

- M. Sc. in COMPUTER SCIENCE
- THIRD SEMESTER (ODD SEMESTER)

FACULTY OF SCIENCE

Eligibility Criteria (Qualifying Exams)	Course Code	Course Type	Course (Paper/Subjects)	Credits	Contact Hours Per Week			EoSE Duration (Hrs.)		
					L	T	P	Thy	P	
After appearing in the Second semester examination irrespective of any number of back/ arrear papers	CMP 301	CCC	ADVANCED JAVA PROGRAMMING	5	4	2	0	3	0	
	CMP 311	CCC	ADVANCED JAVA PROGRAMMING – LABORATORY WORK	2	00	00	3	00	3	
	CMP 302	CCC	DATA COMMUNICATION & COMPUTER NETWORKS	5	4	2	0	3	0	
	CMP 312	CCC	DATA COMMUNICATION & COMPUTER NETWORKS – LABORATORY WORK	2	00	00	3	00	3	
	CMP 303	CCC	RDBMS	5	4	2	0	3	0	
	CMP 313	CCC	RDBMS – LABORATORY WORK	2	00	00	3	00	3	
	CMP S02	OSC	INTELLECTUAL PROPERTY RIGHTS	6	4	3	00	3	00	
	CMP C01	ECC/CB	THEORY OF AUTOMATA & IT'S APPLICATIONS	6	4	3	00	3	00	
	CMP C02	ECC/CB	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM							
	CMP C03	ECC/CB	DATAWAREHOUSE AND DATA MINING							
	MINIMUM CREDITS IN INDIVIDUAL SUBJECT IS 6 AND IN COMPLETE SEMESTER IT WOULD BE 30				TOTAL=33					

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE:	CMP 301 COURSE TYPE : CCC
COURSE TITLE: ADVANCED JAVA PROGRAMMING	
CREDIT: 07	HOURS: 135
THEORY: 05 PRACTICAL: 02	THEORY: 90 PRACTICAL: 45
MARKS: 100	
THEORY: 70	CCA : 30 PRACTICAL: 33
OBJECTIVE: The main objective is to know about java platform . To be familiar about oops , packages and methods ,inheritance ,exception handling,input- output and networking applet and swing.	
UNIT-1 15 Hrs.	Overview of JAVA : The genesis of java, An overview of java, java virtual machine (JVM) ,Java development kit (JDK) ,Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements, Introducing Class, closer look at Methods and class ,Nested and inner class , Writing simple JAVA program.
UNIT-2 15Hrs	Inheritance, Packages and interface- Types of inheritance ,Access specifier ,using super, method overriding ,Abstract class ,constructor in multilevel inheritance ,using final with inheritance ,Dynamic method dispatch ,Defining package, CLASSPATH, Access protection ,Importing package ,Defining and implementing interface ,Extending interface, Nested interface.
UNIT-3 20 Hrs	Exception handling and Multithreading: Using try and catch ,multiple catch classes, Nested try statements , throw ,throws and finally ,Built in exception ,Uncaught exception , Creating own exception class , Java Thread Model: Main thread ,Creating own Thread ,Life cycle of thread, Thread priorities ,Synchronization and messaging, Interthread communication ,Suspending ,Resuming and stopping thread.
UNIT-4 20Hrs	Input Output and Networking : I/O classes: Byte stream and character stream ,Predefined stream ,reading console input, writing consoleoutput,PrintWriter class ,Reading and writing files. Networking : classes and interface ,Socket and overview, TCP/IP client socket and server socket ,Inet address ,URL Connection.Eclipse IDE, Netbeans IDE , Myeclipse IDE, Apache Tomcat Web Server, JBoss Server , Stateless Session Beans, Stateful Session Beans, Packaging , Writing Clients ,Spring,Struct framework.
UNIT- 5 20Hrs	Applet ,AWT,Swing, Event handling and Advance JAVA– Applet life cycle, Creating an applet, Using image and sound in applet ,passing parameter.Exploring AWT and introduction to Swing.Event handling – The delegation-event model , Event classes ,Source of event, Event listener interfaces ,handling mouse and keyboard event ,Adapter class. Advance JAVA : JDBC API. Servlet – Overview of servelet,Life cycle of servlet, JAVA servlet architecture , Generic servlet and http servlet ,The servlet interface, Request and response.

**LABORATORY WORK
CMP 311**

1. Design a program to develop a simple java program .
2. Design a program for various conditional and relational operators .
3. Design a program for class and interface .
4. Design a program for various types of inheritances .
5. Design a program to create a user defined package .
6. Design a program for exception handling .
7. Design a program to create a thread and related problems .
8. Design a program for various streams .
9. Design a program with Apache Tomcat Web Server and JBoss Web Server .
10. Design a program to create an applet .
11. Design a program for database connectivity .
12. Design a program for swing and related concepts .
13. Design a program with Netbeans IDE.
14. Design a program with Eclipse IDE.
15. Design a program with Spring.

**SUGGESTED
READINGS**

1. Java: The complete reference By Naughton P and schildtH. ,OsborneMcgraw-Hill, Berkeley, USA, 1997.
2. Simply JAVA :An Introduction to JAVA programming By James R. Levenick ,Firewall Media publicationNew,Delhi
3. Java Programming By E.Balguruswami
4. Core JAVA for beginners By RashmiKantaDas ,Vikas Publication.

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: CMP 302 COURSE TYPE : CCC	
COURSE TITLE: DATA COMMUNICATION & COMPUTER NETWORKS	
CREDIT: 07	HOURS: 135
THEORY: 05 PRACTICAL: 02	THEORY: 90 PRACTICAL: 45
MARKS: 100	
THEORY: 70	CCA : 30
PRACTICAL: 33	
OBJECTIVE: The main objective is to know about java platform . To be familiar about oops , packages and methods ,inheritance ,exception handling,input- output and networking applet and swing. Students also get knowledge regarding advanced java concepts .	
UNIT-1 20Hrs	Introduction and Physical Layer :Introduction: Goal and application Network Hardware and Software ,Protocol Hierarchies, Design Issue of the layers,Interfaces and services, Connection oriented and connectionless services, Service Primitives,Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode . Physical Layer : Data and signal,Analog and digital Communication, Transmission Media ,Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.
UNIT-2 15Hrs	Data Link Layer : Data Link Layer design issues Data link control:Framing, Flow control. Error Detection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation :static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.
UNIT-3 20 Hrs	Network Layer : The Network Layer Design Issue, IP addressing, Address mapping, Error reporting ,Multicasting ,Delivery, Forwarding and Routing. The Network Layer in the Internet : The IP Protocol.subnets, Internet control protocols ,internet multicasting.
UNIT-4 20 Hrs	Transport Layer : The Transport layer services, The concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.
UNIT- 5 15 Hrs	Presentation and Application Layer : Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols .

LABORATORY WORK CMP 312	<ol style="list-style-type: none"> 1. Practise about IP Address. 2. Sharing of Printers. 3. Develop local area network using Windows and Linux Operating System. 4. Practise about Internet and it's applications . 5. Practise about installation of various Network based Operating System. 6. Practise about Client Server architecture . 7. Practise the installation of bus topology of LAN. 8. Familiar about various networking devices . 9. Sharing of file and folders. 10. Communication between two servers.
SUGGESTED READINGS	<ol style="list-style-type: none"> 1. Data Communications and Networking By Forouzan, Tata McGraw Hill Company. 2. Computer Networks By A.S. Tanenbaum 3. Computer Network By S.S.Shinde ,New Age International Publisher. 4. Data and computer Communication by Shashibanzal ,Firewall media . 5. Internetworking with TCP/IP :Principles,protocols,and Architecture Vol 1 5th Edition ,PHI publication 6. Data Communications and Computer Network by Prakash C Gupta, PHI Publication.

**M.Sc. in COMPUTER SCIENCE
(THIRD SEMESTER)**

COURSE CODE: CMP 303 **COURSE TYPE :** CCC

COURSE TITLE: RDBMS

CREDIT: 07

HOURS: 135

THEORY: 05 **PRACTICAL:** 02

THEORY: 90 **PRACTICAL:** 45

MARKS: 100

THEORY: 70

CCA : 30

PRACTICAL: 34

OBJECTIVE: The main objective is to know about Database Management System . To know about relational model, SQL, various databases and data organization .

UNIT-1 15 Hrs.	Overview of Database Management : Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases. Introduction to MS-Access, Various queries related to MS-Access Database, Form design in MS-Access, Reports in MS-Access.
UNIT-2 15Hrs	Relational Model : Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.
UNIT-3 20 Hrs	Relational Database Design : Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.
UNIT-4 20Hrs	Structured Query Language : Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT...FROM, WHERE... GROUP BY... HAVING... ORDERBY...), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.
UNIT-5 20Hrs	Data Constraints and Functions Pseudo columns – ROWID, ROWNUM, USER, UID, SYSDATE, Null values, TAB table, DUAL table, Operators – arithmetic, relational, logical, range searching, pattern matching and set, Data constraints – Introduction, advantages and disadvantages, Type of data constraints – NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY and CHECK, Modifying constraints, working with data dictionary and use of USER_CONSTRAINTS, Functions – introduction, merits and demerits, types of functions (scalar and aggregate), Scalar : Numeric functions (ABS, FLOOR, MOD, POWER, ROUND, SIGN, SQRT and TRUNC), Character functions (CHR, ASCII, CONCAT, INITCAP, LOWER, SUBSTR, TRIM, UPPER), Date functions (ADD_MONTHS, LAST_DAY, NEXT_DAY, MONTHS_BETWEEN), Conversion functions (TO_NUMBER, TO_CHAR and TO_DATE), Aggregate fun : AVG, COUNT, MAX, MIN, SUM, Miscellaneous functions – NVL, DECODE, COALESCE

LABORATORY WORK CMP 313	<ol style="list-style-type: none"> 1. Design a table and database in Oracle/MySQL. 2. Practise about various forms in Oracle /MySQL. 3. Practise about various graphs in Oracle/ MySQL e. 4. Database connectivity of MS-Access with Oracle/ MySQL. 5. Practise about various queries regarding DDL,DML and DCL . 6. Practise about various data types and clauses of Oracle . 7. Practise about various constraints of Oracle . 8. Practise for inserting and fetching various records from any database . 9. Database Connectivity of Oracle with any Language . 10. Develop any complete software with oracle and any front end language .
SUGGESTED READINGS	<ol style="list-style-type: none"> 1. Database system concept By H. Korth and A. Silberschatz, TMH. 2. Data Base Management System By Alexies&Mathews ,Vikas publication. 3. Data Base Management System By C. J. Date ,Narosha Pub. 4. Data Base Management System By James Matin . 5. Principles of Database System By Ullman.

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE: CMPS02	COURSE TYPE : OSC
COURSE TITLE:INTELLECTUAL PROPERTY RIGHTS	
CREDIT: 06	HOURS : 90
THEORY: 06	THEORY: 90
MARKS : 100	
THEORY: 70	CCA : 30

OBJECTIVE:	
<ul style="list-style-type: none"> - Understands the concept and place of research in concerned subject - Gets acquainted with various resources for research - Becomes familiar with various tools of research - Gets conversant with sampling techniques, methods of research and techniques of analysis of data. 	
UNIT - 1 15Hrs	<p>Introduction: Meaning of property, Is IP a property, Justifications for protection of IP, Major forms of IP- i. Copyright, ii. Patent, iii. Trade Marks, iv. Designs, v. Geographic indication, vi. Semi conductors, vii. Plant varieties. Major international documents relating to the protection of IP- i. Berne Convention, ii. Paris Convention, iii. TRIPS</p>
UNIT - 2 15Hrs	<p>Copyrights: Meaning and historical development of copyright, Subject matter- i. Original literary, dramatic, musical, artistic works, ii. Cinematograph films, iii. Sound recordings, Ownership of copyright, Term of copyright, Rights of owner-i. Economic, Rights, ii. Moral Rights, Assignment and licence (including compulsory licence)of rights, Performers rights, Infringement of copyright, Exceptions of infringement, Remedies-i. Civil, ii. Criminal, iii. Administrative, Registration</p>
UNIT - 3 20 Hrs	<p>Patents: Meaning and historical development, Criteria for obtaining patents- i. Novelty, ii. Inventive step, iii. Utility, Non patentable inventions, Procedure for registration, Term of patent, Rights of patentee, Compulsory license, Revocation, Government use of patent, Infringement of patents, Exceptions to infringement, Remedies, Patent office and Appellate Board</p>
UNIT - 4 20Hrs	<p>Trade Marks: Meaning and historical development of marks, Functions of marks- i. Commercial aspect, ii. Consumer aspect, Concept of distinctiveness, Absolute grounds of refusal, Relative grounds for registration, Doctrine of honest concurrent user, Procedure for registration, Term of Trade mark, Rights of holder, Assignment and licensing of marks, Infringement, Passing Off, Trade Marks Registry and Appellate Board</p>
UNIT - 5 20 Hrs	<p>Designs, GI and other forms of IP Meaning and evolution of design protection, Concept of novel, Concept of original, Registration, Term of protection, Rights of holder, Unregistered designs, Geographical Indication, Meaning and evolution of GI, Difference between GI and Trade Marks, Registration, Rights, Authorized user,</p>
SUGGESTED READINGS	<ol style="list-style-type: none"> 1. W.R.Cornish& D. Llewelyn , Intellectual Property: Patents, Copyrights, Trade Marksand Allied rights, Sweet & Maxwell. 2. Lionel Bently& Brad Sherman, Intellectual Property Law, Oxford. 3. P. Narayanan, Intellectual Property Law, Eastern Law House 4. B.L. Wadehra, Law relating to Intellectual Property, Universal Law Publishing Co.

**M.Sc. in COMPUTER SCIENCE
(THIRD SEMESTER)**

COURSE CODE: CMP C02 **COURSE TYPE :** ECC/CB

COURSE TITLE: THEORY OF COMPUTATION&AUTOMATA

CREDIT: 06

HOURS : 90

THEORY: 06

THEORY: 90

MARKS : 100

THEORY: 70 **CCA :** 30

OBJECTIVE: The main objective is to know Automata, formal languages, regular sets and grammars, context free languages, push down automata and turing machine .

UNIT-1 20Hrs	Theory of Automata: Definition of an automaton, Transition system, Acceptability of a string by FA, Nondeterministic finite state machine, Designing of DFA and NFA ,Equivalence of DFA and NFA, Conversion of NFA to DFA, Mealy and Moore models, Minimization of finite automata.
UNIT-2 20Hrs	Formal Languages, Regular Sets and Regular Grammars: Definition, Languages and their relation, Chomsky classification of language, Regular expression, Pumping Lemma for regular sets, Application of Pumping lemma, Closure property of regular sets, Regular sets and regular grammar.
UNIT-3 20 H rs	Context-free Language: Context fee language and derivation trees, Ambiguity in context free languages, Simplification of context free languages: (left recursion, Unit production elimination,Eliminating null values) Normal forms of context free languages.
UNIT-4 15 Hrs	Pushdown Automation: Definition, Acceptance by PDA, Designing PDA, Push down automation and Context free languages, Parsing and Pushdown automata.
UNIT-5 15 Hrs	Turing Machine: Turing Machines model, Representation of TM, Languages acceptability by TM,Design of TM, Introduction: Universal Turing Machines and Halting problem, Introduction: Linear bounded automata and languages.
SUGGESTED READINGS	<ol style="list-style-type: none"> 1. K L P Mishra “Theory of Computation”,3rd Edition PHI Publication. 2. J.E.Hopcroft, R.Motwani and J.D Ullman, “Introduction to Automata Theory, Languages and Computations”, Second Edition, Pearson Education, 2003 3. G.PSaradhiVarma and B. ThirupathiRao , “ Theory and Computation Formal Languages and Automata Theory”,2005, SCITECH publication. 4. H.R.Lewis and C.H.Papadimitriou, “Elements of The theory of Computation”, Second Edition, Pearson Education/PHI, 2003 5. J.Martin, “Introduction to Languages and the Theory of Computation”, Third Edition, TMH, 2003.

M.Sc. in COMPUTER SCIENCE (THIRD SEMESTER)	
COURSE CODE:	CMP C02COURSE TYPE : ECC/CB
COURSE TITLE: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM	
CREDIT: 06	HOURS : 90
THEORY: 06	THEORY: 90
MARKS : 100	
THEORY: 70	CCA : 30
OBJECTIVE: The main objective is to Artificial Intelligence to the students , how it is useful to them in practicalinterface.They know how to develop Expert System.	

UNIT-1 20Hrs.	Introduction: Definitions and approaches, Foundation of A.I. History, Area and Applications of A.I. Preliminary Concept of Intelligent Agents. AI problems, AI Techniques, Tic-tac-toe, Question Answering. AI programming language: Prolog- objects, relationships, facts, rules and variables, Prolog: Syntax and data structures, representing objects & relationships by using “trees” and “lists”, use of cut, I/O of characters and structures.
UNIT-2 20Hrs	Problem Solving: A water jug problem, production system, Control strategies, Heuristic Search, Design of search programs AI Search techniques :- Depth-first, Breadth-first search, Generate-and-test, Hill climbing, Best-first search, Constraint satisfaction, Mean-ends-analysis, A* Algorithm, AO* algorithm.
UNIT-3 20 Hrs	Knowledge Representation and Reasoning: Knowledge Representation:- Representations and mappings, Knowledge Representations, Issues in Knowledge Representation, Predicate Logic:- Representing Instance and Isa Relationships, Computable Functions and predicates, Resolution, Natural Deduction, Logic programming, Forward versus Backward Reasoning, Distributed Reasoning Systems, Matching, Control knowledge,
UNIT-4 15 Hrs	Pattern Recognition : Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classification , K-NN, K-MEANS. Understanding, Understanding as Constraint satisfaction, Natural Language Processing, Syntactic Processing, Unification grammars, Semantic Analysis, Parallel and Distributed AI, Psychological Modeling.
UNIT-5 15 Hrs	Expert Systems: Definition and characteristics of Expert System, representing and using domain knowledge, Expert system shells Knowledge Engineering, knowledge acquisition, expert system life cycle & expert system tools, MYCIN & DENDRAL examples of expert system.
SUGGESTED READINGS	<ol style="list-style-type: none"> 1. Artificial Intelligence By E. Rich and K. Knight, Tata McGraw Hill. 2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann. 3. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001) ,John wiley, New York. 4. Pattern Recognition : Technique and Applications By Shinghal (2006) ,Oxford University Press, New Delhi.

M.Sc. in COMPUTER SCIENCE	
(THIRD SEMESTER)	
COURSE CODE: CMP C03	COURSE TYPE : ECC/CB
COURSE TITLE: DATAWAREHOUSE AND DATA MINING	
CREDIT: 06	HOURS : 90
THEORY: 06	THEORY: 90
MARKS : 100	
THEORY: 70	CCA : 30

OBJECTIVE: The main objective is to give knowledge about Data Warehouse . How data processing concepts are helpful to us and what is it's role in any database .	
UNIT-1 20Hrs	Warehouse: What is it, Who Need It, and Why?, Things to Consider, Managing the Data Warehouse, Data Warehouse Design Methodology, Data Marts and Start Schema Design, Fundamentals of ETL Architecture, Partitioning Data, Indexing Data.
UNIT-2 20Hrs	Data mining: Introduction, Data mining on what kind of data , Data mining functionalities classification of Data mining systems, Major issues in Data mining Mining Association rules in large databases - Association rule mining, Mining single-Dimensional Boolean association rules from Transactional databases, Mining multi-Dimensional Association rules from relational Databases and Data Warehouses
UNIT-3 20 H rs	Classification and Prediction: Introduction classification by decision tree induction, Bayesian Classification. Other classification methods, classification by back propagation, Prediction, classifier accuracy
UNIT-4 15 Hrs	Cluster analysis: Introduction types of data in cluster analysis a categorization of major clustering methods portioning methods, hierarchical methods, Density based methods,: DBSCAN, Grid-based method : STRING , Model based clustering method: Statistical Approach, outlier analysis
UNIT-5 15 Hrs	Overview of Database Management : Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.
SUGGESTED READINGS	<ol style="list-style-type: none"> 1. Database system concept By H. Korth and A. Silberschatz, TMH. 2. Data Base Management System By Alexies&Mathews ,Vikas publication. 3. Data Base Management System By C. J. Date ,Narosha Pub. 4. Data Mining: Concepts and Techniques, Jiawei Han, MichelineKamber, Morgan Kaufmann,Harcourt India 2001. 5. Data Mining Methods for Knowledge Discovery , Cios, Pedrycz, Swiniarski,Kluwer Academic Publishers,London – 1998.