INDEX

SEMESTER SYSTEM COURSE OF P. G. COMPUTER SCIENCE

P. G. SEMESTER EXAMINATION REGULATIONS

CHAPTER – I

REGULATION OF GENERAL ACADEMIC MATTERS

1.1 The Departments shall follow Semester System of teaching and Examination based on continuous evaluation internally as well as externally subject to moderation of question papers. The system of evaluations of the students shall be based on Course Credit System.

1.1.1 Academic Year

The Academic Year of the department shall ordinarily be from JUNE to MAY. It may however, be modified by the Staff Council from time to time.

1.1.2 Semester

The academic year shall have two semesters, each of which shall be of 6 months duration.

1.2 Minimum working days in a Semester

A Semester shall have a minimum of 90 working/instructional days excluding examination days/Sundays/Holidays etc. The minimum number of classes in a semester shall not fall short of the number of classes as mentioned below.

1. One Credit hour courses	= 10 classes minimum
2. Two Credit hour courses	= 20 classes minimum
3. Three Credit hour courses	= 30 classes minimum
4. Four Credit hour courses	= 40 classes minimum
5. Five Credit hour courses	= 50 classes minimum

1.3 ***Credit hours***

One credit shall signify the quantum of teaching imparted corresponding to one hour of theory class and two hours of laboratory/project work and two hours of seminar per week during a semester in respect of a particular course. Each teaching hour of theory class will be of 60 minutes and practical classes/project work will be of 120 minutes duration and seminar will be of 120 minutes duration. For field study outside headquarters, one working day will be considered as two teaching hours. However, the field study should not exceed 30 days (including Sundays) in one semester.

The P. G. Syllabus may be so designed that the total of credit hours for all four semesters shall be 80 spread equally over all semesters as far as practicable, tutorials and proctorials shall be treated as non-credit components.

1.4 ***Course***

A course is a Unit of instruction under any discipline carrying a specific number of credit hours describing its weightage. Those courses, which a student must take as compulsory requirement, are, called Core Courses. Those courses, which a student opts out of a list of specialized courses offered by the department, are called Elective Courses.

Choice Based Credit System (CBCS) is introduced at the P. G. Semester-I level uniformly in all the subjects to be taught in paper-103. The students of P. G. Arts stream can not opt for the CBCS course of Science stream. The details of the CBCS courses offered by different P. G. Departments are given in Annexure-II.

ANNEXURE-II

CBCS: P. G. Paper-103

Department	Name of the CBCS Course
Botany	Plant in Human Welfare
Chemistry	Polymer Science
Commerce	Fundamental of Business Organization and Entrepreneurship Development
Economics	Indian Economy
Education	Pedagogical Trends and Issue
English	Global English
Geography	Introduction to Geography
History	Tourism & Heritage Management
Mathematics	Elements of Computer Programming
Odia	"Adhunika Odia Nataka o Odia Bhashara Dhwanitatwa" (Modern Odia Drama and Odia Phonetics)
Physics	Foundation in Physics
Philosophy	Practical Ethics
Political Science	Indian Government & Politics
Psychology	Fundamentals of Psychology
Sanskrit	Ancient Indian Culture
Zoology	Animal World, Human Health & Economic Zoology

1.4.1 ***Grade***

The grade awarded to a student in any particular course shall be based on his/her performance in all the tests conducted during a semester and shall be awarded at the end of the semester. The grade in each course is expressed in numerical value in 10.00 scale. The marks of a student shall be converted to10.00 scale and the points scored thereby shall be called the "Grade Point" in the course. Respective "Grade Point Average" (GPA) and "Overall Grade Point Average" (OGPA) shall be awarded at the end of each semester and all semester respectively. A 3.0 Grade Point is required for passing in individual paper and 4.0 GPA to pass any semester examination. The G. P. shall be rounded to one decimal point and GPA to two decimal points.

1.4.2 Grade Point Average (G.P.A.)

Grade Point Average (G.P.A.) of a semester shall be calculated as:

$$\text{GPA} = \frac{\text{Summation of } \{(\text{Credits in each course}) \times (\text{Grade point in that course})\}}{\text{Total No. of Credits in that Semester}}$$

Where the summation is taken over all courses in a given semester, G.P.A. shall be rounded up to 2 decimal points.

1.4.3 O.G.P.A. (Overall Grade Point Average)

It is the average of accumulated grade points of a student, worked out by dividing the cumulative total of grade points by the cumulative total of credit hours of all the courses covered and completed by a student during all the Semesters. For the first semester of the programme the GPA and OGPA shall be the same.

$$\text{OGPA} = \frac{\text{Summation of } \{(\text{Credits in each semester}) \times (\text{Total Credits in that semester})\}}{\text{Total No. of Credits in that Semester}}$$

Where the summation is taken over all semesters in a given programme. OGPA shall be rounded up to e decimal points. For merit lists, in case of equality, the OGPA shall be calculated beyond two decimal places if necessary.

1.4.4 Conversion of grades to marks and classification of results under course credit system

The OGPA can be converted to percentage of marks in the following manner:

Percentage of Marks = (OGPA) ×10

A student after successful completion of all the semesters, Degree shall be awarded in the following manner:

O.G.P.A.	≥ 6.0	: FIRST CLASS
O.G.P.A.	≥ 5.0 - < 6.0	: SECOND CLASS
O.G.P.A.	4.0 - < 5.0	: THIRD CLASS
O.G.P.A.	< 4.0	: FAIL

1.5 ***Academic Calendar***

The Examination Section and the academic section shall finalise the schedule of semester registration and other academic activities at the start of academic session. The Academic Calendar shall be prepared by the Academic Committee of the University in consultation with examination section.

The broad format for academic calendar for P. G. with regard to admission, registration and commencement of classes shall be as follows:

Admission and Registration and Commencement of Classes for 1st Semester	JULY
1st Semester Examination	DECEMBER
Commencement of Classes 2nd Semester	JANUARY-MAY
2nd Semester Examination	JUNE
Commencement of 3rd Semester Classes	JULY-NOVEMBER
3rd Semester Examination	DECEMBER
Commencement of 4th Semester Classes	JANUARY-APRIL
4th Semester Examination	APRIL & MAY
Final Results to be published in the month of	JUNE

1.5.1 Requirement of award of degree

The minimum credit hour requirement for the Master Degree shall be 80 (eighty) credits and the residence required for Master Degree shall be continuous four semesters from the first date of registration and the maximum time allowed to complete the Master Degree shall be 8 (eight) semesters.

1.6 Requirement for attendance

A candidate shall be required to attend 75% lectures, tutorials and practical classes separately during the semester (For late admitted students' attendance to be calculated from the date of admission). Condonation may be granted by the staff council only to the extent of 15% in exceptional cases. (Illness, accident, mishap in the family, deputation by University/Department). When a candidate has been deputed by the University to represent the University/state for any activity, the lectures delivered during his/her absence for the purpose shall not be counted towards the calculation of attendance provided the student submits a certificate to that effect from the appropriate authority.

1.7 ***Registration in a semester***

A student has to register his/her name at the beginning of every semester in the prescribed form, for the course he/she wants to take in that semester. Examination Section (General) shall notify the registration dates and the list of registered students for the semester shall be given to the Head of the Department within two weeks of the commencement of the Semester.

CHAPTER – II
REGULATIONS ON EXAMINATION MATTERS

2.1 Mid Term Examination

In each Semester there shall be one Mid Term Assessment examination of 60 minutes duration. The Mid Term examination shall be conducted by COE like that of End Term examination.
The answer scripts shall be evaluated by the external and internal examiners and the marks along with answer scripts shall be retained in COE.

2.2 Semester Examination

After the end of each semester there shall be an examination of each theory paper of 2 hours duration and of each practical paper of 4 hours duration, which shall be called Term End / "Semester Examination". The maximum marks for each theory paper shall be 50 out of which 40 marks for term end and 10 marks for Mid Term. The maximum marks for each practical/ semester/ project/ dissertation/ review examination shall be 50 for Arts and Commerce and 100 marks for Science. The classes shall remain suspended ten days (including Sundays and holidays, if any) before the date of commencement of semester test for preparation by the students.

2.3 Results of Examinations

The results shall be declared ordinarily within four weeks of completion of the examinations. A students who seeks re-addition of his/her marks in a course shall be allowed to do so by submitting an application to Registrar along with a required fees in the fee counter of the University. All such cases/complaints if any shall be disposed of by the Examination Section in a prefixed day and necessary corrections if any shall be reflected in the mark/grade sheet. The candidates shall have to appear in all the Units of a semester examination to be eligible to be a declared 'pass' provided he/she secures minimum pass marks/grade.

2.4 Promotion to the next semester

A student shall be admitted to the next semester only when he/she appears in all the papers of the concerned semester examination. However, a student failing to appear semester examination in some or of all papers due to some reasons as mentioned in 2.5 may be admitted to the next semester. Such a student shall produce sufficient proof in favour of his/her reason for not being able to appear in some or all papers of the Semester Examination on the next academic session in the corresponding semesters.

2.5 *Absence from Examination*

If a student is unable to appear a semester examination in some or all papers the Registrar shall consider his/her case for admission into the next higher semester only the following cases:

(a) When he/she is hospitalized.

(b) When he/she is not be able to appear in the examination due to serious illness or death of parents, brothers, sisters, spouse or children.

(c) When he/she met an accident of serious nature.

(d) When the department/University or any official directive deputes him/her

2.6 *Procedure for Repeat/Improvement*

A student who wants to sit for the semester examination of first and/or second semester in the subsequent academic session (for repeat or improvement) he/she shall have to apply to the Registrar in plain paper before fifteen days of the commencement of the said examination. If allowed by the Registrar, he/she shall deposit the required fees for each paper with centre charge and produce the proof to the teacher in-charge examination with permission letter from the Registrar.

In a semester to appear improvement examination the candidates must have passed the semester examination. A candidate can appear repeat examination of papers in which he/she has failed or not appeared for reasons mentioned in 2.5.

The Master Degree student seeking to appear/improvement examination in any course(s) shall get 3 chances for 1st and 2nd semester within 8 semesters.
Candidates appearing in repeat/improvement examination shall not be considered in the merit list and it shall be reflected in the Provisional Certificate cum Mark sheet (PCM) but not in the final degree certificate.

2.7 Award of Degree Certificate, Grade/Mark sheet

A Degree certificate under the official seal of the university and signed by the Vice-Chancellor shall be presented at the Convocation or in absentia to each of the successful students of particular degree. The Controller of Examinations shall issue the mark/grade sheet of each semester to the candidates in the sheet of each semester to the candidates in the prescribed format by depositing the required fees for marks/Grade Sheet to be deposited in the University counter.

2.8 **Guideline for filling up of Forms for PG Classes (IMP/ Repeat)**

A student shall repeat all the theory and practical papers in which he/she failed in the semester examination within a period of eight semesters from the date of first registration. Such students shall have to apply to the Head of the Department/Registrar in plain paper during the filling up of form for the ensuing semester examination. If allowed, he/she shall deposit the fees as prescribed by the University

If a candidate secures less than 3.0 Grade point in a paper(s) and less than 4.0 Grade point average in a Semester examination he/she has to appear all the papers in that Semester.

If a candidate secures less than 3.0 Grade Point in a paper(s) and a minimum 4.0 Grade point average in a semester examination, he/she has to appear only the paper(s) in which he/she secured less than 3.0 Grade point.

A candidate is eligible to sit for improvement in a paper(s) only when he/she has passed the semester examination concerned. Further, he/she can improve in a maximum of EIGHT paper(s) in the entire course. The Master Degree students seeking to take improvement examination in any course(s) shall get chances within 8 semesters from the year of admission to the course. The candidates taking this advantage (improvement) will be examined on the basis of current syllabus and the higher marks shall be retained during computation of result.

2.9 If a candidate fails to appear in any paper of the said examination and marked ABSENT his/her results will be declared only when he/she clears that paper/those papers.

2.10 ***Disciplines in the Examination***

(A) Late Comers: A student arriving in the examination hall/room fifteen minutes after the commencement of the examination shall not be ordinarily allowed to sit for the examination. No examinee shall be allowed to go out of the examination hall within one hour of commencement of examination. The invigilators shall keep a record of temporary absence of students from the examination hall/room during the examination.

(B) Adoption of unfair means in the Examination:
Possession of unauthorized materials and using it, copying from scripts of other students or from any other source, showing his/her answer script to others during the examination, creating disturbance or acting in a manner so as to cause inconvenience to other students in the examination hall or near about shall be treated as adoption of unfair means or malpractice.

Sd/-
REGISTRAR

PG COURSE STRUCTURE AT A GLANCE
M. SC. COMPUTER SCIENCE

SEMESTER – I

Paper-101	Digital Circuits and Computer System Architecture	40+10
Paper-102	Discrete Mathematical Structure	40+10
Paper-103	Distributed Operating System, Data Structure using C	40+10
Paper-104	Data Structure using C (LAB)	100

SEMESTER – II

Paper-201	Data Base Management System	40+10
Paper-202	Object Oriented Programming using Java	40+10
Paper-203	Microprocessor and Assembly Language	40+10
Paper-204	JAVA, DBMS (PL/SQL), 8086 Microprocessor (LAB)	100

SEMESTER-III

Paper-301	Software Engineering	40+10
Paper-302	Theory of Computer, Mobile Computing	40+10
Paper-303	Analysis and Design of Algorithms, Computer Graphics	40+10
Paper-304	Web Technology (HTML, XML, WML) (LAB)	100

SEMESTER-IV

Paper-401	Computer Network and Cryptography	40+10
Paper-402	Artificial Intelligence	40+10
Paper-403	Elective: (Any one to be chosen) (i) Compiler Design (ii) Digital Signal Processing (iii) Internet Technology	40+10
Paper-404	Project	100

SEMESTER SYSTEM COURSE OF P. G. COMPUTER SCIENCE

FIRST SEMESTER

Paper-101

DIGITAL CIRCUITS AND COMPUTER SYSTEM ARCHITECTURE

Unit – I

Common Application of Sequential Circuits: Design of binary, Decode and module N counters, Ripple and synchronous counter, Ring counter, Universal shift registers etc.

Computer Arithmetic:- Signed binary and BCD adder, Substractor units, carry look ahead adder bit slice adders, design of a simple ALU, Multiplication technique for signed and unsigned binary number, Serial-parallel, Connection techniques, Multipliers, Division algorithms, Floating point arithmetic. Full Adder, half Adder.

Unit-II

Computer function and Interconnection: Computer Components, Computer Function, Interconnection Structure, Bus Interconnection, PCI.

Cache Memory: Computer Memory System, Cache Memory Principles, Elements of Cache Design, Pentium-4 Cache Organization

External Memory: Magnetic Disk, RAID, Optical Memory, Magnetic Tape, External Devices, I/O Module, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels and Processors.

Unit-III

CPU Structure and Function: Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining, The Pentium Processor.

Reduced Instruction Set Computer (RISC): Instruction Execution Characteristics, Use of a Large Register File, Compiler Based Register Optimization, reduced Instruction Set Architecture, BICS Pipelining, MIPS, RICS versus RISC.

Serial Organization:

Parallel Organization: Multiple Processor Organizations, Symmetric Multiprocessors, Cache Coherence and MESI Protocol, Clusters, Non-Uniform Memory Access (NUMA), Vector Computation.

Prescribed Books:

1. "Digital Computer Electronics", A. P. Malvino, 2nd Edition, TMH Edition
2. "Computer System Architecture", Morris Mano, 3rd Edition, PHI

Reference Books:

1. Digital Computer Electronics & Micropreocessor- R.P Jain, TMH Edition
2. Computer Organization & Architecture – W. Stallings, PHI

Paper-102

DISCRETE MATHEMATICAL STRUCTURE

Unit-I

Fundamentals of logic, Prepositional equivalence, Predicates and Quantifiers, Nested Quantifiers, Methods of Proof, Sequence and summations, Mathematical Induction. Sets, set operations, Properties of binary relation, Equivalence relations and partition, Partial ordering relations and lattices, Properties or lattices, Distributive and Complemented lattices, Boolean algebra, Chains and antichains, Functions and Pigeonhole principle.

Unit-II

The basis of counting Permutation and Combinations, Recurrence relations, Solving Recurrence relations, Generating functions, Inclusion-exclusion. Groups, Subgroups, Cosets and Lagrange's Theorem, Codes and Group Codes, Homomorphisms and Normal subgroups, Isomorphisms, Ring, Integral Domains and Fields.

Unit-III

Introduction to graphs, Graphs Terminology, Representing graphs and Graphs isomorphism, Euler and Hamilton paths, Introduction to trees, Application of trees.

Prescribed Books:

1. "Discrete Mathematics & Its Application", Kenneth H. Rosen, TMH.
2. "Elements of Discrete Mathematics", C. L. Liu, MGH.

Reference Books:

1. "Discrete Mathematics Structure", Bernardi Kolman, Robret C. Busby, Sharon Ross, Prentice Hall of Indian.
2. "Discrete Mathematics for Computer Science and Mathematics", J. L. Mott, A. Kandel & T. P. Baker, 2nd Edition (P 1999).

Paper – 103

DISTRIBUTED OPERATING SYSTEM & DATA STRUCTURE

Distributed Operating System

Unit-1

Introduction to parallel computing, history of parallel computers, Classification of parallel computers- Flynn's classifications, Characteristics of distributed operating system, Design goal, communication and computer network, Distributed Operating System, Client Server Model, Remote Precedure Call (RPC), File Server, Name Space, Fault tolerance, Synchronization and coordination.

Unit-II

IPC and its features, synchronization in IPC , Buffering, types of buffer, Group Communication, Group Management, Group Addressing, Buffer and Un-buffer, Multicast, Group Communication Perimeters.

Data Structure

Introduction to Data structure, Classification of data structure, Array, Stack, Link List, Queue, Tree, Graphs, Data Structure Operation, ADT. Array- 1D, 2D

Unit-III

Introduction to Data structure, Classification of data structure, Array, Stack, Link, List Queue, Tree, Graph, Data Structure Operation, ADT Array- 1D, 2D, Operation on Stacks: PUSH, POP, Application of Stacks, Linked list: Single Link List, Double Link List, Circular Link list, Queue: Representation & Manipulation, Circular Queue, Priority Queue, D Queue.

Tree: Introduction, Binary Search Tree, Tree traversal, Operation on Binary trees, Graph: BFS, DFS

Sorting and Searching: Binary Search, Bubble Sort, Insertion Sort, Quick Sort, Heap Sort.

Prescribed Books:

1. "Distributed Operating System", P. K Sinha, IEEE Press
2. "Distributed Systems & Networks", W. Buchanan, Tata McGraw Hill
3. "Data Structure", Seymour Lipschutz, Schaum's Series, TMH

Reference Books:

1. "Fundamentals of Parallel Processing", H. F Jordan, Pearson
2. "Parallel & Distributed Programming using C++", C. Hughes & T. Hughes, Pearson
3. "Parallel Programming", P. S Pacheco & Morgan Kaufmann, MPI
4. "Data Structure Using C", A. K. Ratha & A. K. Jagadev, Scitech Publication.

Paper-104
PRACTICAL

LAB ON DATA STRUCTURE USING C.

SECOND SEMESTER-II

Paper-201

DATA BASE MANAGEMENT SYSTEM

Unit-I

Database System Architecture: Data Abstraction, Data Independence, Data Definitions and Data Manipulation Language.

Data Models: Entity Relationship (ER), Mapping ER Model to Relational Model, Network, Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations. Relation Query Languages, Relational Algebra, Tuple and Domain Relational Calculus, SQL and QBE.

Unit-II

Relational Database Design: Domain and Data dependency, Normal Forms, Dependency Preservation, Comparison of Oracle & DB2

Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Optimization Algorithms.

Unit-III

Storage Strategies: Indices, B-Trees, Hashing, Transaction processing- Recovery and Concurrency Control, Locking and Timestamp based Scheduled, Concurrency Control Schemes.

Advanced Topics: Object-Oriented and Object Relational Databases. Logical Databases, web Databases, Distributed Databases, Data Warehouse and Data Mining.

Prescribed Books:

1. "Fundamentals of Database System" Elmaski & Navathe, Pearson
2. "Database System Concepts", A. Korth, McGraw Hill

Reference Books:

1. "An Introduction to Database System", C. J. Jate, Pearson

Paper-202

OBJECT ORIENTED PROGRAMMING USING JAVA

Unit-I

Fundamentals of Objected Oriented Programming, Evolution of Java. Introduction to Java and Java Programming Environment: Simple Java Program Structure, Java tokens, Java

statements, Implementing Java Program, Java virtual machine, Command line arguments, Programming Style. Constants, Variables and Data types: Constants, Variables, Data types, Declaration of variables, Scope of variables, Symbolic constants, Types casting. Operators and Expressions: Arithmetic, Relational, Logical Assignment, Increment & Decrement, Conditional and Special operators, Arithmetic expression, Evaluation of expressions, Precedence of arithmetic operators. Type conversions in expressions, Operator precedence and associavity, Mathematical functions, the "Decisions making and branching, Decision making and looping.

Classes, Objects and Methods: Defining a Class, Adding variables, Adding methods, Creating objects, Accessing class members, Constructors, Methods overloading, Static members, Nesting methods, Inheritance: Extending a Class, Overriding methods, Final variables a methods, Final classes Finalizer methods, Abstract methods, Final Classes visibility control, Arrays, Strings and Vectors: Creating an array, One-dimensional and Two Dimensional arrays, Vectors, Wrapper classes, Interfaces: Defining, Extending, Implementing and Accessing interfaces.

Unit-II

Packages: Java API Packages, Using System Packages, Naming conventions, Creating, Accessing, Using packages, Adding a class to a package, Hiding classes. Multithreading Programming: Crating threads, Extending the thread classes, Stopping and Blocking a thread, Life cycle of a thread, Using thread methods, Thread exceptions, Thread priority, Synchronization, Implementing “Runnable” interface.

Unit-III

Errors and Exceptions: Types of errors, Syntax and exception handling code, Multiple catch statement, Using finally statement, Throwing our own exceptions, Using exceptions for debugging. Applets Programming: Local and Remote applets, Applets and Applications, Preparing to write applets, Building applets code, Applet life cycle, Creating an executable applet, Designing a web page, Applet tag, Adding applet to HTML file, Running the applet Passing parameters to applets, Aligning the display, Displaying numerical values, Getting input from the user.

Prescribed Books:

1. “Programming with Java”, E. Balagurusamy, TMH
2. “The Complete Reference Java 2” H. Schildt, TMH

Reference Books:

1. “Black Book on Core Java”, Chandrashekharan, Kognet Publication.

Paper-203

MICROPROCESSOR AND ASSEMBLY LANGUAGE

Unit-I: Microprocessor: Their emergence from 8-bit, Introduction to the basic feature of RISC and CISC Processor, Micro controller, Their areas of use, Introduction to 8085 Microprocessor: Architecture, Bus organization, registers, ALU, Control section, Basic fetch and Execute cycle of a program, Timing diagrams, Instruction set of 8085, Instruction format, Types of instructions, Addressing modes.

Logic devices for interfacing: Tri-state logic, Buffers, Bi-directional buffers, Decoders, Encoders Latches. R/W and ROM models, Memory map address, Memory address range of a 1K memory chip, Memory address lines, Memory word size, Memory and instruction fetch, Memory classification, Memory structure and its requirements, interfacing, Address decoding and memory addresses.

Unit-II: Assembly Language Programming, Instruction and data format, Writing assembly language programs, Debugging a program, Programming techniques such as rotate and compare, Dynamic debugging, Counters and delays, Stacks and subroutines, Advanced subroutine concepts. ALP in 8086 processor.
Data Transfer Techniques: Programmed data transfer, Parallel data transfer using 8155, Programmable peripheral interface (8255) and handshake input/output, Asynchronous data transfer using 8261A, Programmable interrupt controller 8259A transfer, DMA transfer, Cycle stealing and busrt mode of DMA, 8257-DMA controller.

Unit-III: Various Interfacing Protocols: Interrupts of various types (software, Hardware, vectored), Interrupt service routine, CALL vs. hardware & software interrupts, Preliminary concepts of Exceptions/Traps, DMA and its use.

Analog Digital Interfacing: A/D & D/A converters, Analog Signal Conditioning circuits, Data Acquisitions Systems.

Prescribed Books:

1. "Advanced Microprocessor and Peripherals", Ray & Bhurchandi, TMH
2. "Fundamentals of Microprocessor & Microcomputer", B. Ram, Dhanpatrai publication

Reference Books:

1. "Microprocessor and Digital System", D. V Hall, TMH
2. "Microprocessor Architecture, Programming & Application with 8085/ 8080A, R. S Gaonkar, Wiley Eastern Ltd.

Paper-204

PRACTICAL

JAVA, DBMS (PL/SQL), 8086 MICROPROCESSOR (LAB)

SEMESTER SYSTEM COURSE OF P. G. COMPUTER SCIENCE

THIRD SEMESTER

Paper-301

SOFTWARE ENGINEERING

Unit-I

Introduction to Software Engineering: Introduction, Software, Types of Software, System Software, Application Software, Roles of Software, Software Crisis, Software Myths, What is Software Engineering. Software process, Software development models.
SDLC (Software Development Life Cycle): Feasibility study, Requirement Analysis and Specification, Design, Coding, Testing, Implementation and maintenance.

Unit-II

Software Process Model: Waterfall model, Prototype model, Spiral model, Rapid Application Development (RAD)

Feasibility Study: S/w Project Management, Software Project Planning, Software Project Scheduling: Work Breakdown Structure (WBS), Activity Chart, PERT, Gantt Charts.

S/W Project Estimation: LOC, Function point metrics, Risk management and control, Requirement analysis and specification.

Design: Introduction to Software design, Design process, Cohesion, Coupling, Software Design method.

Unit-III

Coding: Coding guideline and standard, Code Review, Walk through code inspection, coding tools.

Testing: Principle of testing, Types of testing: Unit Testing, Integration Testing, System Testing, Acceptance Testing, Black Box Testing, White Box Testing, Validation and Verification.

Maintenance: Need of Software maintenance, Model, Maintenance Process, software Configuration Management and Reserve Software Engineering, CASE Tools.

Prescribed Books:

1. "Fundamentals of S/W Engineering", Rajiv Mall, PHI
2. "Software Engineering Practitioners Approach", Pressman, TMH.

Reference Books:

1. "Software Engineering", Sommer Ville
2. "An Integrated Approach to Software Engineering", Pankaj Jalote, Narosa.

Paper-302

THEORY OF COMPUTATION

Unit-I

Regular Languages & Finite Automata

Background Materials: Alphabets, Strings, Empty String, Sets Empty Sets, Proof Methods: Induction & Contradiction. Deterministic Finite Automata, Non-deterministic Finite Automata, Equivalence of NFA and DFA. Regular Expressions and Languages, Conversion of DFAs to Regular Expressions and vice-versa. Properties of Regular Languages: Pumping Lemma, Closure properties: Union, Intersection, Complement, Difference, Reversal, Homomorphism, and Inverse Homomorphism. Decision Problem for Regular Language (Four Problems): The Emptiness/Universality Problem, The Finiteness Problem, The Membership Problem and the Equivalence Problems. Myhill Nerode Theorem, Testing the Equivalence of two DFAs, DFA Minimization.

Unit-II

Context Free Language & Pushdown Automata

Context Free Languages, Context Free Grammars, Derivation, Ambiguity, Parsing, Pushdown Automata: Definition of PDAs, Acceptance of PDAs by final state and by empty stack. Conversion of CFG to PDA and vice-versa, Determination & Parsing, Simplification of CFG's, Chomsky Normal Form, Greibach Normal Form. The Pumping Lemma for CFL's. Closure properties: Union, Concenation*, +, Homomorphisms and Reversal.

Unit-III

Mobile Computing: Personal communication services architecture, Cellular telephony, Multiplexing techniques (SDM, TDM, FDM, CDM). Mobility Management: Hands off, Roaming management for SS7 & CT2.

Prescribed Books:

1. "Introduction to the Theory of Computation", Michael Sipser, Cengage learning India Pvt. Ltd., New Delhi.
2. "Introduction to Automata Theory", John E. Hocroft, Rajeev Motwan & Jefry D. Ullman Pearson.
3. "Wireless and Mobile Network Architecture", Yi-Bing Lin and Imrich Chalmtac, Johri Wiky and Sons.
4. "Mobile Communication", Jochen Schiller, Pearson Education.

Reference Books:

1. "Theory of Compution", G. Sudha Sadashivam, Scitech Publication.
2. "Introduction to Language and the Theory of Computation", John C. Marti, TMH.
3. "Mobile and Personal Communication System & Services", Raj Pandya, PHI.
4. "Mobile Cellular Tele Communication", C.Y William Lee, TMH.

Paper-303

ANALYSIS AND DESIGN OF ALGORITHMS, COMPUTER GRAPHICS

Unit-I

Algorithms and Complexity- Asymptotic notations, Orders, worst-case and average-case, amortized complexity. Basic Techniques- divide & conquer, dynamic programming, greedy method, backtracking.

Randomization Data Structure- heaps, search trees Dynamic Programming: Multistage graphs, Traveling Salesman Problem. Applications sorting & searching, combinatorial problems.

Unit-II

Optimization problems, all pairs shortest path problems, strings matching, Graphing Algorithm-BFS and DFS.

Minimum cost Spanning trees, single source shortest paths. PN-completeness, NP-completeness, Approximation algorithms.

Unit-III

The origin of Computer graphics, how the in Interactive, VDU (Visual Display Unit), new display devices, general purpose graphics software, the user interface, the display of solid objects. Coordinate Systems, Incremental methods, Line-drawing algorithms, circle generators. Display devices and controllers, display devices, the CRT. Transformation principles, Concatenation, matrix representations, use of homogeneous coordinate system.

A line clipping algorithm, mid point subdivision, clipping other graphics entities, polygon clipping viewing transformation, the windowing transformation.

Prescribed Books:

1. "The Design and Analysis of Algorithm", Coreman, Riveet, PHI.
2. "Computer Graphics", Hearn & Baker, PHI.

Reference Books:

1. "The Design and Analysis of Algorithm", Aho, Hopcroft & Ullman, Addision-Wesley.
2. "Fundamentals of Computer Algorithms", Horowitz & Sahani, Galgotia Publication.

Paper-304

PRACTICAL

LAB ON WEB TECHNOLOGY (HTML, XML, WML)

SEMESTER SYSTEM COURSE OF P. G. COMPUTER SCIENCE

FOURTH SEMESTER

Paper-401

COMPUTER NETWORK AND CRYTOGRAPHY

Unit-I

Introduction to data communication and networking: Networking goals, application of computer networks, Basic concepts of WAN, MAN and LAN, Computer network viz. distributed system, Network structure and network topologies.

Fundamental concepts of Data Transmission and Communication: Terminologies, Analog and digital data transmission, guided transmission media, wireless transmission, modulation and demodulation technique (amplitude, frequency and pulse code), Synchronous and asynchronous data transmission, Error detection and control.

Unit-II

1. Importance of multiplexing in data communication and networks, Frequency division multiplexing, time division multiplexing (synchronous and statistical)
2. Introduction the switching networks, circuits witching, packets switching Data
3. Gain roach, virtual circuit approach congestion control, X.25, frame relay, comparison of various switching networks.
4. Basic idea on network protocols and architecture, TCP/IP reference model, design issue of the various layers, OSI terminologies, connection oriented and connective less service.

Unit-III

Cryptography: Overview of cryptography, substitution and affine cipher and their cryptanalysis, Perfect Security, Stream and Block cipher, Data Encryption Standard (DES), Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher modes of operation, Advanced Encryption Standard. Principles of Public-key Cryptosystems, the RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Authentication Functions, Message Authentication Codes (MAC), Hash Functions, Security of Hash Function and MAC, Secure Hash Algorithm, HMAC, Digital Signature.

Prescribed:

1. “Data Communication & Networking”, B. A. Forouzan, TMH.
2. “Cryptography and Network Security Principles and Practice”, W. Stalling, Pearson.

Reference Books:

1. “Computer Networks”, A. S. Tanenbaum, PHI.
2. “Cryptography: Theory & Practice”’ D. Stinsori, CRC Press.

Paper-402
ARTIFICIAL INTELLIGENCE

Unit-I

Introduction to AI, History of AI, State of Art Intelligent. Agents: Structure of Intelligent agent, Problem Solving by Searching: BFS, Unitary Cost Search, DFS, IDS, Bi-directional Search, Constraint Satisfactory Search, Informed Search Best First Search, Heuristic Function, Memory bounded search, A* and IDA*, Game Playing: Min-Max search.

Unit-II

Learning: Learning from observations. A General Model of Learning Agents, Inductive Learning: Expert System, Architecture, Knowledge Acquisition, MYCIN: Natural Language Processing: Syntactic Processing, Semantic Analysis, Practical applications: Machine Translation, Efficient parsing.

Unit-III

Introduction to Pattern Recognition: Recognition & Classification Process, Classification Patterns, Visual Image Understanding, Image transformation; Perception: Image Formation, Image Processing Operations for Easy Vision, Speech, Recognition, Introduction to Robotics.

Prescribed Books:

1. "Artificial Intelligence", Elaine Rich, MGH.

Reference Books:

1. "Artificial Intelligence: A Modern Approach", Stuart Russel & Peter Norvig, Pearson.

Paper-403 (ELECTIVE)
(Any one to be chosen)

(I) COMPILER DESIGN

Unit-I

Compilers & Translators, Need of Translators, Structure of a compiler, Phases, Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Book Keeping, A symbol table in brief, Semantic Analysis, L-value, R-value, Error Handling.

Unit-II

Rules of Lexical Analyser, Need for Lexical Analysis, Input Buffering, Preliminary Scanning, A simple approach to the design of Lexical Analysers, Transition Diagrams, Regular Expression, String & Languages, Finite Automata, Non-deterministic Automata, Deterministic Automata, From regular expression to Finite Automata, Context free Grammars, Derivations & Parse Trees, Parsers, Shift Reduce Parsing, Operator-Precedence Parsing.

Unit-III

Symbol Table Management, Contents of a Symbol Table, Names & Symbol table records, reusing of symbol table spaces, array names, Indirection in Symbol Table entries, Data Structure for Symbol Tables, List, Self Organizing Lists, Search Trees, Hash Tables, Errors, Reporting Errors, Sources of Errors Syntactic Errors, Dynamic Errors, Lexical Phase Errors, Minimum Distance Matching, Syntactic Phase Error, Time of Detection, Ponic mode, Case study on Lex and Yacc.

Prescribed Books:

1. "Principles of Compiler Design", Alfred V. Aho & Jeffery D. Ullman
2. "Compiler Design", G. Sudhasadashivam, Scitech Publication.

(II) DIGITAL SIGNAL PROCESSING

Unit-I

Discrete Time Signals: Elementary discrete time signals, Classification of discrete time signals, Manipulation of discrete time signals. Classification of discrete time system, Interconnection of discrete time systems. Response of LTI systems to arbitrary inputs: Convolution sum, Properties of convolution. Causality of LTI systems, Stability of LTI systems, Systems with finite duration impulse response and infinite duration impulse response.

Unit-II

Discrete time system described by difference equation: Linear time-invariant systems characterized by constant-coefficient difference equations, the impulse response of a LTI system. Implementation of discrete time systems, Correlation of Discrete Time Signals: Cross correlation and Autocorrelation sequences, Properties of autocorrelation and cross correlation sequences.

Unit-III

The Z- Transform: Direct z-transform, Properties of z-transform. Rational z-transforms: Poles and Zeros, Pole location for casual signals, Systems function of a LTI system. The inverse z-transform by counter integration, by power series expansion, by fraction expansions, One-sided z-transform: Properties, Solution of difference equations.

Prescribed Books:

1. "Digital Signal Processing", John G. Proakis, D. G. Manolakis, Pearson

Reference Books:

1. "Digital Signal Processing", S. Salivahanan, TMH
2. "Introduction of Digital Signal Processing", J. R. Johnson, PHI

(III) INTERNET TECHNOLOGY

Unit-I

Introduction to Swing and JDBC: Advance GUI programming using swing, Containers, Components, Layout managers, Event handling technique, J Frame, J Panel, J Label, J Button, J Check Box, J Radio Button, J Text Field, J Text Area, J Scroll Pane, J Table, Networking and socket programming, JDBC API, Steps of JDBC, RMI (Remote Method Invocation)

Unit-II

Internet and web Technology: Internet working concept, Internet backbones and its features, Internet accesses dial up connection, Direct connection and Broadband connection, Roles of ISP, Function of Hub, Switch, Bridge router and Gateways in internet, Internet Protocols- TCP/IP, FTP, HTTP, TELNET, Gopher and WAIS, Internet addressing- IP address, domain names, URLs, Distinction between Internet and Extranet.

Unit-III

Web Programming: Overview of WWW, Web browsers, web servers, Basics of HTML and XHTML programming- syntax document structures, image, Hyperlinks, List, Tables, Forms, Frames, CSS, Basic JAVA script programming- Loop, Function and Arrays, XML document structure, XML schema and parsing XML documents.

Prescribed Books:

1. "Developing Web Application", Ralph Mosely, Willey, New Delhi.
2. "Internet working with TCP/IP", Vol. 1, Douglas E. Corner.

Reference Books:

1. "HTML, XHTML, XML Complete Reference", Tata MacGraw Hill.
2. "J2EE Complete Reference", JIM Keogh, Tata MacGraw Hill.

Paper-404

PROJECT

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