks**	**Credit**
CS-242	**Data Base Management System**	2	1	2	150	4

Unit 1 Basic Concepts: DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, database users and DBA.

Unit II: Data models and their Comparison, Entities and attributes, Entity Sets, Relationships, Extended E-R Features Defining the E-R diagram of database Relational Data models: Domains, Tuples, Attributes, Relations, Integrity constraints.

Unit III: Structured Query Language , Relational algebra, Relational algebra operations like select, Project, Join, Division, outer union. SQL: DDl, DML and their commands, Aggregate function, nested subquery, views in SQL, join ,Data retrieval queries, accessing SQL from programming language.

Unit IV: Database Design : Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, multi-valued dependencies, Join Dependencies.

Unit V: Transaction Processing Concepts: - Transaction System, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints based Recovery ,deadlock handling. Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction. Introduction to Distributed databases, data mining, data warehousing.

Text Books:

1) Database System Concepts, Silberschatz, Korth and Sudarshan
2) Fundamental of database system by Elmasri / Navathe the Benjamin / Cunnings Publishing company inc.

Reference:

3) Data Base Management System by C.J. Date
4) Data Base Management System by Ullman
5) Data base design by Gio Wiederhold. McGraw Hill
6) Fundamental of Data Base Management System by Leon & Leon, Vikas Publishing House Pvt. Ltd.
7) Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.

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Course Content						
Subject Code	Subject Name	L	T	P	Max Marks	Credit
CS-243	Computer System Organization	2	1	2	150	4

Data representation and Computer arithmetic: Introduction to Computer Systems, Organization and architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth's algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations.

Basic Computer organization and Design: Instruction codes, stored program organization, computer registers and common bus system, computer instructions, timing and control, instruction cycle: Fetch and Decode, Register reference instructions; Memory reference instructions. Input, output and Interrupt: configuration, instructions, Program interrupt, Interrupt cycle, Micro programmed Control organization, address sequencing, micro instruction format and microprogram sequencer.

Central Processing Unit: General register organization, stack organization, instruction formats, addressing modes, Data transfer and manipulation, Program control. CISC and RISC: features and comparison. Pipeline and vector Processing , Parallel Processing, Pipelining, Instruction Pipeline, Basics of vector processing and Array Processors.

Input-output organization: I/O interface. I/O Bus and interface modules, I/O versus Memory Bus. Asynchronous data transfer: Strobe control, Handshaking, Asynchronous serial transfer. Modes of Transfer: Programmed I/O, Interrupt driven I/O, Priority interrupt; Daisy chaining, Parallel Priority interrupt. Direct memory Access, DMA controller and transfer. Input output Processor , CPU-IOP communication, I/O channel.

Memory organization: Memory hierarchy, Primary memory, Auxiliary memory, Associative memory, Cache memory: mapping functions, Virtual memory: address mapping using pages, Memory management.

Suggested Reading:

1. Morris Mano, M., "Computer System Architecture," 3/e, Pearson Education, 2005.
2. Hamacher, Vranesic, Zaky, "Computer Organization," 5/e, McGraw Hill, 2007.
3. William Stallings, "Computer Organization and Architecture: Designing for performance," 7/e, Pearson Education, 2006.
4. John P. Hayes, "Computer Architecture and Organization," 3/e, TMH, 1998.
5. Govindarajulu, B., "Computer Architecture and Organization," 2/e, TMH, 20

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Course Content						
Subject Code	Subject Name	L	T	P	Max Marks	Credit
CS-244	Analysis and Design of Algorithm	2	1	2	150	4

Algorithm Analysis: ,Time Space Tradeoff ,Asymptotic Notations ,Conditional asymptotic notation ,Removing condition from the conditional asymptotic notation - Properties of big-Oh notation ,Recurrence equations ,Solving recurrence equations

Divide and Conquer :Design and analysis of algorithms: Binary Search, Heap Sort, Merge Sort, Quick Sort. Multiplication of Large Integers , Strassen's Matrix Multiplication,

Greedy Algorithms: Knapsack Problem, Job scheduling algorithm, Huffman Codes, Spanning Trees.

Dynamic Programming: General Method , Multistage Graphs ,All-Pair shortest paths , Optimal binary search trees ,0/1 Knapsack ,Travelling salesperson problem .

Backtracking: General Method , 8 Queens problem ,sum of subsets ,graph coloring , Hamiltonian problem ,knapsack problem. Graph Traversals.

Branch and Bound: General Methods (FIFO & LC) ,0/1 Knapsack problem .

Introduction to NP-Hard and NP-Completeness.

TEXT BOOK:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran," Computer Algorithms/ C++", Second Edition, Universities Press, 2007. (For Units II to V)

2. K.S. Easwarakumar, "Object Oriented Data Structures using C++", Vikas Publishing House pvt. Ltd., 2000 (For Unit I)

REFERENCES:

1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.

2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.

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Course Content						
Subject Code	Subject Name	L	T	P	Max Marks	Credit
CS-245	Theory of Computation	3	1		100	4

UNIT I : Automata:
Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata.

Regular Sets and Regular Grammars:
Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill-Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT II : Context –Free Grammars:
Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT III : Pushdown Automata:
Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA.

Context Free Languages:
The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT IV : Turing Machines:
Introduction, TM model, representation and languages acceptability of TM Design of TM,Universal TM & Other modification, Church's hypothesis, composite & iterated TM.Turing machine as enumerators.Properties of recursive & recursively enumerable languages,Universal Turing machine

UNIT V: Tractable and Untractable Problems:
P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

References:-

1.John E. Hopcroft, Jeffery Ullman,"Introduction to Automata theory, Langauges & computation" , Narosa Publishers.
2. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning
3. Michael Sipsev,"Theory of Computation",Cenage Learning
4. John C Martin, "Introdution to languages and theory of computation", McGraw Hill
5. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
6. Kohavi,"Switching & Finite Automata Theory",TMH

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Course Content						
Subject Code	Subject Name	L	T	P	Max Marks	Credit
CS-247	Computer Programming II Java Technology			4	50	2

Course Contents:

Why Java: Flavors of Java, Java Designing Goal. Role of Java Programmer in Industry. Features of Java Language. JVM –The heart of Java,Java's Magic Byte code.

The Java Environment:: Installing Java. Java Program Development, Java Source File Structure, Compilation, Executions.

Basic Language Elements: Lexical Tokens, Identifiers, Keywords, Literals, Comments Primitive Data types, Operators, Assignments.

Object Oriented Programming: Class Fundamentals. Object & Object reference. Object Life time & Garbage Collection. Creating and Operating Objects. Constructor & initialization code block. Access Control, Modifiers, methods ,Nested , Inner Class &Anonymous Classes Abstract Class & Interfaces.
Defining Methods, Argument Passing Mechanism Method Overloading, Recursion.
Dealing with Static Members. Finalize() Method. Native Method. Use of "this "reference.
Use of Modifiers with Classes & Methods.

Design of Accessors and Mutator Methods Cloning Objects, shallow and deep cloning, Generic Class Types.

Extending Classes and Inheritance: Use and Benefits of Inheritance in OOP,Types of Inheritance in Java, Inheriting Data Members and Methods, Role of Constructors in inheritance, Overriding Super Class Methods. Use of "super". Polymorphism in inheritance. Implementing interfaces.

Package: Organizing Classes and Interfaces in Packages. Package as Access Protection
Defining Package. CLASSPATH Setting for Packages. Making JAR Files for Library Packages
Import and Static Import Naming Convention For Packages

Exception Handling: The Idea behind Exception, Exceptions & Errors, Types of Exception
Control Flow In Exceptions, JVM reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling. In-built and User Defined Exceptions, Checked and Un-Checked Exceptions.

Array & String :Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array, Operation on String, Mutable & Immutable String, Using Collection Bases Loop for String, Tokenizing a String, Creating Strings using StringBuffer

Thread :Understanding Threads, Needs of Multi-Threaded Programming. Thread Life-Cycle Thread Priorities, Synchronizing Threads,Inter Communication of Threads, Critical Factor in Thread -Deadlock

References:

1. Big Java by Cay Horstmann, John Wiley and Sons, 2nd Edition

2. The Complete Reference Java J2SE by Herbert Schildt, TMH Publishing Company Ltd, New Delhi, 5th Edition

3. Java How to Program by H.M.Dietel and P.J.Dietel, Pearson Education/PHI, Sixth Edition

4. Core Java 2, Vol 1, Fundamentals by Cay.S.Horstmann and Gary Cornell, Pearson Education, Seventh Edition

5. Core Java 2, Vol 2, Advanced Features by Cay.S.Horstmann and Gary Cornell, Pearson Education, Seventh Edition

6. Beginning in Java 2 by Iver Horton, Wrox Publications.

List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Scope of Variables
3. Write a program to show Concept of CLASS in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance
6. Write a program to show Polymorphism
7. Write a program to show Access Specifiers (Public, Private, Protected)
8. Write a program to show use and Advantages of CONTRUCTOR
9. Write a program to show Interfacing between two classes
10. Write a program to Add a Class to a Package
11. Write a program to show Life Cycle of a Thread
12. Write a program to Hide a Class