**Program:** MCA
**Semester:** Second
**Course:** Java Programming
**Course Code:** 3CIT105

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## Course Objective:

### Unit I
Java Fundamentals: Features of Java, OOPs concepts, Java virtual machine, Reflection byte codes, Byte code interpretation, Data types, variable, arrays, expressions, tokens, operators, and control structures, java environment setup, Objects and classes.

### Unit II
Java Classes, Abstract classes, Static classes, Inner classes , access modifiers, static member, method overloading, method overriding, inheritance and its types, polymorphism, Packages ,Wrapper classes ,Interfaces ,abstraction, this keyword, Super, Exception handling, Exception as objects, Exception hierarchy, Try – catch, finally, Throw, throws.

### Unit III
IO package ,Input streams ,Output streams ,Object serialization ,Deserialization ,Sample programs on IO files ,Filter and pipe streams , Multi-threading ,Thread Life cycle ,Multi-threading advantages and issues ,Simple thread program ,Thread synchronization.

### Unit IV
GUI :Introduction to AWT programming ,Layout and component managers ,Event handling ,Applet class ,Applet life-cycle ,Passing parameters embedding in HTML ,Swing components – JApplet, JButton, JFrame, etc. ,Sample swing programs Database Connectivity, JDBC architecture , Establishing connectivity and working with connection interface.

### References

1. Programming with Java, E. Balaguruswamys, TMH.
2. The Complete Reference-Java 2, Schildt, Herbert, TMH.
3. Core Java for beginners, RASHMI Kanta Das, Vikas pub.
4. Java server programming, Ivan Bayross,Shroff Publishers
5. Java Server Programming Java EE 7 (J2EE 1.7) - Black Book, Kogent, Dreamtech PressSenn, LA., "Analysis and Design of Information Systems". Tata McGraw Hill Book Company, 1986.

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**Program:** MCA
**Semester:** Second
**Course:** Java Programming Lab
**Course Code: 3CIT105P**

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**Write a java:**

1. Program to find square root of given number.
2. Program to enter principal, rate & time and find simple interest.
3. Program to create an object.
4. Program to enter a character from keyboard and find out the ASCII value of the character.
5. Program to enter a number from keyboard and find out Fibonacci series.
6. Program to enter a number from keyboard and find out factorial of the number.
7. Program to enter a number from keyboard and print the prime numbers present within it.
8. Program to swap two numbers without using third variable.
9. Program to show inheritance.
10. Program to demonstrate dynamic method dispatch.
11. Program to demonstrate abstraction.
12. Program to enter a number from keyboard and convert it into binary form and vice-versa.
13. Program to sort an array in an ascending order.
14. Program to find out the sum and average of the elements present in an array.
15. Program to find out the biggest and smallest number from a matrix.
16. Program to enter a string from keyboard and check how many vowels and consonants are present.
17. Program to reverse a specified string.
18. Program demonstrating the use of package.
19. Program to show the current date, date after one day and date before ten days.
20. Program to draw the shape.
21. Program to find out the pixel color.
22. Program to move the bubbles using thread.
23. Program to create an applet.
24. Program to create a form using applet.
25. Program to show the database connectivity.

**Program:** MCA
**Semester:** Second
**Course:** Computer Communication Networks
**Course Code: 3CIT106**

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**Unit I:**

**Introduction to computer network**

Advantages of networks, structure of the communications network, point-to-point and multidrop circuits, data flow and physical circuits, network topologies, topologies and design goals. Hierarchical topology, horizontal topology (Bus), star topology, ring topoloy, mesh topoloy. The telephone network, switched and non-switched options, fundamentals of communications theory, channel speed and bit rate, voice communications and analog waveforms, bandwidth and the frequency spectrum, connecting the analog and digital worlds, digital worlds, digital signals, the modem, asynchronous and synchronous transmission.

Wide area and local networks, connection oriented and connectionless networks, classification of communications protocols, time division multiple access (TDMA), time division multiplexing (TDM), carrier sense (Collision) systems, token passing, peer-to-peer priority systems; priority slot, carrier sense (collision free) systems, token passing (priority) systems.

**Unit II:**

**Layered Protocols and the OSI model**

Goals of Layered Protocols, network design problems" communication between layers, introduction to standard organizations and the OSI model, standards organizations, Layers of OSI, OSI status.

**Polling/Selection Protocols**

Character and bit protocols, binary synchronous control (BSC) HDLC; HOLC options, HDLC frame format, code transparency and synchronization, HDLC transmission process, HDLC subsets, SDLC;, Protocol conversion.

**Local Area Networks**

Way LANs?, Primary attribues of a LAN, Broadband and baseband and base LANs, IEEE LAN standards, e1ationship of the 802 standards to the ISO/CCITT model., connection options with LANs, LLC and MAC protocol data units, LAN toppologies and protocols, CSMA/CO and IEEE 802.3, token ring (Priority), token bus and IEEE 802.4, metropolitan area networks (MANs), ANSI fiber distributed data interface.

**Unit III:**

**Switching and Routing in Networks**

Message switching, packet switching, when and when not to use packet switching, packet routing, packet switching support to circuit switching networks. **The X.25 Network and Supporting Protocols**

Features of X.25, Layers of X.25 and the Physical layer, X.25 and the data link layer. companion standards to X.25, features of X.25, X.25 channel options, flow control principles, other packet types, X.25 logical channel states, packet formats. internetworking, connectionless mode networks, the frame relay and X.25 stacks.

**Unit IV:**

**TCP/IP**

TCP/IP and internetworking, example of TCP/IP operations, related protocols ports and sockets. The IP address structure, major features of IP, IP datagram. Major IP services. IP source routing, value of the transport layer, TCP, Major features of TCP, passive and active operation, the transmission control block (TCP), route discovery protocols, examples of route discovery protocols, application layer protocols.

**Personal Computer Networks**

Personal computer communications characteristics, error handling, using the personal computer as a server, linking the personal computer to mainframe computers, tilt: transfer on personal computers, personal computers and local area networks, network operating systems (NOSs), common IBM PC LAN protocol stacks.

**References**

Black, V., "Computer Networks· Protocols, Standards and Interfaces", Prentice Hall of India, 1996.

Stallings, W., "Computer Communication Networks", (4th edition). Prentice Hall of India. 1993.

Tanneabaum, A.S .. "Computer Networks", Prentice Hall of India, 19'81.

**Program:** MCA
**Semester:** Second
**Course:** Theory of Computation
**Course Code: 3CIT107**

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**Course Objectives** This course enables the students to:
A. Define a system and recognize the behavior of a system.
B. Design finite state machines and the equivalent regular expressions.
C. Construct pushdown automata and the equivalent context free grammars
D. Design Turing machines and Post machines
E. Learn about the issues in finite representations for languages and machines, as well as gain a more formal understanding of algorithms and procedures.

**Course Outcomes** After the completion of this course, students will be able to:
1. Relate formal languages and mathematical models of computation
2. Attain knowledge about different types of languages and the corresponding machines
3. Learn about the pushdown machine and its role in compiler construction
4. Understand the capability of real computers and learn examples of unsolvable problems.
5. Analyse classes of P, NP, NP-C and NP-Hard problems

**MODULE: I** Basic Mathematical Objects and Mathematical Induction: Sets, logic, Functions, Relations, Alphabets, Strings, Languages, Principle of mathematical induction, Recursive definition.

**MODULE: II** Regular Expressions and Finite Automata: Regular languages and Regular Expressions, Memory required to recognize a language, Finite Automata, capability & limitations of FSM, Deterministic Finite Automata , Non-Deterministic Finite Automata, NFA with e-moves, regular sets & regular expressions, Equivalence of DFA and NDFA, NFA from regular expressions, regular expressions from DFA, Moore versus Mealy m/c, two way finite automata equivalence with one way , Kleen's Theorem, applications of finite automata.
**MODULE: III** Regular and Non-regular languages: Criterion for Regularity, Minimal Finite Automata, Pumping Lemma for Regular Languages, Decision problems, Regular Languages and Computers. Context Free Grammars: Introduction, definition, Regular Grammar, Derivation trees, Ambiguity, Simplified forms and Normal Forms, Applications.
**MODULE: IV** Pushdown Automata: Definition, Moves, Instantaneous Descriptions, Language recognised by PDA, Deterministic PDA, Acceptance by final state & empty stack, Equivalence of PDA , Pumping lemma for CFL, Interaction and Complements of CFL,Decision algorithms. Turing Machines: Definition and examples, Computing Partial Functions with Turing Machine(TM), Combining TMs, Variations of TMs, Multi-tape TMs, Non-deterministic TM, Universal TM, Church Thesis.
**MODULE: V** Recursively Enumerable Languages: Recursively Enumerable and Recursive, Enumerating Language, Context Sensitive and Chomosky Hierarchy. Unsolvable Problems and Computable Functions: Nonrecursive Language and unsolvable Problems, Halting Problem, Rice Theorem, Post Correspondence Problem. Computational Complexity: Discussion on P, NP, NPC and NP-Hard Problems.
Text Books:

1. Martin John “Introduction to Languages and the Theory of Computation”, 3rd Edition, TMH.
Reference Books: 1. Mishra K.L.P &Chandrasekharan N., “Theory of Computer Science”, PHI.
2. Hopcroft John E. And Ullman Jeffrey D., “Introduction to Automata Theory, Languages & Computation”, 3rd Edition, Narosa, 2008.
3. Lewis H. R. and Papadimitrou C. H, “Elements of the theory of Computation”, PHI.

**Program:** MCA
**Semester:** Second
**Course:** Software Engineering
**Course Code:** 3CBM201

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**Course Objectives** This course enables the students to:
1. Students are effective team members, aware of cultural diversity, who conduct themselves ethically and professionally
2. Students use effective communication skills and technical skills to assure production of quality software, on time and within budget.
3. Students build upon and adapt knowledge of science, mathematics, and engineering to take on more expansive tasks.
4. Able to increase level of self-reliance, technical expertise, and leadership.

**Course Outcomes** After the completion of this course, students will be:
1. Explain the software engineering principles and techniques
2. Apply Software Project Management Practices
3. Apply the knowledge gained for their project work as well as to develop software following software engineering standards
4. Analyze various methods of software testing strategies
5. Develop self-reliance, technical expertise, and leadership.

**MODULE: I**
**Introduction to Software Engineering:** Evolving Role of Software, Changing Nature of Software, Legacy Software, Process Frame work, Process Patterns, Process Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, Unified Process Model, Agile Process Model.
**MODULE: II**
**Requirement Engineering:** A bridge to design and construction, Requirement Engineering Task, Initiating the Requirement Engineering Process, Eliciting Requirements, Developing Use case, Building the Analysis Model, Negotiating Requirements, Validating Requirements.
**MODULE: III**
**Design Engineering**: Design Process and Design Quality, Design Concepts, Design Models, Pattern Based Software Design.
**Software Testing:** Testing Strategies and Testing Tactics, Strategic Approach to software Testing, Test Strategies for conventional, Validation Testing System Testing, White Box Testing, Basic Path Testing Control Structure Testing, Black Box Testing.
**MODULE: IV**
**Metric for process and Estimation Techniques:** Process metrics, Software Measurement, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object Oriented Projects Specialized Estimation Techniques. Software Quality and Configuration Management: Quality Concepts, Software Quality Assurance, Software Reliability, Software Configuration Management, SCM Repository, SCM Process.

**Text Book:**
1. Pressman Roger S., "Software Engineering – A Practitioner's Approach", 6th Edition., Tata McGraw Hill.

**Reference Books:**

1. Vliet Haus Van, “Software Engineering – Principles and Practice”, Wiley John and Sons, 2 nd Edition.
2. Sommerville Ian, “Software Engineering”, 7th Edition. Pearson Education.

**Program:** MCA
**Semester:** Second
**Course:** Optimization Techniques Linear Programming
**Course Code: 3CMT102**

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**Course Objective:**

**UNIT I**

Graphical method for two dimensional problems - Central problem of linear programming various definitions - statements of basic theorems and properties - Phase I and Phase II of the simplex method - revised simplex method - primal and dual - dual simplex method - sensitivity analysis transportation problem and its solution - assignment problem and its solution by Hungarian method.

**UNIT II**
**Integer Programming** Gomory cutting plane methods - Branch and Bound method.
**Queueing Theory** Characteristics of queueing systems - steady state MIMIt, MlMit/K and MIMIC queueing models.

**UNIT III**
**Replacement Theory** replacement of items that deteriorate - Replacement of items that fail Group replacement and individual replacement.
**Inventory theory** Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite.

**UNIT IV**

**PERT and CPM**
Arrow networks - time estimates- earliest expected time, latest allowable occurrence time and slack - critical path - probability of meeting scheduled date of completion of project – calculations on CPM network - various floats for activities - critical path - updating project - operation time cost trade off curve - project time cost trade off curve - selection of schedule based on cost analysis.
(Remarks: No mathematical derivations included).

**References**
Gillet, B.E., "Introduction to Operations Research : A Computer Oriented Algorithmic Approach". Tata McGraw Hill, New York, 1990.

Gross D., and Harris. C.M .. "Fundamentals of Queueing Theory", John Wiley and Sons, New York. 1980.

Hillier F., and Lieberman. GJ., "Introduction to Operations Research", Holden Day, New York. 1985.

Karnbo, N.S., "Mathematical Programming Techniques", McGraw Hill, New York. 1985.

Kanti Swarup, Gupta, P.K., and Man Mohan, "Operations Research", Sultan Chand & Sons. New Delhi. 1990.

Mital K. V., "Optimization Methods In Operations Research and System Analysis", New Age International (P) Ltd., New Delhi, 1992.

Saffer, L.R., Fitter J.B., and MeyerW.L., "The Critical Path Method". McGraw Hill. New York. 1990.

Taha, H.A., "Operations research- An Introduction", McMillan Publishing co .• New York, 1986.

**Program:** MCA
**Semester:** Second
**Course:** Computer Graphics
**Course Code: 3CITE202**

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## Unit 1

**Introduction**: Computer Graphics and their applications. Overview of Graphics system. Display Devices: CRT Monitors (Random – Scan and Raster Scan, DVST, Plasma – Panal Display, LED and LCD Monitors. Graphics Software.

## Unit2

**Elementary Drawing**: Points and various line drawing Algorithms and their comparisons efficiency contact. Cycle generating algorithms Other objects like ellipses, arcs, section spirits. Two Dimensional Geometric Transformations: Basic Transformations, Matrix Representations and Homogeneous coordinates, Composite Transformations, Reflection and Shear, Transformations between Coordinates Systems, Raster Methods for Transformations.

## Unit 3

**Two Dimensional Viewing**: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-View Port Coordinate Transformation, Clipping- Point, Line(Cohan-0Sutherland Line Clipping and Liang –Barsky Line Clipping and Nicholl-Lee-Nicholl Line Clipping) and Polygon Clipping(Sutherland-Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping).

## Unit 4

**Three Dimensional Geometric Transformations**: Translation, Rotation, Scaling, Reflection and Shears, Composite Transformations, Modeling and Coordinate Transformations. Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates, Projections and
Clipping.

**References:**


1. Computer Graphics by Donal Hearn M. Pardive Baker (PHI) Easter Economy Edition.
2. Computer Graphics by Roy A. Plastockand Gordon Kalley – Schaum's Series.
3. Computer Graphics by Marc Berger.
4. J. F. KoegelBuferd -Multimedia Systems, Pearson Education, New Delhi,
5. J.D.Foley- Computer Graphics, 2ndEdn, Pearson Education, New Delhi,

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**Program:** MCA
**Semester:** Second
**Course:** Computer Graphics lab
**Course Code: 3CITE202P**

1. Write a program to draw a point.
2. Write a program to draw line
3. Write a program to draw a circle.
4. Write a program to draw a rectangle
5. Write a program to draw a sector
6. Write a program to draw an ellipse
7. Write a program to draw an arc.
8. Write a program to draw smiley face
9. Write a program to draw a polygon
10. Write a program to draw a filled polygon.
11. Write a program to draw a concentric circle.
12. Write a program to draw a kite
13. Write a program to draw pie slice
14. Write a program to draw a bar
15. Write a program to draw a 3D bar
16. Write a program to draw pie chart
17. Write a program to draw bar chart
18. Write a program to draw 3D Bar chart
19. Write a program to draw a digital clock
20. Write a program to draw a car.
21. Write a program to draw a moving car
22. Write a program to draw a half filled glass with blue water
23. Write a program to explain DDA Line Drawing algorithm.
24. Write a program to explain Bresenham's Line Drawing algorithm
25. Write a program to explain Bresenham's Circle Drawing algorithm.
26. Write a program to explain :
    - Text Animation
    - 2D Rotation, Translation, Scaling
    - 3D Rotation, Translation, Scaling
    - Line Clipping

**Program:** MCA
**Semester:** Second
**Course:** Professional Skills
**Course Code: 3CHSMC102**

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**COURSE OBJECTIVE**-*The aim is to develop students' soft skills, communication, leadership and teamwork skills; and personal development skills using practical approach and exposure of students to the realities of the world.*

- *To enhance Leadership – assessing the requirements of a task, identifying the strengths/weaknesses within the team, utilising the diverse skills of the group to achieve the set objectives.*
- *To improve Communication – demonstrating clear briefing and listening /speaking skills.*
- *To make them realize that effective communication and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the business environment.*
- *The course aims to cause a basic awareness about the significance of soft skills in professional and inter-personal communications and facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one's life and career. But only soft skills can ensure a person retain it, climb*

**Unit 1 : Personal Development**

Managing Self - Self Discovery, Self Awareness, Self Esteem, Self Responsibility, Self Management

Personal Development Skills, Categories of Personal Development, Personal Development Process

Relationship Management - Managing Others, Interpersonal Skills, Improving Relationship, Transactional Analysis, JOHARI Window, four Life Positions

**Unit II : Thinking Process**

Strategic Thinking – Introduction, Concept, Stages in Strategic Thinking, Process of Strategic Thinking, Importance of Strategic Thinking, Characteristics of Strategic Thinkers, Developing Strategic Thinking
Lateral Thinking – Introduction, Meaning, Need for Lateral Thinking, Techniques of Lateral Thinking, Benefits of Lateral Thinking
Creative Thinking – Out of Box Thinking, Application of Thinking

Facing Changes – Adapting Change, Understanding Change- Examples of Organizational Change

Facing Challenges – Introduction, Taking Initiative, Benefits of facing challenges, Facing challenges in life
Balancing Work and Life – Importance, Gender differences regarding work life balance, Tips for balancing work and life

**Unit III : Individual Behaviour**

Attitude – Components of Attitude, Factors influencing Attitude, Types of Attitude, Challenges and lessons from Attitude, Impact of Attitude on Behaviour
Motivation – Concept, Objective, Factors of Motivation, Self Steem, Intrinsic & Extrinsic Motivation
Time Management – Value of Time, Diagnosing Time management, Weekly Planner, To Do List, Prioritizing Work
Stress Management – Introduction, Difference between Stress, Anxiety and Tension, Managing Stress
Applied Ethics – Introducing Professional Ethics, Ethical Dilemma

**Unit IV : Employment Communication**

Job Communication – Developing Job Communication Skills, Job Communication Process, Developing Confidence
Job Search Strategy – Understanding the Job Market, The Job Search Process, Job Search Techniques
Job Application, Employment Letters
Resume Building – Difference between Bio data, Curriculum Vitae and Resume

The Job Interview - Types of Job Interview, Preparing for a Job Interview, Understanding Interview Questions, Handling Interview Questions, Interview Strategies
Psychometric Test

**Suggested Readings :**

*1. Covey S (2004) The 7 Habits of Highly Effective People.*
*2. Goud, N. & Arkoff, A. (2003) Psychology and Personal Growth, Allyn & Bacon.*
*3. Sen, Leena, Communication Skills, Eastern Economy Edition*
*4. Dr. K.Alex Managerial Skills, S.Chand*