Subject: Discrete Mathematics (MCA-100-22)

Semester	First				Teaching Hrs = 60	
Subject Code	MCA-100-22					
Subject Name	Discrete Mathematics					
Teaching Scheme			**Examination Scheme**			**Credits**
Teaching Hrs/Week	Practice/Assignment Hrs/Week	Total Hrs	External Exam	Internal Exam	Total Marks	
4		4	60	40	100	4

Course Outcomes (COs)

After learning this course student will be able to,

* Describe several areas of mathematics beyond calculus
* Recognize several members of the mathematics department
* Explain why mathematical thinking is valuable in daily life
* Express their interest in mathematics
* Write precisely about mathematics

Sr. No	Chapter / Topic Details	No. of Hours
1	**Mathematical logic Propositions** (Statements) Logical connectivity's, N, A, V, →, →, ← Compound statements form, truth tables, tautology, implications and equivalence of statements forms logical identities Normal forms: disjunctive normal form and simplification. Conjunctive normal form, logical implications, valid arguments, methods of proof. Theory of inference of statement calculus, predicate calculus, qualifiers free and bound variables, theory of inference of predicate calculus.	8
2	**Relations and functions**: Relation defined as ordered n-tuple Unary, binary Restrict to binary relations Graphical representation of relation – Digraphs Properties of binary relation – symmetric, transitive	8

		Equivalence, equivalence classes, partitions covering, compatible relation Partial ordering relation – Lattice, maximal and minimal elements, upper bound, lower bound, Definitions Functions-definitions: Partial function, injunctive (one-to-one) Inverse functions, Bijection, Constant function.	
3	**Algebraic structures**: Operations on sets, use -Unary, binary, definitions of algebraic systems (Restrict to binary operations) Properties – closure, idempotent, associative, commutative, identity, inverse Semigroup, abelian group, permutation group, multiplicative abelian group, normal subgroups, isomorphism, homomorphism		8
4	**Permutations & Combinations** Addition principle, multiplication principle, Bijection principle, r-permutations of n-elements, r-combination of n-elements, binomial coefficients, circular permutations, permutations with repetitions, Multinomial theorem,		6
5	**Matrix** Algebraic operations, Crammers Rule, L.P.P.		6
6	**Probability** Sample space, events, different approaches, conditional probability, Baye's rule, Random variables, univariate & bivariate Discrete Distributions Binomial, Poisson, zeta		6
7	**Expectation** Expectation of R.V, expectation of a function of a R.V should be defined for all the above distributions using these Definitions mean & variance should be obtained.		5
8	**Finding mean & variance** Using m.g.f. cumulant generating function, cumulants properties, finding mean & variance, correlation, Regression coefficient, Interpretation, Skuness and Kurtosis.		6

9	**Distributions** Continuous Distributions Uniform, normal, exponential, Ray Leigh laplace, Cauchy	6
1	**Marginal& conditional distributions** For the above discrete distribution definition of R.V and derivation of its P.M.F is expected. For the continuous distributions P.D.F should be defined.	4
	Probable Total lectures required	60

Advanced C programming and Data structures (MCA-101-22)

Semester	First			Teaching Hrs = 60	
Subject Code	MCA-101-22				
Subject Name	Advanced C programming and Data structures				

Teaching Scheme			Examination Scheme			Credits
Teaching Hrs/Week	Practice/Assignment Hrs/Week	Total Hrs	External Exam	Internal Exam	Total Marks	
4	**2**	**6**	**60**	**40**	**100**	**4**

Course Outcomes (COs)

After learning this course student will be able to,

* Strong Foundation Language for Programming. Mother of many Programming Languages like Java, Linux, Vb.Net etc.
* Most widely used programming language due to portability, robustness and expandability.
* Improvement of logical thinking
* Select suitable data structure as applied to specified problem definition
* Use linear and non-linear data structures like trees, graphs, queues, linked- list etc. to manage data and summarize searching and sorting techniques
* Describe stack, queue and linked list operation.
* Have knowledge of tree and graphs concepts.

Sr. No.	Particulars	No. of hours
1	**Functions** * Writing user defined functions * Categories of functions * Function declaration and prototype * Call by value call by references * Recursive function * Passing an array as an argument to a function	6
2	**Pointers** * Defining pointers * Passing Pointers as argument	5

	* Pointer Arithmetic	
	* Pointer to function	
	* Array of pointers	
3	**Structures& Union**	5
	* Defining and declaring structure	
	* Working with array of structures	
	* Passing structure to functions	
	* Nested structure	
4	**Introduction to Data Structure**	5
	* Introduction,	
	* Data objects, Data Types	
	* Data Structures, primitive and non-primitive data structures	
	* Implementation of the data structures	
5	**Stack**	8
	* Introduction, Definition,	
	* Operation on stack,	
	* Implementation of stack,	
	* Application of stack-recursion, Infix, prefix, postfix expressions	
6	**Queue**	8
	* Introduction	
	* Definition of a Queue	
	* Operation on a queue	
	* Static and dynamic implementation of Queue	
	* Circular Queue	
7	**Linked List**	10
	* Introduction	
	* Drawback of sequential storage	
	* Concept of linked list Singly linked list	
	* Operation of linked list	
	* Doubly linked list and operations, Circular linked list and operation	
	* Difference between an array and linked list	
8	**Tree**	8
	* Introduction, tree terminology	
	* Rooted tree binary tree	
	* Binary tree representation	
	* Binary search tree – creating a BST	
9	**Graph**	2

	Introduction, Graph representation, Applications of graph.	
	Total	60

Subject: Linux and shell programming (MCA-102-22)

Semester	First	Teaching Hrs = 60		
Subject Code	MCA-102-22			
Subject Name	Linux and shell programming			

Teaching Scheme			Examination Scheme			Credits
Teaching Hrs/Week	Practice/Assignment Hrs/Week	Total Hrs	External Exam	Internal Exam	Total Marks	
4	2	6	60	40	100	4

Course Outcomes (COs)

After learning this course student will be able to,

* Communicate to the Unix/Linux shell (command interpreter), and run commands
* Apply Unix/Linux file redirection and pipelining to combine utilities to perform complex tasks.
* Create and manage files and directories, set and use file permissions, and navigate the Unix/Linux file system.
* Learn operating system concepts.
* Develop the shell programming skills.

Sr. No.	Chapter / Topic Details	No of Hours
1	**Unix and Linux Fundamentals:** Unix and Linux history, concept and architecture. Basic features of Linux. Advantages of Linux. Help in Linux. Linux commands. Linux File System Hierarchy (FSH). Overview of Linux kernel, kernel space and user space. System Initialization – boot process of Linux. Startup and shutdown processes. Functions of /etc /rcd /rc.sysinit, /etc/rc.d/rc and /etc/rc.d/rc.local.	5
2	**Installation:** Hardware requirement of Linux operating system. Installation methods- Local installation and Network Installation. Detailed Local installation procedure.	5

3	**Basic Linux Commands:** Basic Linux commands like date, cal, passwd, whoami, wall, login, logout, shutdown, halt etc. File manipulation commands eg. ls, md, rm, cp, mkdir, rmdir, touch, pwd, file, more, less, cat, paste, mv etc. Hard links and soft links in Linux. Inodes in Linux. File types in Linux. Shells in Linux. BASH shell features.	6
4	**Package Management:** RPM package manager. Installing and removing software. Updating a kernel rpm, rpm queries, rpm verifications. Package management using yum. Configuring repositories using yum.	4
5	**VIM Editor:** Introduction to VIM. Three Modes of VIM. Manipulating text, using multiple windows, search and replace, file saving options, running commands etc. Advance VIM options	4
6	**Standard I/O and Pipes and Print Management in Linux.:** Standard input and output, redirecting output to a file, redirecting error to a file. STDIN, STDOUT and STDERR. Piping and output redirection. Print management to configure printer in Linux through GNOME. Study of printing commands.	4
7	**User and Group Management:** Users, groups and permissions, ls, chmod, chown and chgrp commands. Symbolic and Numeric method to change permissions. Useradd, usedel, groupadd, groupdel, usermod, passwd commands. SUID, SGID and sticky bit permissions. Uname, su commands. /etc/passwd, /etc/shadow and /etc/group files.	4
8	**File Management, Disk Management and Backup Management in Linux:** Types of hard disk controllers. File systems supported by Linux; ext2, ext3, ext4 file systems. Swap file system, LVM and RAID file systems in Linux. Disk management commands like du, df, fdisk, mkfs, e2	6

	label, fsck, mount, umount etc. Commands to create swap file and big file. Partitioning in Linux. Swap partition and data partition. Backup Management commands like tar, cpio and dump, gzip, bzip2, gunzip and gzip etc.	
9	**Process Management:** What is process? Listing process, finding processes, signals, sending signals to processes, scheduling priority of processes. crond service, crontab command. Process management commands like ps, kill, jobs, fg, bg, test, nice, renice sleep etc. Services in Linux – init services, sys V launched services and xinetd services. Commands like service, chkconfig and ntsysv etc. Daemons in Linux.	4
10	**Network Management:** Configuring NIC, viewing an IP address, enabling and disabling NIC. Configuring multiple IP addresses. Enabling system as router. Verifying NIC connectivity. Defining hostname, verifying DNS connectivity. Study of Network Management commands like ifconfig, setup, hostname, arp, traceroute, dhclient, ifup, ifdown etc.	4
11	**Troubleshooting:** Method of fault analysis, Things to check for GUI environment, networking, file system corruption, file system recovery, recovery of run-levels, rescue environment, Rescue environment utilities. Some examples of boot and login problems.	4
12	**Shell Scripting:** Scripting basics. Creating shell Scripts. Simple filter commands like head, tail, sort, uniq etc. Filters using regular expressions like grep, sed, etc Introduction to variables – system and user variables. Operators in Linux – Mathematical and string. If… else, if…elif… else statements. Loops - The while, for loop, until & infinite loop. Functions and arrays.	10
	Probable Total lectures required	58

Subject: Software Engineering and Testing (MCA-103-22)

Semester	First				Teaching Hrs = 60	
Subject Code	MCA-103-22					
Subject Name	Software Engineering and Testing					

Teaching Scheme			Examination Scheme			Credits
Teaching Hrs/Week	Practice/Assignment Hrs/Week	Total Hrs	External Exam	Internal Exam	Total Marks	
4	2	6	60	40	100	4

Course Outcomes (COs)

After learning this course student will be able to,

∗ Cite knowledge of various approaches to document a software system (Remembering)
∗ Describe functional and non-functional requirements (Understanding)
∗ Use proper architecture for software (Applying)
∗ Categorize different components used in the software system (Analyzing)
∗ Finding defects which may get created by the programmer while developing the software
∗ Gaining confidence in and providing into about be level of quality

Sr. No.	Chapter / Topic Details	No of Hours
1.	**System Concept and the information system environment** System concept definition, Characteristics of system, Boundaries and Interface, Open and closed system, Types of system	5
2.	**The role of System analyst** Academic and professional qualifications, The multifaceted role of the Analyst, Change agent, Investigation and monitoring, Architect, Psychologist, The analyst/ User Interface	5
3.	**Structured System Analysis Tools and Techniques** Fact finding tools and techniques, Functional Decomposition	8

	Diagram (FDD)		
4.	**Different approaches to Software Development** Waterfall model, Spiral Model, Prototyping, RAD, Object oriented, ER model (Data Modeling), Data Flow Diagram (Process Modeling)		**10**
5.	**Software Quality Assurance & Software Reliability** Quality Concept, QA, SQA, Quality factors, Need for SQA Building blocks of SQA, Reliability Measures and Reliability models		**10**
6.	**Software Testing Fundamentals** Verification & Validation, Software inspections, Testing objectives, Testing lifecycle, Test Cases		**8**
7.	**Types of Testing** Unit Testing, Integration Testing, System Testing, Acceptance Testing Alpha testing & Beta testing, Static vs. Dynamic testing, Manual vs. Automatic testing, Usability testing, Regression testing, Performance Testing, Load Testing, Security testing, Black Box & White Box Testing		**10**
8.	**Test Review** Informal Review, Technical or peer review, Walkthrough, Inspection, static analysis, Review Meeting		**4**
	Total		**60**

Subject: Soft Skill development (MCA-104-22)

Semester	First		Teaching Hrs = 50			
Subject Code	MCA-104-22					
Subject Name	Soft skill development					
Teaching Scheme			**Examination Scheme**			**Credits**
Teaching Hrs/Week	Practice/Assignment Hrs/Week	Total Hrs	External Exam	Internal Exam	Total Marks	
3		3	30	20	50	2

Course Outcomes (COs)

After learning this course student will be able to,

* Improve the listening and speaking competence of the learners
* Build the confidence of the learners to face job interviews and take part in group discussions
* Train the learners in interpersonal skills and business etiquettes
* Build teamwork and leadership skills of the learners
* Train the learners to effectively manage time and boost productivity
* Help the learners maintain a positive outlook using techniques of stress reduction and management

Sr. No.	Chapter / Topic Details	No of Hours
2.	**Communication and Listening Skills** Component of effective Communication • Types of Communication • Body Language • Barriers of Communication • Listening Skills • Non-Verbal Communication • Practice of pronunciation and listening skills • Vocabulary building • Roleplay / situational conversation • Public speaking • Group discussion: method and practice	6
3.	**Self-Management & Personality Development** What is Stress management?	6

	• Types of stress • Causes of stress • Stress management and reduction techniques What is Time management? • Setting goals • Planning • Prioritizing, • Setting deadlines • Multi-tasking, • Practicing self-discipline, • Overcoming procrastination • Interpersonal skills • Professional ethics	
4.	**Soft Skills** Business etiquettes • Workplace etiquettes • Social etiquettes • Telephone mannerisms, • Meeting and dressing etiquettes • Table manners • Communication mannerisms • Punctuality • Teamwork • Adaptability and flexibility • assertiveness, negotiation, Problem solving • Persuasion and conflict resolution • Leadership qualities • Self-assertiveness, • Self-confidence, • Decision making, • Diplomacy • Accountability • Types of leaders and their qualities	12
5.	**Personal Grooming and Hygiene** • What is Grooming • What is Dressing • What is Hygiene • Types of Dressing	3

6.	**Techniques of Attending Interviews** Types of interviews • Preparation and common questions • Curriculum vitae/ resume writing • Interview Etiquettes • Interview Dress Code	3
	Total	**30**