KANNUR UNIVERSITY

MASTER OF COMPUTER APPLICATIONS

(Credit Based Semester System)
Regulations, Curricula, Syllabus and Scheme of Evaluation

(With Effect from 2014 admission)

KANNUR UNIVERSITY

MASTER OF COMPUTER APPLICATIONS

(Credit Based Semester System)

Regulations, Curricula, Syllabus and Scheme of Evaluation

(With Effect from 2014 admission)

REGULATIONS

1. Duration of the MCA programme shall be 3 years, divided into 6 semesters. Each semester shall have 90 working days. The maximum period of completion is twelve semesters (6 years).

2. Eligibilityfor admission: As announced by the University from time to time.

3. Programme Structure

3.1 **Attendance*:*** The minimum attendance required for each course shall be 75% of the total number of classes conducted for that semester. Those who secure the minimum attendance in a semester alone will be allowed to register for the End Semester Examination. Condonation of shortage of attendance may be granted as per Kannur University PG regulation.

3.2 ***Credits:*** The total minimum credits, required to complete MCA programme is 120 in which minimum credits required for core (including practical and project) courses is 96. The credits for elective courses shall vary between 16 and 24.

3.3 **Theory and Practical courses**

The evaluation scheme for each Theory/ Practical course except MCA1C06 (Communication and Presentation skills), shall contain two parts; (a) Continuous Assessment (CA) and (b) End Semester Evaluation (ESE). 20% marks shall be given to CA and the remaining 80 % to ESE. For MCA1C06 Communication and Presentation skills, the evaluation is 100% internal and shall follow the distribution applicable to theory CA.

CONTINUOUS ASSESSMENT (CA)

Theory : The components oftheory evaluation are as follows:

	COMPONENTS	% OF MARKS
i	**Test papers**	**40%**
ii	**Assignment**	**20%**
iii	**Case Study / Seminar / Viva**	**20%**
iv	**Attendance**	**20%**

i. *Test Papers*: There shall be a minimum of two test papers to be conducted for each course. If more than two test papers are conducted, then two best scores shall be taken for the award of IA marks. The dates of test papers shall be announced well in advance and the marks should be displayed in the notice board.

ii. *Assignments:* One or more assignments (including practical assignments) shall be given for each course. The mode of assessment of the assignments shall be decided by the faculty concerned with due approval from the department council and shall be declared at the beginning of the semester. (It is suggested that to the extent possible, give individual assignments and also conduct short viva based on the assignment submitted). Assignment shall include practical assignments also.

iii. *Case study / Seminar / viva*: The faculty with due approval from the department council shall choose one or more from this category, depending on the nature of subject and the mode of assessment is to be declared at the commencement of the semester.

iv. *Attendance* :

Attendance	**% of Marks for attendance**
>=90	100
85 to 89	80
80 to 84	60
76 to 79	40
75	20

Practical : The Components of CA for practical courses except Case study I and II are as follows:

	COMPONENTS	**% OF MARKS**
i	Lab Test (Minimum one)	20%
ii	Completion of the list of Lab assignments prescribed by the faculty	20%
iii	Periodical assessment of Lab assignments through execution of programs and viva	40%
iv	Attendance (Mark distribution is same as that of theory)	20%

Case study I and II :

	COMPONENTS	**% OF MARKS**
i	Periodical viva / short quizzes / short programming assignments to evaluate the basic knowledge/understanding of the tool.	30%
ii	Coding – Logic, Selection of appropriate constructs / features of the Tool, Style etc.	30%

iii	Execution of the case study - output	20%
iv	Viva based on case study	20%

Mini Project :

Component	% of marks
Understanding of the problem / concepts	25
Adhering to methodology.	20
Quality of presentation and demonstration (Demonstration is optional)	15
Quantum of work / effort	30
Organization and content of Project report	10

Note :All the records in respect of Continuous Assessment (CA) must be kept in the department and must be made available for verification by university. The results of the CA shall be displayed on the notice board within 5 working days from the last day of a semester. It should be get signed by the candidates. The marks awarded for various components of the CA shall not be rounded off, if it has a decimal part. The total marks of the CA shall be rounded off to the nearest whole number.

END SEMESTER EVALUATION (ESE):

There shall be double valuation system of answer books. The average of two valuations shall be taken in to account. If there is a variation of more than 10% of the maximum marks, the answer books shall be valued by a third examiner. The final marks to be awarded shall be the average of the nearest two out of three awarded by the examiners. After that there shall be no provision for revaluation

Pattern of questions: Questions shall be set to assess knowledge acquired, standard application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. Question paper for end semester theory examination shall consist of:

i. Short answer type : 12 questions of which 10 to be answered. 10 x 3 = 30 marks,

ii. Essay type: 5 questions (one either –or question from each module) x 10 marks = 50 marks

End Semester Evaluation in Practical courses shall be conducted and evaluated by two examiners- one internal and one external. Details of scheme of evaluation of ESE practical courses are given along with respective syllabus.

3.4 Project: A project work has to be undertaken by all students. The project can be software development following all or some of the software development lifecycle or an R&D project. The hours allotted for project work may be clustered into a single slot so that students can do their work at a centre or location for a continuous period of time. The Major project work should be carried out in the Department /Institution or in an Industry / R & D organization of national repute. Project work shall be carried out under the supervision of a Teacher. If the project is carried out in an Industry / R & D organization outside the campus, then a co-guide shall be selected from the concerned organization. If the project work is of interdisciplinary nature, a co-guide shall be taken from the other department concerned. Every student should do the Project individually and no grouping is allowed. The candidates are required to get the synopsis and the guide approved by the department before the commencement of the project. A co-guide should be a postgraduate in CS/Application/IT or allied subject or a person of eminence in the area in which student has chosen the project. At the end of the semester the candidate shall submit the Project report (two bound copies and one soft copy) duly approved by the guide and co-guide for End Semester Evaluation. The project report shall be prepared according to the guidelines approved by the University.

Evaluation of Project:

i. A Departmental committee duly constituted by the Head of the Department will review the project periodically.

ii. **Continuous Assessment of project work**: There shall be three internal presentations before the committee (Minimum two members, including the guide). The assessment is based on presentation, interim report and viva voce. The total mark for CA shall be divided among the three presentations in the ratio 20%:30%:50%.Each internal presentation shall be evaluated based on the following components:

Component	% of marks
Understanding of the problem / concepts	25
Adhering to methodology.	20
Quality of presentation and demonstration (Demonstration is optional)	15
Quantum of work / effort	30
Organization and content of mid-term report	10

iii. **End Semester Assessment of Project**: A board of two examiners appointed by the University shall conduct ESE evaluation. The evaluation shall be based on the report, presentation of the work, demonstration of the work (optional) and a detailed viva voce based on the work carried out. A candidate will not be permitted to attend the Project evaluation without duly certified project reports. Also a project will be evaluated only if the candidate attend the ESE presentation and Viva voce on the scheduled date and time. A board shall evaluate a maximum of 10 candidates in a day. The End Semester evaluation shall consist of the following components:

Component	% of marks
Understanding of the problem/requirements/ concepts related to the project	15
Adhering to methodology (Software engineering phases or research methodology) and the candidates understanding of the components of methodology	15
Quality of Modeling of the problem and solution/ database design / form design / reports / testing (For research projects - relevance /novelty of the work(s)/ use of data/ proposal of new models /analysis of algorithms/ comparison and analysis of results /findings)	20
Quality of presentation / demonstration	15
Quantum of work / effort - assessed through the content of report, presentation and viva.	25
Organization and content of report	10

iv. A student shall pass in the Project course if she/he secures a separate minimum of 40 % for the external and 40% for ESE and CA put together.

v. If a candidate fail in the evaluation of Project, he/she has to repeat the project course along with the next batch and undergo both CA and ESE. *Unlike theory/practical courses, the CA mark will not retained*.

vi. There shall be no improvement chance for the marks obtained in the Project course.

3.5 Seminar: Each student shall select a relevant topic, prepare a seminar report and give a presentation (30 to 45 minutes), under the guidance of a faculty member. The evaluation of seminar is 100% internal and components and mode of evaluation shall be formulated by the department council (May include components like content, Presentation, interaction and structure of report).

3.6 VIVA VOCE: A general Viva Voce covering all courses in the Programme shall be conducted in the fourth semester. The Viva voce shall be conducted by two external examiners. The Viva voce *shall not be clubbed* with the project evaluation. The details of the mode of conduct and evaluation of Viva Voce shall be decided by the BOE.

4. **GRADING SYSTEM**

Seven Point Indirect Relative grading system:

Evaluation(both internal and external) is carried out using Mark system .The grading on the basis of a total internal and external marks will be indicated for each course and for each semester and for the entire programme.

The guidelines of grading is as follows-

% of Marks (CA+ESE)	Grade	Interpretation	Range of grade points	Class
90 and above	O	Outstanding	9-10	First class with Distinction
80 to below 90	A	Excellent	8-8.9	
70 to below 80	B	Very good	7-7.9	First class
60 to below 70	C	Good	6-6.9	
50 To below 60	D	Satisfactory	5-5.9	Second class
40 to below 50	E	Pass/Adequate	4-4.9	Pass
Below 40	F	Failure	0-3.9	Fail

CREDIT POINT = GRADE POINT (GP) X CREDIT (C)

$$SGPA = \frac{\sum OF\ CREDIT\ POINTS\ OF\ ALL\ COURSES \in THE\ SEMESTER}{TOTAL\ CREDITS \in THAT\ SEMESTER}$$

$$CGPA = \frac{\sum OF\ CREDIT\ POINTS\ OF\ ALL\ COMPLETED\ SEM\ ESTERS}{TOTAL\ CREDITS}$$

$$OGPA = \frac{\sum OF\ CREDIT\ POINTS\ ACQUIRED \in SIX\ SEMESTERS}{TOTAL\ CREDITS(120)}$$

PASS REQUIREMENTS :

Course : For a course, a candidate securing E grade with 40% of aggregate marks and 40% separately for ESE shall be declared to have passed in that course. For courses with only internal components (Seminar, Mini project etc.) , E grade with 40% in CA is the requirement for a minimum pass.

Semester : Those who secure a minimum pass in all courses of a semester shall be declared to have successfully completed that semester.

The marks obtained for CA in the first appearance shall be retained (irrespective of pass or fail).

However, if a candidate fail in CA for the courses Seminar (MCA1C07, MCA2C13, MCA3C18, MCA4C23 & MCA5C29), Communication and Presentation skills (MCA1C06) and Mini project (MCA5Pr01), they have to register and undergo continuous assessment along with the subsequent batch. The institution shall provide necessary facilities for this and forward the modified CA marks to the University, along with the CA marks of the subsequent batch.

A candidate fails to secure minimum pass in a course shall be permitted to reappear for the ESE along with the next batch.

For a successful completion of a semester, a candidate should pass all courses and secure a minimum SGPA of 4. However a student is permitted to move to the next semester irrespective of his/her SGPA. A student will be permitted to secure a minimum SGPA of 4.00 required for the successful completion of a semester or to improve his results at the ESE of any semester, by reappearing for the ESE of any course of the semester concerned, along with the examinations conducted for the subsequent batch.

Improvement :

A candidate who secures minimum marks (40%) for a pass in a course will be permitted to write the same examination along with the next batch if she/he desires to improve his /her performance in ESE. If the candidate fails to appear for the improvement examination after registration, or if there is no change/up gradation in the marks after availing the improvement chance, the marks obtained in the first appearance shall be retained. There shall be no improvement chance for the marks obtained in internal assessment. Improvement of a particular semester can be done only once. The student shall avail the improvement chance in the succeeding year along with the subsequent batch.

There will be no supplementary examinations. For re-appearance / improvement student shall appear along with the next batch.

5. FOR THOSE ACADEMIC AND ADMINISTRATIVE ASPECTS NOT COVERED IN THIS REGULATION THE EXISTING KANNUR UNIVERSITY PG REGULATION (2014) WILL BE APPLICABLE.

KANNUR UNIVERSITY

Master of Computer Applications

Course Structure and Scheme of Evaluation (From 2014 Admission)

(CBSS- For affiliated Colleges)

CREDIT DISTRIBUTION

Semester	Core	Elective	Practical	Project	Total
1	**18**	**0**	**3**	**0**	**21**
2	**17**	**0**	**3**	**0**	**20**
3	**13**	**3**	**5**	**0**	**21**
4	**13**	**3**	**5**	**0**	**21**
5	**10**	**6**	**2**	**2**	**20**
6	**2**	**6**	**0**	**9**	**17**
Total	**73**	**18**	**18**	**11**	**120**

COURSE STRUCTURE

Semester 1

Course Code	Course title	*Instructional Hrs/week*			MARKS			Credit
		L	P	T	CA	ESA	TOTAL	
MCA1C01	Discrete Mathematics	3	0	0	20	80	100	3
MCA1C02	Digital Systems and Introduction to Microprocessors	4	0	0	20	80	100	4
MCA1C03	Operating Systems	3	0	0	20	80	100	3
MCA1C04	Fundamentals of Programming	3	0	0	20	80	100	3
MCA1C05	Database Management Systems	3	0	0	20	80	100	3
MCA1C06	Communication and Presentation skills	1	0	1	50	0	50	1
MCA1P01	Lab – I (C Programming/ DBMS / OS)	0	8	1	20	80	100	3
MCA1C07	Seminar	0	0	3	50	0	50	1
Total		17	8	5	**220**	**480**	**700**	**21**

Semester 2

Course Code	Course title	*Instructional Hrs/week*			MARKS			Credit
		L	P	T	CA	ESA	TOTAL	
MCA2C08	Data Structures and Algorithms using C++	4	0	0	20	80	100	4
MCA2C09	Computer Organization	3	0	0	20	80	100	3
MCA2C10	Computer Networks	3	0	0	20	80	100	3
MCA2C11	Principles of Management	3	0	0	20	80	100	3
MCA2C12	Computer Graphics	4	0	0	20	80	100	3
MCA2P02	Lab – II (DS/C++/CG)	0	8	2	20	80	100	3
MCA2C13	Seminar	0	0	3	50	0	50	1
Total		17	8	5	**170**	**480**	**650**	**20**

Semester 3

Course Code	Course title	*Instructional Hrs/week*			MARKS			Credit
		L	P	T	CA	ESA	TOTAL	
MCA3C14	Programming in Java	3	0	0	20	80	100	3
MCA3C15	Theory of Computation	3	0	0	20	80	100	3
MCA3C16	System and Network Administration	3	0	0	20	80	100	3
MCA3C17	Advanced Microprocessors & microcontrollers	3	0	0	20	80	100	3
ELECTIVE I MCA3E01	Probability & Statistics	3	0	0	20	80	100	3
ELECTIVE I MCA3E02	Python Programming							
ELECTIVE I MCA3E03	Visual Programming							
ELECTIVE I MCA3E04	Soft Computing							
MCA3P03	Lab – III(java/NPA/Microprocessor)	0	7	1	20	80	100	3
MCA3P04	Case study I	0	3	2	20	80	50	2
MCA3C18	Seminar	0	0	2	50	0	50	1
Total		15	10	5	**190**	**560**	**750**	**21**

Semester 4

Course Code		Course title	*Instructional Hrs/week*			MARKS			Credit
			L	P	T	CA	ESA	TOTAL	
MCA4C19		Advanced JAVA programming	3	0	0	20	80	100	3
MCA4C20		Software Engineering	3	0	0	20	80	100	3
MCA4C21		System Programming & Compiler Design	3	0	0	20	80	100	3
MCA4C22		Web Technology	3	0	0	20	80	100	3
ELECTIVE II	MCA4E05	Artificial Intelligence	3	0	0	20	80	100	3
	MCA4E06	Linux Kernel							
	MCA4E07	Infrastructure, Resources and Education Management in E-Learning							
	MCA4E08	Accounting & Financial Management							
MCA4P05		Lab – IV (Advanced Java/SP&CD/Web technology)	0	7	1	20	80	100	3
MCA4P06		Case study II	0	3	2	20	80	50	2
MCA4C23		Seminar	0	0	2	50	0	50	1
Total			15	10	5	**190**	**570**	**750**	**21**

Semester 5

Course Code		Course title	*Instructional Hrs/week*			MARKS			Credit
			L	P	T	CA	ESA	TOTAL	
MCA5C24		Object Oriented Modeling & Design	3	0	0	20	80	100	3
MCA5C25		Information Security	3	0	0	20	80	100	3
MCA5C26		Advanced Database Management Systems	3	0	0	20	80	100	3
ELECTIVE III	MCA5E09	Operations Research	3	0	0	20	80	100	3
	MCA5E10	Simulation and Modeling							
	MCA5E11	Design and Analysis of Algorithms							
	MCA5E12	Information Storage and Management							
	MCA5E13	Mobile computing	3	0	0	20	80	100	3

ELECTIVE IV	MCA5E14	Geographical Information System							
	MCA5E15	Data Mining							
	MCA5E16	Software Architecture							
MCA5Pr01		Mini Project	0	10	0	20	80	100	4
MCA5C27		Seminar	0	0	3	50	0	50	1
Total			15	10	5	**170**	**480**	**650**	**20**

Semester 6

Course Code		**Course title**	***Instructional Hrs/week***			MARKS			Credit
			L	P	T	CA	ESA	TOTAL	
ELECTIVE V	MCA6E17	Cloud Computing	3	0	0	20	80	100	3
	MCA6E18	Linux Device Drivers							
	MCA6E19	High Performance computing							
	MCA6E20	Digital Image Processing							
ELECTIVE VI	MCA6E21	Cyber Forensics	3	0	0	20	80	100	3
	MCA6E22	M Commerce							
	MCA6E23	Big Data Analytics							
	MCA6E24	Software Project Management							
MCA6Pr02		Project	0	19	5	40	160	200	8
MCA6C28		General Viva Voce	-	-	-	-	100	100	3
Total			6	19	5	**80**	**420**	**500**	**17**

CORE COURSES

Course Code	Course Title	Credit
MCA1C01	Discrete Mathematics	3
MCA1C02	Digital Systems and Introduction to Microprocessors	4
MCA1C03	Operating Systems	3
MCA1C04	Fundamentals of Programming	3
MCA1C05	Database Management Systems	3
MCA1C06	Communication and Presentation skills	1
MCA1C07	Seminar	1
MCA2C08	Data Structures and Algorithms using C++	4
MCA2C09	Computer Organization	3
MCA2C10	Computer Networks	3
MCA2C11	Principles of Management	3
MCA2C12	Computer Graphics	3
MCA2C13	Seminar	1
MCA3C14	Programming in Java	3
MCA3C15	Theory of Computation	3
MCA3C16	System and Network Administration	3
MCA3C17	Advanced Microprocessors & Microcontrollers	3
MCA3C18	Seminar	1
MCA4C19	Advanced JAVA programming	3
MCA4C20	Software Engineering	3
MCA4C21	System Programming & Compiler Design	3
MCA4C22	Web Technology	3
MCA4C23	Seminar	1
MCA5C24	Object Oriented Modeling & Design	3
MCA5C25	Information Security	3
MCA5C26	Advanced Database Management Systems	3
MCA5C27	Seminar	1
MCA6C28	General Viva Voce	3
TOTAL		**74**

ELECTIVE COURSES

Course Code	Course Title	Credit
MCA3E01	Probability & Statistics	3
MCA3E02	Python Programming	
MCA3E03	Visual Programming	
MCA3E04	Soft Computing	

MCA4E05	Artificial Intelligence	3
MCA4E06	Linux Kernel	
MCA4E07	Infrastructure, Resources and Education Management in E-Learning	
MCA4E08	Accounting & Financial Management	
MCA5E09	Operations Research	3
MCA5E10	Simulation and Modeling	
MCA5E11	Design and Analysis of Algorithms	
MCA5E12	Information Storage and Management	
MCA5E13	Mobile computing	3
MCA5E14	Geographical Information System	
MCA5E15	Data Mining	
MCA5E16	Software Architecture	
MCA6E17	Cloud Computing	3
MCA6E18	Linux Device Drivers	
MCA6E19	High performance Computing	
MCA6E20	Digital Image Processing	
MCA6E21	Cyber Forensics	3
MCA6E22	M Commerce	
MCA6E23	Big Data Analytics	
MCA6E24	Software Project Management	
TOTAL		**18**

PRACTICAL AND PROJECT COURSES

Course Code	Course Title	Credit
MCA1P01	Lab – I (C Programming/ DBMS / OS)	3
MCA2P02	Lab – II (DS/C++/CG)	3
MCA3P03	Lab – III(java/NPA/Microprocessor)	3
MCA3P04	Case study I	2
MCA4P05	Lab – IV (Advanced Java/SP&CD/Web technology)	3
MCA4P06	Case study II	2
MCA5Pr01	Mini Project	4
MCA6Pr02	Project	8
TOTAL		**28**

CORE COURSES

MCA1C01 DISCRETE MATHEMATICS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Propositional logic – Propositions, truth tables, converse, contra positive and inverse, compound statements and their truth tables, translating natural language sentences to logical statements, tautology, contradiction, logical equivalence, De Morgan's laws, normal forms. Predicate logic – predicates, universal and existential quantifiers, binding variables, translating natural language sentences to logical statements.

Unit 2

Sets, representation of sets, set operations, Cartesian product, using set notation with quantifiers, truth sets of quantifiers, computer representation of sets.Functions – one-to-one and onto functions, inverse functions and compositions of functions.

Unit 3

Relations – properties, functions as relations, relations on a set, combining relations, n-ary relations and their applications, representing relations, closures of relations, Warshall's algorithm, equivalence relations, equivalence classes and partitions.

Unit 4

Basics of counting, basic counting principles, the inclusion-exclusion principle, the pigeonhole principle, the generalized pigeonhole principle, permutations and combinations, with and without repetitions.Generating permutations and combinations.Recurrence relations, modeling with recurring relations.

Unit 5

Graphs – definition, different types of graphs, graph models, basic terminology, representing graphs, isomorphism, connectivity, Euler and Hamilton paths, shortest path problem and Dijkstra's algorithm.

Trees - basic terminology, properties (no proofs), spanning trees, depth-first and breadth-first searches.

Reference books:

1. Kenneth H. Rosen, Discrete Mathematics and Applications, TMH 2003
2. J.P. Tremblay and R Manohar Discrete Mathematical Structure with Applications to Computer Science, TMH 2001.
3. John Truss, Discrete Mathematics for Computer Scientists, Pearson Edn 2002
4. Sengadir, Discrete Mathematics, Pearson, 2009

MCA1C02 DIGITAL SYSTEMS & INTRODUCTION TO MICROPROCESSORS

Contact Hours/ week : 4 **Credit : 4**

Unit 1

Number systems and arithmetic operations, Different Binary codes, Gates, Boolean algebra & Laws, Combinational Circuits: Sum of product, Product of sum, simplification by Boolean methods

Unit 2

K-Map Simplification- up to six variables. Tabular method. Decoders, Multiplexer, De-multiplexer, Encoder, Binary Adders, Subtractors, Magnitude comparator, ROM, PLA, PAL

Unit 3

Sequential circuits: Flip-flops, Analysis of Clocked Sequential Circuits, State Reduction and assignments, FF excitation tables, Design procedure Registers : shift registers, SISO,

SIPO,.PISO, PIPO, Universal Shift Registers, Ripple Counters, Synchronous counters, Ring counter, Shift Counter, Up-down counters.

Unit 4

Logic families: General Characteristics, RTL, DTL, TTL, I^2L, ECL, NMOS, PMOS, CMOS, CMOS Transmission Gate Circuits. DAC and ADC

Unit 5

Microprocessor: Architecture of 8085, Block diagram and pin outs , Instruction set. Addressing modes, Subroutines, Interrupts.

Reference Books

1. M. Moris Mano, Digital Design – PHI 2001
2. Ronald J. Tocci, Neal S. Widmer and Grigory L. Moss, Digital Systems- Principles and applications, Pearson, 2009.
3. John . M. Yarbrough , Digital Logic Applications and Design ,Thomson -2002 .
4. Malvino A P and Leach D P, Digital Principles and applications, Tata Mc-Graw Hill,1991
5. R. Gaonkar, Microprocessor Architecture and Programming. TMH-2002

MCA1C03OPERATING SYSTEMS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction – Mainframe systems, Desktop systems, Multiprocessor systems, Distributed systems, Clustered systems, Real time systems, Hand held systems, Computing environments. **Computer System structures** – Computer system operation, I / O Structure, Storage structure, Storage hierarchy, Network structures. **Operating system structures** - System components, Operating systems services, System calls, System programs, System structure, Virtual machine, System design and implementation.

Unit 2

Processes – Process concepts, Process scheduling, Operations on Process, Cooperating Process, Inter Process communication in Client/ Server system. **Threads**- Multi threading models, Threading issues, Pthreads, Linux and Java Threads. **CPU Scheduling** – Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor Scheduling, Real time Scheduling, Algorithm evaluation, Process Scheduling models. **Process Synchronization** – Critical section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical region, Monitors, OS Synchronization, Atomic transaction.**Deadlocks** – System models, Deadlocks characterization, Method for handling Deadlocks, Deadlock prevention, Deadlock avoidances, Deadlock detection, Recovery from Deadlocks.

Unit 3

Memory management- swapping, Contiguous memory allocation, Paging Segmentation, Segmentation with paging.**Virtual memory**- Demand paging, processes creation, page replacement, allocation of frames, thrashing. **File system interface and Implementation**- File concepts, access methods, directory structure, File system mounting, File sharing, Protection, File system structure, File system implementation, Directory implementation, Allocation methods, Free space managements, Efficiency and performance, Recovery , Log-structured file system, NFS.

Unit 4

I / O Systems - I / O hardware, Application I/O interface, Kernel I / O subsystem, Transforming I / O to hardware operations, STREAMS, Performances. **Mass storage**

structure - Disk structure, Disk scheduling, Disk management, Swap space managements, RAID structure, Disk attachments, Stable storage implementation, Tertiary storage structure.

Unit 5

Distributed Systems – Motivation, Types of Distributed Operating systems**. Distributed file systems** – Background, Naming and transparency, Remote file access, Stateful versus stateless service, File replication. **Protection**- Goals and principles of protection, Domain of protection, Access matrix, Access control, Revocation of access rights, Capability based systems (Hydra), Language based protection(protection in java). **Security**- The security problem, Program threats, System and network threats.

Text Book:

1. Silberschatz, A., Galvin, P.B. & Gagne, G. "Operating System Concepts", 6th Ed. Wiley-India.

References:

1. Dhamdhere, D. M. "Operating Systems", 2nd Ed. The McGraw - Hill Companies.
2. Kochan, S, G., Wood, P., "Unix shell programming", 3rd ed. Pearson Education, 2003
3. Ditel, Deital and Choffness, Operating Systems, Pearson, 3rdEdn

MCA1C04 FUNDAMENATALS OF PROGRAMMING

Contact Hours/ week : 3 **Credit : 3**

UNIT 1 :

The Problem -Solving aspect – Top down design – Implementation of algorithms – Properties of algorithms – The efficiency of algorithms – Flow chart- Pseudo Code, Programs and Programming Languages - compiler – Interpreter, Loader and Linker - Program execution – Classification of Programming Language-Structured Programming Concept, Features of C, Evolution of C, Structure of a C Program, Compiling a C Program.

UNIT 2:

C Character sets-identifiers-data types-keywords-statements- variable and constants- tokens-Operators- Storage classes-auto, register, static, extern, typedef- Type casting, I/O Functions-Control Constructs-Control Statements-Conditional, switch Statements- Loops and Jumping statements -break, continue and goto Statement

UNIT 3:

Introduction to Functions, Function Declaration and Prototypes, Storage Classes, Recursion in Function, call by value and call reference. Arrays-One Dimensional Array - Two Dimensional, Multi-dimensional Array, Searching and Sorting techniques, String operations.

UNIT 4:

Understanding memory addresses- address operator- pointer- use of pointers- arrays and pointers – pointers and strings - array of pointers- pointer to pointer- pointers to functions-dynamic memory allocation- memory leak and memory corruption- structures - union-enumeration types- bitfields. Structure Definition-Structure Initialization- Arrays of Structures- Arrays within Structures, Structures within Structures-Passing Structures to Functions-Structure Pointers. Union–Definition and Declaration- Accessing a Union Member-Initialization of a Union Variable- Use of User Defined Type Declarations.

UNIT 5

Introduction to File Handling in C- File- Defining and Opening a File- Reading and Writing in Files Reading and writing Data- Sequential File- Functions for Random Access to Files- C preprocessors, macros, undef, scope of macro, line, error, directives-, conditional compilation directives, null directives, command line arguments

Reference Books:

1. R.G.Dromey , How to solve it by computer, Pearson education, fifth edition, 2007.
2. Kernighan,B.W and Ritchie,D.M, "The C Programming language", 2nd Edn, Pearson Education, 2006
3. S. G. Kochan, Programming in C, Pearson Edn, 4th Edn, 2014.
4. M T. somasekhara, Problem Solving with C, PHI, 2009
5. Balagurusamy, Programming in ANSI C, 5th edn, TMH.
6. Byron Gorrfried, Programming with C, 3rd Edn, Schaum's outline

MCA1C05 DATABASE MANAGEMENT SYSTEMS

Contact Hours/ week : 3 **Credit : 3**

Unit 1:

Introduction: Database System Applications, Database Systems versus File Systems, View of Data, Data Models, Schemas, and Instances, DDL, DML, Data Dictionary, Data Integration, Database Access Method, Database Languages, Database Users and Administrators, Transaction Management, Database System Structure, Application Architectures, History of Database Systems, Advantages of Using a DBMS, Spreadsheet Applications.

Unit 2:

The Relational model: Data modeling using Entity Relationship (ER), ER Diagram, Entity sets, attributes and keys, Relationships, Relationship types, roles and structural constraints, Weak Entity types, Specialization and generalization. Relational model concepts, Relational model constraints, Mapping the ER Model to Relational DBs. Case study – Any two database applications.

Unit 3:

Database Design: Functional dependencies Basic definitions Trivial and non-trivial dependencies Closure of a set of dependencies Closure of a set of attributes Irreducible sets of dependencies No-loss decomposition and Functional dependencies. First, Second, Third and Fourth normal forms, Boyce Codd normal form.

Unit 4:

Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

Unit 5:

SQL: Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, join, Exist, Any, All, joined relations, embedded SQL, QBE. Integrity and security: domain constraints, referential integrity, assertion, triggers, authorization in SQL. **Views**: Introduction to views, data independence, security, updates on views, comparison between tables and views. Case study - PostgreSQL.

Reference Text:

1. Silbersehatz, Korth and Sudarshan, Database system concepts, 6th edition MGH 2011
2. Ramakrishnan and Gehrke, Database Management Systems, 3rd Edn, McGraw Hill, 2003
3. A Leon & M Leon, Database Management Systems , Leon Vikas – 2003.
4. Elmasri and Navathe, Fundementals of Database systems, 5th Edition ,Pearson 2009
5. O'Reilly, Practical PostgreSQLShroffPublishers(SPD) 2002
6. C J Date, An Introduction to Database systems, Pearson, 2004.

7. Cornell, Morris, Mob, Database Systems, Cenage, Learning, 2013
8. M. Gruber, Understanding SQL, Sybex.

MCA1C06 COMMUNICATION AND PRESENTATION SKILLS

Contact Hours/ week : 1-0-1

Credit: 1

Unit 1 :**Fundamentals in Communication**

Process and Elements of Communication: context of communication; the speaker/writer and the
listener/reader; Medium of communication; Principles of communication (7 C's of communication); Barriers in communication, effective communication; Communication in organization.

Unit 2 :**Writing**

Selecting material for expository, descriptive, and argumentative pieces; Resume; covering letter, Elements of letter writing and style of writing, business letters: Quotation and Tenders; Basics of Informal and Formal Reports, technical report writing, lab report; Précis writing.

Unit 3: Reading

Effective Reading; reading different kinds of texts for different purposes; reading between the lines. Comprehension of Unseen Passages. Grammar in use: Errors of Accidence and syntax with reference to Parts of Speech; Agreement of Subject and Verb; Tense and Concord; Use of connectives, Question tags. Voice and Narration.Indianism in English: Punctuation and Vocabulary, Building (Antonym, Synonym, Verbal Analogy and One Word Substitution).

Unit 4: Speaking

Achieving desired clarity and fluency; effective speaking; task oriented, inter-personal, informal and semi-formal speaking. Meetings, Seminar, Conferences, Interviews, Presentation, Audio-visual communication.

Unit 5: Listening

Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English and American English; Intelligent listening in situations. Advantages of listening.Hearing and Listening; Essentials of Good Listening.Use of Modern Communication Devices; Telephonic Conversation.

Reference :

1. Sharma RC & Mohan K, Business Corresponding and Report Writing, Tata McGraw Hill, 1994.
2. Alok Jain, P S Bhatia & A M Shiekh, Professional Communication Skills, S. Chand & Co Ltd. 2005.
3. Rajendra Pal and JS Korlahalli, Essentials of Business Communication, Sultan Chand &Sons, 1997.
4. L. A. Hill, A guide to Correct English, Oxford University Press, (For Unit III)
5. T.C. JUPP, and JOHN MILNE ,English Sentence Structure by, Heinemann, (For Unit III)
6. DipaliBiswas, Enhancing softskills, SPD, 2009

MCA2C08 DATA STRUCTURES AND ALGORITHMS USING C++

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction to OOP – overview of C++,Class, Object, inline functions, constructors, destructors, scope resolution operator, friend functions, friend classes, static members, *this* pointer, references, dynamic memory allocation. Function overloading, overloading constructors, pointers to functions, Operator overloading.

Unit2

Inheritance, types of inheritance, protected members, virtual base class, polymorphism, virtual functions, pure virtual functions.

Streams, formatting I /O with class functions and manipulators, overloading << and >> , File I/ O , name spaces, conversion functions, array based I /O, Standard Template Library (STL).

Unit3

Abstract Data Types **(**ADT**),** Algorithm analysis, Asymptotic notations.

Arrays – representation.

Linked list – Singly linked list (SLL) – basic operations (create list, add/delete nodes, traverse/print, search SLL, concatenate, merge two sorted SLLs, recursive function for reversing a SLL). Circular SLL – operations (add/delete nodes, print, concatenate, search). LL with header/trailer nodes. Doubly Linked List – basic operations (create list, add/delete nodes, traverse/print).

Stack – array and Linked List implementation – applications – infix to postfix conversion – evaluation of postfix. Queue – array and Linked implementation – Circular queue (array based).

Unit 4

Non-linear data structures – tree and binary tree– basic definitions and properties –function to create binary tree - traversal – recursive and non-recursive, Print/traverse data level by level, count number of nodes.

Binary search tree – create - add/delete nodes – search. Applications of trees. AVL trees.

Unit 5

Searching – Sequential and Binary, Sorting – Insertion, selection, Quick, merge and Heap sort algorithms. Comparison of sort algorithms.

Graph - Definitions – Representation of graph - Graph Traversals - Depth-first traversal – breadth-first traversal - applications of graphs – shortest-path algorithm – Dijkstra's algorithm -minimum spanning tree – Prim's and Kruskal's algorithms.

Reference Books:

1. Horowitz, Sahni and Mehta, Fundamentals of Data Structures in C++, 2nd Edn, University Press
2. Horowitz, Sahni, Rajasekaran, Fundamentals of Algorithms, 2nd Edn, University Press
3. M. A. Weis, Data Structures and Algorithm Analysis in C++, Pearson Education Asia, 2013
4. Langsam, Augenstein and Tenenbaum, Data Structures Using C and C++, 2nd edn, PHI.
5. Anany Leviton, Introduction to the Design and Analysis of Algorithms, 3rd Edition, Pearson Education.
6. Aho, Hopcroft and Ullman, Data Structures and Algorithms, Pearson Education.
7. Schildt, C++ - The complete Reference, 4th edn, McGraw Hill.
8. Somashekara, Guru, Nagendrasamy, Majunath, object Oriented Programming with C++, 2nd edn PHI
9. BjarneStroustrup - The C++ Programming language, Addison Wesley , 3rd Ed.

MCA2C09 COMPUTER ORGANIZATION

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Basic structure : Basic operational concepts. Number representation and arithmetic operations.Character representations.Performance.

Instruction set Architecture:Memory locations and addresses, memory operations, instructions and instruction sequencing, addressing modes. Assembly language, stacks, subroutines, RISC vs CISC.

Unit 2

Basic I/O: Accessing I/O devices (device interface, program controlled I/O), Interrupts (enabling and disabling, handling multiple interrupts, controlling I/O device behavior, Processor control registers, exceptions).

I/O organization: Bus structure, bus operation, arbitration, Interface circuits, interconnection standards (USB, PCI, Firewire, SCSI, SATA).

Unit 3

Basic Processing Unit : Fundamental concepts, Instruction execution, Hardware components, Instruction fetch and execution steps, control signals, Hardwired control, CICS style processors (3-bus organization, microprogrammed control).

Arithmetic - multiplication of unsigned numbers (array and sequential multipliers), multiplication of signed numbers (Booth algorithm), Fast multiplication (bit pair recoding), Floating point numbers and operations.

Unit 4

Memory system : Basic concepts, Semiconductor RAMS, ROMs, DMA, Memory hierarchy, Cache memory, performance requirements, virtual memory, memory management requirements, secondary storage devices.

Unit 5

Pipelining: basic concepts, pipeline organization, issues, data dependencies, memory delays, branch delays, performance evaluation, superscalar operations.

Parallel processing: Hardware multithreading, Vector processing, Shared memory multiprocessors, message passing multi-computers.

Text book:

1. Hamacher, Vranesic, Zaky, Manjikian, Computer Organization and Embedded Systems, 6th edn, Tata McGraw Hill.

Reference books:

1. William Stallings, Computer Organization & Architecture – Designing for Performance, 9th Edn, Pearson
2. John P. Hayes, Computer Architecture and Organization, Third Edn, Tata McGraw Hill.
3. M. Morris Mano, Computer System Architecture, PHI 2003

MCA2C10 COMPUTER NETWORKS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction, network hardware, software, Reference Model,Internet, ATM, Physical Layer, Transmission Media, Wireless transmission, Switching – circuit switching, packet switching, message switching and hybrid switching - Communication Satellites.

Unit 2

Data Link Layer design issues, Error detection & correction, Elementary data link protocols, Sliding Window protocols, Data Link Layer in the Internet.

Unit 3

Medium access layer, Channel allocation problem, Multiple access protocols, Ethernet, Wireless LAN, Bluetooth.

Unit 4

Network Layer, Design Issues, Routing Algorithms, Congestion Control Algorithm, Internetworking, Internet Protocol, IP Address, Internet Control Protocol.

Unit5

Transport Layer, Design Issues, Connection Management – addressing, establishing and releasing a connection, Simple Transport Protocol, Internet Transport Protocol, E-mail, Network Security, Cryptography.

Text book

1. Andrews S. Tanenbaum. "Computer Networks", 4th Edition, Prentice Hall of India, 2006.

References Books

1. Behrouz A Forouzan. "Data Communications and Networking", 4th Edition, McGraw Hill, India, 2011.
2. William Stallings. "Data and Computer communications", 7th Edition, Prentice Hall of India, 2004.
3. Kruse and Ross, Computer Networking, , 5thedn, Pearson

MCA2C11 PRINCIPLES OF MANAGEMENT

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Basic Managerial Concepts, Levels of management, Managerial Skills, Concept of management principles, nature and need of management, management functions, management thought – classical approach, scientific management, fayol's management, bureaucratic approach, systems approach, Contingency approach. Planning – Meaning, nature, structure, steps, effective planning, MBO, SWOT Analysis. Organizing – meaning, process, structure, formal and informal, types of organization,
departmentation, delegation of authority.

Unit 2

Staffing – meaning, nature, staffing process, recruitment & selection. Directing, supervision,
Motivation – significance, motivational theories- Maslow's need hierarchy, McGregor's Theory X &
Theory Y. Leadership, Communication – formal and informal, Oral and written, barriers, effective communication. Controlling-concepts, steps, objectives, features of a good control system.

Unit 3

Organizational behavior – Key elements, scope, models of OB, Individual behavior, personality, attitudes values and job satisfaction, Group behavior, team building- Types, process, roles.

Unit 4

Marketing Management-importance, scope. Core Marketing Concepts, Marketing research, Customer value, Customer relationship management, Brand Equity, Product Life Cycle, Pricing Strategies, Distribution Channels, Promotions – Sales promotions, advertising and public relations. Marketing Information System, Global marketing and Integration.

Unit 5

Management Accounting- concepts, functions, role, Financial Accounting, Principles of accounting, accounting concepts, double entry system, journal entry, posting, trial balance, subsidiary books, final accounts. Depreciation – meaning, methods of depreciation.

References

1. R N Gupta, Principles of Management, S.Chand& Company Ltd.
2. Koontz &Wheinrich, Essentials of Management –7th Edition, PHI Publications
3. Keegan, Global marketing management, 7th Edition, PHI Publications
4. Kotler, Keller, Jha and Koshy, Marketing management –13th edition, Pearson Education
5. Srinivasan&Murugan, Accounting for Management, S.Chand& Company Ltd
6. S.S Khanka, Organisational Behavior, S.Chand& Company Ltd
7. L M Prasad, Principles of Management, Sultan Chand Publications

MCA2C12 COMPUTER GRAPHICS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Overview of Graphics systems: Video display devices, Raster scan systems, Graphic workstations and viewing systems, Input devices, Graphics software, introduction to OpenGL.

Graphics Output Primitives:Coordinate reference frames, Line drawing algorithms (DDA and Bresenham's), OpenGL curve functions, Circle generating algorithms (Midpoint circle), Pixel addressing and Object geometry, fill area primitives, Polygon fill areas.

Unit 2

Attributes of graphics primitives : Color and Gray scale, point attributes, Line attributes, Fill-Area attributes, General Scan-line polygon fill algorithm, Scan-Line fill of convex-polygons, Boundary fill and flood fill algorithms, Antialiasing.

Two-dimensional viewing : 2D viewing pipeline, Clipping window, normalization and viewport transformation, Clipping algorithms, point clipping, line clipping (Cohen-Sutherland, Nichol-Lee-Nichol), Polygon Fill-area clipping (Sutherland – Hodgeman).

Unit 3

Geometric Transformations: Basic 2D transformation, Matrix representation and Homogeneous coordinates, Inverse transformations, 2D composite transformations, Reflection and shear, Raster methods for geometric transformations, Transformations between 2D coordinate systems. 3D Geometric transformations, 3D translation, 3D rotation (coordinate axis rotation, General 3-d rotation, Quaternion methods for 3D rotation), 3D scaling, 3D composite transformations, transformations between 3D coordinate systems.

Unit 4

Three-dimensional viewing : Overview of 3D viewing concepts, 3D viewing pipeline, 3D viewing coordinate parameters, Transformation from world to viewing coordinates, Projection transformations, orthogonal projections (axonometric and isometric, orthogonal projection coordinates, clipping window and orthogonal projection view volume, Normalization transformation), Oblique parallel projections (Cavalier and cabinet projections, Clipping window and Oblique parallel-projection view volume, Oblique parallel projection transformation matrix, normalization transformation), Perspective projections (transformation coordinates, perspective-projection equations, vanishing points, view volume, transformation matrix, symmetric and oblique perspective-projection frustum, Normalized perspective-projection transformation coordinates), 3D clipping algorithms (region codes, point and line clipping, polygon clipping)..

Unit5

3D Object representation : Quadric surfaces, superquadrics, blobby objects, spline representations.

Visible surface detection methods : Classification, Back-face detection, depth-Buffer method, A-buffer method. Wireframe visibility methods.

Illumination models and surface rendering methods : Light sources, Surface lighting effects, Basic illumination models (Ambient light, Diffuse reflection, Specular reflection and the Phong model), polygon rendering methods (constant intensity surface rendering, Gouraud surface rendering, Phong surface rendering), Ray tracing methods – basic Ray-tracing algorithm.

Text Book :

1. Hearn and Baker, Computer Graphics with OpenGL, 3rdedn, Pearson.

Reference Books:

1. Hill Jr. and Kelly, Computer Graphics using OpenGL, 3rdEdn, Pearson
2. Shreiner, Sellers, Kessenich, Licea-Kane, OpenGL programming guide, 8thedn, Pearson.
3. Foley, Van Dam, Feiner, Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education.

MCA3C14PROGRAMMING IN JAVA

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Object oriented programming, basic concepts of OOP; Introduction to Java programming, features of Java: - Bytecode, Java Virtual Machine (JVM), Java Applets and Applications, Java file name and directory structure; Packages of Java API. Data Types, Variables, and Arrays, Type Conversion and Casting; Operators; Control Statements.

Unit 2

Class, Class Fundamentals, Declaring Objects, Constructors, access specifier, static, Nested and Inner Classes, Command-Line Arguments, this Keyword; Garbage Collection.String handling.

Collection class.

Inheritance, method overloading, Method Overriding, Dynamic Method Dispatch, Abstract Classes.

Unit 3

Packages, Importing Packages; Interface: Defining an Interface, Implementing Interfaces; Exception Handling: try, catch, throw, throws, and finally, Java's Built-in Exceptions; Thread, Synchronization, Messaging, Runnable interface, Inter thread communication, Deadlock, Suspending, Resuming and stopping threads, Multithreading. I/O streams, File streams.

Unit 4

Applets: Applet lifecycle, working with Applets, The HTML APPLET tag. Working with Graphics. Abstract Window Toolkit (AWT): AWT Classes, Window Fundamentals, Component, Container, Panel, Window, Frame. working with Frame Windows, AWT Controls, Layout Managers, and Menus.

Unit 5

Event Handling: Events, Event Sources, Event Classes, Event Listener Interfaces, Adapter Classes.

Java database connectivity:- JDBC architecture- drivers- database connections- statements- resultsets- transactions-metadata-stored procedures-error handling- blobs and clobs.

Reference books:

1. Herbert Schildt, The complete reference Java2 ,7th ed, Mc, Graw Hill.
2. David Flanagan, Java in a Nutshell A desktop quick Reference, 2 Edition, OReilly& Associates, Inc
3. Rajkumar, Java programming, pearson, 2013
4. HarimohanPandey, Java Programming, Pearson, 2012
5. sha and sha, Core Java for beginners, ShroffPubl and dist, 2010
6. Rasdhakrishnan, Object Oriented Programming through Java, University Press, 2007
7. Deital and Deital, Java for Programmers, 2nd Edn, Person

MCA3C15 THEORY OF COMPUTATION

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction to the Theory of computation and Finite Automata: Mathematical preliminaries and notation, Proof techniques, Three basic concepts: languages, grammar & automata. Some applications.

Finite automata: Deterministic Finite Acceptors, Nondeterministic Finite Acceptors, Equivalence of deterministic and nondeterministic finite acceptors, Reduction of the number of states in finite automata.

Unit 2

Regular Languages and Regular grammars :Regular expressions, connection between regular expressions and regular languages , regular grammars

Properties of Regular Languages:closure properties of regular languages, identifying non regular language.

Context-free grammars & languages Context-free grammars, parsing and ambiguity.

Unit 3

Simplification of Context free Grammars and Normal forms : methods of transforming grammars, two important normal forms.

Pushdown automata for context-free languages Non deterministic pushdown automata, PDA and context-free languages, deterministic pushdown automata and deterministic context-free languages.

Unit 4

Properties of Context-Free Languages: pumping lemmas for context free languages and linear languages, closure properties for context-free languages.

Turing machine Standard Turing machine, combining Turing machines for complicated tasks, Turing's thesis

Unit 5

Other models of Turing machine : Minor variations on the Turing machine theme, Turing machine with complex storage, nondeterministic Turing machine, a universal Turing machine, Linear bounded automata.

Limits of Algorithmic computation: Problems that cannot be solved by Turing machines, Undecidable Problems for Recursively enumerable Languages, The Post Correspondence problem.

Text Book :

1. An introduction to Formal Languages and Automata, Peter Linz, 4th edn, Narosa publishing House.

Reference Books

1. John C Martin, Introduction to Languages and the Theory of Automata, McGraw Hill 1997
2. Mishra &Chandrasekharan, Theory of Computer Science : Automata, Languages and Computation, 3rd edn, PHI
3. Hopcroft, Motwani and Ullman, Introduction to automata theory, Languages and Computation, 3rdEdn,., Pearson

MCA3C16 SYSTEM AND NETWORK ADMINISTRATION

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction:Important parts of kernel; Major services in a UNIX system: init, login from terminals, syslog, periodic command execution crown and at;***Boot process****:* The LILO boot process: LILO parameters, /etc/lilo.conf; The GRUB boot process; The /boot directory and files; initrd file and mkinitrd; Run levels: */etc/inittab*, *start-up script /etc/rc.d/rc.sysinit;* ***System Configuration****:* The /etc/sysconfig/… files,*kernel modules;* kernel daemon; /etc/conf. modules and module parameters; /lib/modules/… directory structure and contents.

Unit 2

File system configuration: file system types, /etc/fstabloyout and meaning; Basic user environment: /etc/skel/… and home directories, Window manager configuration file locations; ***System Security*****:** Host security: tcp_wrappers and /etc/hosts.allow and /etc/hosts. deny, /etc/security, shadow password, file permissions, users groups and umask; Adding and deleting users;***System maintenance*****:** Syslogd, klogd and /etc/syslog.conf; Using a remote syslog; The system crontab, dailyscript, tmpwatch and logrotate; Using and managing the system log files; Basic system backup and restore operations; Emergency rescue operations.

Unit 3

TCP / IP Network Configuration: Introduction to TCP / IP network, Protocols, IP address, Hostname, Configuring a Host : setting the host name, assigning IP address, broad cast, net mask and name server address, Editing Host and network files, Interface Configuration: loop back interface, Ethernet interface, The SLIP and PPP interface, Configuring Gateway, Routing through gateway, Network commands: ifconfig, netstat, route. Network applications Configuration: File Transfer Protocol (FTP) and Trivial File Transfer Protocol (TFTP), Network File Systems (NFS) . Network Information System(NIS),Hyper Text Transfer Protocol (HTTP) and Web server, Server Message Block (SMB) Protocol and Samba server, Dynamic Host configuration Protocol (DHCP) Firewalls, Remote booting.

Unit 4

Domain Name Services (DNS) and Mail services: working of DNS, Host name Resolution Name lookup with DNS, Reverse Lookup, Domain Name Servers and Zones, DNS database: SOA, NS, MX, A and PTR records, Secondary and primary DNS, Zone change notification, root servers, internet root domains, configuring DNS, Using nslookup. Simple Mail Transfer Protocol (SMTP), Post office Protocol(POP) Multipurpose Internet Mail Extension (MIME), SMTP and POP3 command, Mail routing, Configuring A mail server.

Unit 5

Inter Process Communication programming : Create a process- fork() system call, Parent and Child Process, Process ID, User and Group ID Half Duplex Unix Pipes, Named Pipes, (First In First Out) , Streams and messages, System V IPC :Message Queues, Semaphores, Shared memory, Sample programs for IPC that uses Pipes, FIFO;Socket Programming: Overview, socket address, Elementary Socket System Calls: socket, socket pair, bind, connect,

listen,accept, send, sendto, recv, recvfrom, close, Byte ordering routines, Byte Operations, Address conversion routines, Simple client Programs that uses some reserved ports, Simple Client / Server Program using unreserved ports.

Reference Books

1. Evi Nemeth ., et al, Linux Administration Hand Book , PHI 2003
2. Nicholas Wells, Linux Installation and Administration, Thomson Vikas 2000.
3. Olaf Kirch& Terry Dawson, Linux Network Administrators Guide, O'relly, 2003
4. Hunt, Linux DNS server Administration, BPB Publication, 2003
5. W Richard Stevens, Unix Network Programming, PHI, 2002

MCAC3C17 ADVANCED MICROPROCESSORS MICROCONTROLLERS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Internal Architecture of 8086, Functional Blocks, Instruction set and 8086 Family Assembly language programming, Assembler directives, Addressing memory and ports, Interrupts and Interrupt service procedures.

Unit 2

80286 Microprocessor and its architecture, Addressing modes-Real address and Protected virtual Address mode, Privilege, Protection , additional instructions in 286, concept of Math coprocessor, Memory Management Unit concepts, Advanced features of 386 Processor and their architecture, Paging, virtual 8086 mode, enhancement in the instruction sets.

Unit 3

Architecture and special features of 486 processor. Overview of the features of Pentium and later processors, architecture – recent trends in microprocessor design.

Applications and interfacing of 8086 microprocessor with other peripherals 8251, 8255, 8253, 8257.

Unit 4

Microcontrollers :Overview of Microcontrollers, Types of microcontrollers, embedded system : Hardware architecture; CPU, Memory, Clock circuitry, Watchdog Timer / Reset circuitry, Chip select, I/O devices, Debug port, Communication interfaces, Power supply units. Software architecture, services provided by an operating system, architecture of embedded operating system, Categories of embedded operating systems. Application software, communication software.Development / Testing tools.

Unit 5

Hardware platforms : Types of hardware platforms; single board computers, PC add-on cards, custom-built hardware platforms. 89C51 : architecture, instruction set and programming. AVR micro controller development board, PIC microcontrollers. 16F84 architecture, instruction set and programming.

Reference Books

1. Doughlas V. Hall, Microprocessors and Interfacing-programming and Hardware, Mc-GrawHill Publishers
2. Ray A.K., Bhurchandi K M, Advanced Microprocessors and Peripherals-Architecture, programming and interface, Tata McGraw Hill, 2000
3. WimWilhurt, Embedded Technology.
4. Wayne Wolf, Computers as Components – Principles of embedded Computing system Design.
5. David E. Simon, An Embedded software Primer, Pearson Education, 2002.

MCA4C19 ADVANCED JAVA PROGRAMMING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Java servlets: life cycle; http servlets, post, head and other requests; Servlet responses; error handling; security; servlet chaining; thread safety; cookies; session tracking; httpsessionbinding listener; databases and non-html content.

Unit 2

Remote Method Invocation: RMI architecture; RMI object services; defining remote objects; key RMI classes for remote object implementations; stubs and skeletons; accessing remote object as a client; factory classes; dynamically loaded classes; configuring clients and servers for remote class loading; remote object activation, persistent remote references; defining an activatable, remote object, activatable class, implementing an activatable object, registering activatable objects, passing data with the marshalled object; activation groups, registering activation groups, assigning activatable objects to groups; activation daemon. CORBA: architecture, idl, creating CORBA objects, registering with naming service, finding and using remote objects.

Unit 3

Java Naming and Directory Interface: JNDI Architecture, Context, initial context class, Looking up Object in a context, Listing the children of a context, Creating and destroying the object, binding objects -acessing directory services, modifying directory entries, creating directory entries, searching a directory, Event notification.

Unit 4

Enterprise JavaBeans: EJB roles-ELB client-Object –container-Transaction management-implementing a Basic EJB Object- Implementing session Beans, Implementing Entity Beans-Deploying an enterprise Java Beans Object- Changes in EJB1.1 specification.\

Unit 5

JavaServer Pages: JSP basics, directives and declarations, sharing data between JSPs, JSP actions,JSP application development: Generating dynamic content, using scripting elements implicit JSP Objects, Conditional processing- Displaying values using an expression to set an attribute, Declaring variables and Methods Error Handling and Debugging sharing data between JSP pages, Requests, and users passing.

Reference books:

1. David Flanagan,Jim Parley, William Crawford & Kris Magnusson , Java Enterprise in a nutshell- A desktopQuick reference -O'REILLY, 2003
2. Stephen Ausbury and Scott R. Weiner, Developing Java Enterprise Applications, Wiley-2001
3. JaisonHunder& William Crawford, Java Servlet Programming, O'REILLY, 2002
4. Kogent Learning Solutions Inc. --Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX

MCA4C20SOFTWARE ENGINEERING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Software and Software Engineering: Nature of software and web apps, The software process, Software Engineering practice, Software myths.

Process Models: A generic process model, Prescriptive process model, Specialized process models, The unified process, Personal and team process models, Process technology, Product and process.

Agile Development: Agility- Agility and cost of change, Agile process, Extreme programming, Other agile process models.

Unit 2

Project Management Concepts: The management spectrum, People, Product, Process, Project, W^5HH principle.

Product Metrics:A framework for product metrics, Metrics for the requirements model, Metrics for the design model, Design metrics for Web apps, Metrics for Source code, Metrics for Testing, Metrics for maintenance.

Process and project Metrics:Metrics in the process and project domains, Software measurements, Metrics for software quality.

Estimation for Software Projects:Observations on estimation, The project planning process, Software scope and feasibility, Resources, Software project estimation, Decomposition techniques, Empirical estimation models, Specialized estimation techniques.

Project scheduling: Basic concepts, Project scheduling, Defining a task set for software project, Scheduling, Earned value analysis.

Risk Management: Reactive Vs proactive risk strategies, Software risks, Risk Identification, Risk projection, Risk refinement, Risk mitigation, Monitoring, Management, The RMMM plan.

Unit 3

Quality Concepts: Software quality, Software quality dilemma, Achieving software quality.

Review Techniques: Cost impact of software defects, Defect amplification and removal, Review metrics and their use, Informal reviews, Formal technical reviews.

Software Quality Assurance: Elements of software quality assurance, SQA tasks, Goals and metrics, Formal approaches to SQA, Statistical quality assurance, Software reliability, The SQA plan.

Software Configuration Management: Software configuration management, The SCM process, Configuration management for web apps

Principles That Guide Practice: Software engineering knowledge, Core principles, Principles that guide each framework activity.

Understanding Requirements: Requirements engineering, Establishing the ground work, Eliciting requirements, Building requirements model, Negotiating requirements, Validating requirements.

Unit 4

Requirements Modeling: Flow, Behavior and Web Apps, Requirements modeling strategies, Flow oriented modeling, Creating a behavioral model, Requirements modeling for web apps.

Design Concepts: The design process, Design concepts, the design model. Software architecture, Architectural Design, Architectural mapping using dataflows.

Component Level Design: Cohesion, Coupling, Component level design for web apps, Component based development.

Use Interface Design: The golden rules, Use interface analysis and design, Interface analysis, Interface design steps, Web apps interface design, Design evaluation.

Web apps Design: Web apps design quality, Design goals, Design pyramid for web apps, Web apps interface design, Aesthetic design, Content design, Architecture design, Navigation design, Component level design.

Unit 5

Software Testing Strategies A strategic approach to software testing, strategic issues, Test strategies for conventional software, test strategies for web apps, Validation testing, system testing, The art of debugging.
Testing Conventional Applications: Software testing fundamentals, white box testing, Basis path testing, Control structure testing, Black box testing.
Testing Web Applications: Testing concepts for web apps, content testing, User interface testing, Component level testing, Navigation testing, Configuration, Performance and security testing.
Maintenance and Re Engineering: Software maintenance, Reengineering, Software reengineering, Reverse engineering, Restructuring, Forward engineering.

Text book :

1. Roger S. Pressman.Software Engineering – A practitioner's Approach, 7th Edition.,McGraw Hill,2010.

Reference Books:

2. Ian Somerville., Software Engineering., 9th Edition, Pearson , 2012.
3. Richard Fairley. , Software Engineering Concepts , TMH, 1997.
4. PankajJalote., Software Engineering - A precise Approach,Wiley India, 2011
5. Ammann and Offcut, Introduction to Software Testing, Cambridge University Press, 2008

MCS4C21 SYSTEMS PROGRAMMING & COMPILER DESIGN

Contact Hours/ week : 3 **Credit : 3**

Unit l

Assemblers: Elements of Assembly Language Programming, Overview of Assembly Process, Design of Two pass Assembler, Macros and Macro Processors, Macro definition, call and expansion, Nested Macro calls, Advanced Macro facilities, Design of Macro preprocessor.

Unit 2

Linkers: Linking and Relocation concepts, Design of linkers, Self relocating programs, Linking for over-lays, Loaders. Introduction to compilers: Different Phases. Lexical Analysis:role of the lexical analyzer, input buffering, specification of tokens, Recognition of tokens, lexical Analyzer generators, Lex.

Unit 3

Syntax Analysis: role of the parser Context free grammar, writing a grammar, Top down parsing, Recursive descent parsing, Predictive parsing. Bottom Up Parsing, Shift Reduce parsing, Operator precedence parsing, LR parsers (SLR, Canonical and LALR). Parser generators, Yacc.

Unit 4

Syntax-directed translation – Syntax-directed definitions: S-attributed definition, L-attributed definition. Top-down and bottom-up translation, Type checking, Type systems, Specification of a type checker. Run time Environment:source language issues, storage organization Storage organization schemes, Activation records. Storage allocation strategies, Access to non-local names. Parameter passing mechanisms.Symbol tables.

Unit 5

Intermediate code generation, intermediate languages, declaration and assignment statements. Code generation: Issues, target machine, run time storage management, Runtime storage allocation, basic blocks and flow graphs. Code optimization: Principal sources of optimization.

Text books:

1. D.M. Dhamdhere, "Systems Programming and Operating Systems", TMH, 2003.
2. A.V. Aho, R. Semi, J.D. Ullman, "Compilers - Principles, techniques and tools", Pearson Education, 2003

Reference books:

1. A.V. Aho and J.D. Ullman, " Principles of Compiler Design", Narosa, 2002
2. Kenneth.C.Louden, Compiler Construction:Principles And Practice, Thomson Learning, India
3. Dave and Dave, Compilers – principles and practice, pearson, 2012
4. Lex and Yac, o'Reilly, 2nd Edn
5. Appel, Modern Compiler Implementation in C, Cambridge , 2012

MCA4C22WEB TECHNOLOGIES

Contact Hours/ week : 3 **Credit : 3**

Unit 1

HTML5: New Elements -Structural Elements, New Form/Input Elements, New Attributes, Canvas, Video and Audio, Web Storage, Geolocation.

The JavaScript Language- Introduction to JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects.

Unit 2

Host Objects : Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling . **Scripting with HTML5**.**JQuery:** jQuery Library, jQueryBasics ,jQuery Getters and Setters , Altering Document Structure , Handling Events with jQuery.

Unit 3

PHP: Syntax and variables, Control and functions, string and arrays, creating functions, reading data in webpages, advanced object oriented programming, Session,Cookies, FTP and HTTP,Integrating payment system; Working with database: connecting to MySQL, making MySQL queries, fetching data building in error checking, MySQLfunctions, displaying queries in tables.

Unit 4

Introduction to Web 2.0: Difference between Web 1.0 and Web 2.0 , MVC Architecture.

Scripting XML and JSON: XML Basics, XML request and responses,XML Parsing,XML in a string, XPath, XSTL.JSON Requests and responses, JSON Parsing.

Ajax: Using XML and JSON, **Syndication :**RSS and Atom Feeds.

Unit 5

Content Management System : Introduction, need of CMS, Understanding CMS technologies , Different types of CMS : Portals, Wikis, Blog etc, their features and possible uses.

Web services: Introduction,Web service architecture - RPC,SOA,REST, Web service standards – SOAP, WSDL, UDDI. **Mash-ups:**Introduction.

Reference Textbooks:

1. Jeffrey C. Jackson, Web Technologies: A Computer Science Perspective, Prentice Hall
2. David Flanagan**,** JavaScript: The Definitive Guide, 6th Edn. O'Reilly Media.2011
3. Bob Breedlove, et al, Web Programming Unleashed,Sams Net Publishing, 1st Edn
4. Steven Holzner, PHP: The Complete Reference, McGraw Hill Professional, 2008
5. Steve Suehring, Tim Converse, Joyce Park, PHP6 and MY SQL Bible, John Wiley & Sons,2009
6. Pedro Teixeira,Instant Node.js Starter ,Packt Publishing Ltd., 2013
7. Anthony T. HoldenerIII ,Ajax: The Definitive Guide, O'Reilly Media, 2008
8. Nirav Mehta, Choosing an Open Source CMS: Beginner's Guide Packt Publishing Ltd, 2009
9. James Snell, Programming Web Services with SOAP, O'Reilly 2002

MCA5C24 OBJECT ORIENTED MODELING & DESIGN

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Overview of object-oriented systems, objects, attributes, encapsulation, class hierarchy, polymorphism, inheritance, messages, history of object orientation.

Unit 2

Introduction to UML, basic expression of classes, attributes, and operations, Class diagrams: generalization and association constructs, composition and aggregation. Use case diagrams, Object interaction diagrams: collaboration diagrams, sequence diagrams, asynchronous messages and concurrent execution. State diagrams: basic state diagrams, nested states, concurrent states and synchronization, transient states. Activity diagrams.

Unit 3

Architecture diagrams : packages, deployment diagrams for hardware artifacts and software constructs . Interface diagrams: window-layout and window-navigation diagrams.

Unit4

Encapsulation structure, connascence, domains of object classes, encumbrance, class cohesion, state-spaces and behavior of classes and subclasses, class invariants, pre-conditions and post-conditions, class versus type, principle of type conformance, principle of closed behavior.

Unit5

Abuses of inheritance, danger of polymorphism, mix-in classes, rings of operations, class cohesion and support of states and behavior, components and objects, design of a component, light weight and heavy weight components, advantages and disadvantages of using components.

Reference books

1.Page-Jones .M, Fundamentals of object-oriented design in UML, Addison Wesely
2.Booch. G, Rumbaugh J, and Jacobson. I, The Unified Modeling Language User Guide, Addison Wesely.
3.Bahrami.A, Object Oriented System Development, McGraw Hill.
4.Booch. G, Rumbaugh J, and Jacobson. I, The Unified Modeling Language Reference Manual, Addison Wesely.
5.Larman.C, Applying UML & Patterns: An Introduction to Object Oriented Analysis & Design, Addison Wesley
6.Pooley R & Stevens P, Using UML: Software Engineering with Objects & Components, Addison Wesley.

MCA5C25 INFORMATION SECURITY

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Foundations of Cryptography and security: Ciphers and secret messages, security attacks and services.

Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques), steganography.

Mathematics for cryptography: Euclid's algorithm , modular arithmetic, Linear congruence , Groups, rings and fields, finite fields, polynomial arithmetic.

Unit 2

Block cipher principles – The data encryption standard (DES) – strength of DES – Differential and linear cryptanalysis – Block cipher design principles.

Advanced encryption standard – AES structure – AES transformation function – key expansion – implementation.

Block cipher operations –Multiple encryption – ECB – CBC – CFM – OFM – Counter mode.

Pseudo Random Number generators - design of stream cipher, RC4.

Unit 3

Public Key cryptography: Prime numbers and testing for primality, factoring large numbers, discrete logarithms.

Principles of public-key crypto systems - RSAalgorithm.

Diffi-Helman Key exchange, Elgammal Cryptographic systems - elliptic curve arithmetic, elliptic curve cryptography.

Hash functions – examples – application – requirements and security – Hash function based on Cipher block chaining – Secure Hash algorithm.

Unit 4

Message authentication requirements - Message authentication functions – requirements of message authentication codes - MAC security – HMAC – DAA – CCM – GCM.

Digital signatures, ElGamal and Schnorr Digital signature schemes, Digital signature standard.

Key management and distribution – Symmetric key distribution using symmetric and asymmetric encryption.Distribution of public keys, Public Key Infrastructure.

Unit 5

User Authentication: Kerberos.

Electronic mail security: Pretty Good Privacy,S/MIME.

IP and Web security protocols :secure socket layer and transport layer security, HTTPS – IP security overview and policy.

Firewall and Intrusion Detection: virus and related threats, virus counter measures,intrusion detection and password management, firewall design principles.

Reference books

1. William Stallings, Cryptography and Network Security, Pearson 2004
2. Foorouzan and Mukhopadhyay, Cryptographiy and Network security, 2nd edn
3. Buce Schneier., Applied cryptography – protocols and algorithms, Springer Verlag 2003
4. William stallings, Network Security Essentials, , 4th edn, Pearson
5. Pfleeger and Pfleeger, Security in Computing, 4th Edn, Pearson

MCA5C26 ADVANCED DATABASE MANAGEMENT SYSTEMS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Accessing SQL From a ProgrammingLanguage, Functions and Procedures, Triggers, Recursive Queries, Advanced Aggregation Features, OLAP. File Organization, Organization of Records in Files, Data-Dictionary Storage, Indexing and Hashing - Basic Concepts, Ordered Indices, B+-Tree Index Files, B+-Tree Extensions, Multiple-Key Access, Static Hashing, Dynamic Hashing.

Unit 2

Query processing – Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Evaluation of Expressions.

Query Optimization – Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans.

Unit 3

Transaction Concept -A Simple Transaction Model, Storage Structure, Transaction Atomicity and

Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity.

Concurrency Control - Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols.

Recovery System - Failure Classification, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile, Storage Early Lock Release and Logical Undo Operations.

Unit 4:

Parallel Databases – Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism Intraoperation Parallelism, Interoperation Parallelism.

Distributed Databases, Homogeneous and Heterogeneous Databases, Distributed Data Storage, Distributed Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing, Heterogeneous Distributed Databases, Cloud-Based Databases.

Unit 5:

Information Retrieval, Overview, Relevance Ranking Using Terms, Relevance Using Hyperlinks, Synonyms, Homonyms, Ontologies, Indexing of Documents.

Object-Based Databases – Overview, Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance , Array and Multiset Types in SQL, Object-Identity and Reference Types in SQL, Implementing O-R Features, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational.

Reference Books

1. Silbersehatz, Korth and Sudarshan, Database system concepts, 6th edition MGH 2011
2. Ramakrishnan and Gehrke, Database Management Systems, 3rd Edn, McGraw Hill, 2003
3. A Leon & M Leon, Database Management Systems , Leon Vikas – 2003.
4. Elmasri and Navathe, Fundementals of Database systems, 5th Edition,Pearson 2009
5. O'Reilly, Practical PostgreSQLShroffPublishers(SPD) 2002
6. C J Date, An Introduction to Database systems, Pearson, 2004.
7. Cornell, Morris, Mob, Database Systems, Cenage, Learning, 2013
8. M. Gruber, Understanding SQL, Sybex.

ELECTIVE COURSES

MCA3E01PROBABILITY & STATISTICS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Probability distributions : Random variables, Binomial distribution, Hyper geometric distribution, Mean and variance ofprobability distribution, Chebysheve's theorem, Poisson approximation to binomial, Poisson processes, Geometric distribution, Normal distribution, Normal approximation to Binomial distribution, Uniform distribution, Log-normaldistribution, Gamma distribution, Beta distribution, Weibull distribution.

Unit 2

Sampling distributions and Inference Concerning Means :- Population and Samples, the sampling distribution of the mean, sampling distribution of variance, Point estimation, Bayesian estimation, Tests of Hypotheses,the null Hypotheses and the significance tests, Hypotheses concerning one mean, Operating characteristic curves, Inferenceconcerning two means.

Unit 3

Inference concerning Variance and Proportions : Estimation of variances, Hypotheses concerning one variance,Hypotheses concerning two variances, Estimation of proportions, Bayesian estimation, Hypotheses concerning oneproportion, Hypotheses concerning several proportions, analysis of rxc tables, Goodness of fit.

Unit 4

Correlation and Regression analysis: Curve fitting, the method of least squares, inference based on the lest squareestimators, curvilinear regression, correlation, fisher's transformation, inference concerning correlation coefficient.

Unit 5

Analysis of variance :- General principles, Complexity randomized design, Randomized Block diagram, Multiplecomparison, Some further experimental designs, Analysis of covariance.

Reference Books:

1. Johnson, Probability and Statistics for Engineers (V Edn), Miller & Freund

2. Levin & Rubin, Statistics for Management, PHI
3. Milton & Arnold, Probabilities in engineering and Computer Sciences, MGH
4. Ross, Introduction to Probability and Statistics for engineers and Scientists, John Wiley & Sons
5. Frank &Althoen, Statistics – concepts and Applications, Cambridge University press
6. Walpole et. al., Probability and Statistics for Engineers & Scientists, 8thEdn, Pearson

MCA3E02 PYTHON PROGRAMMING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Overview : Features of Python; The Python Language: Lexical Conventions and Syntax, Types and Objects, Operators and Expressions,Numeric operations,Sequence operations,dictionary operations, Flow Control and Exceptions , Modules packages and distributions, input and output.

Unit 2

Python's Programming Paradigms: Imperative/Procedural/Scripting, Functions and Functional Programming , Classes and Object Oriented Programming, execution environment, testing debugging profiling and tuning; Application development: Using python as a RAID Tool, application development with python, distributing python modules.

Unit 3

Python Library: built in functions and exceptions, runtime services, mathematics, String and Text Handling , Data Structures and Algorithms , operating system services, Threading , Network programming and sockets , Internet application programming, Web Programming , Internet data handling and encoding, File and directory handling, Database Access .

Unit 4

GUI programming: introduction, dialogs, main windows, using Qt designer, data handling and custom file formats events, the clipboard, drag and drop; Web development : Web development basics, standard markup language processing, other python webtools; Cross platform development: path to cross-platform development; inside python : architecture, debugging and tuning, documenting, extending python, embedding python.

Unit 5

Pygame : Introducing Pygame: Understanding Events,Opening a Display,Using the Font Module; Creating Visuals, Making things move: moving in a straight line ,exploring vectors; Accepting User Input: Understanding Keyboard Control, Implementing Mouse Control; Moving into the Third Dimension: Exploring the Third Dimension: introducing OpenGL, Setting the Scene with OpenGL: understanding lighting, understanding blending,understanding fog, Rendering the Backdrop.

Reference Books :

1. David M Beazley ,Python Essential Reference (4thEdn), Addison Wesley, 2009
2. Martin C. Brown , Python, - The complete reference, Osborne – McGraw Hill
3. Mark Summerfield ,Rapid GUI Programming with Python and Qt, Prentice Hall.
4. Will McGugan, Beginning Game Development with Python and Pygame, Aprèss.

MCA3E03 VISUAL PROGRAMMING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction to Windows Programming: Different paradigms of programming, comparison, event driven programming, Windows programming fundamentals Data types, Resources, Windows Messages, Device Contexts, Dynamic linking libraries.

Introduction to VC++ and MFC: IDE, resource editor, resource files, Application wizard and class wizard, message handling, tools in VC++, simple programs DLL and API, Messages, Components, User, GDI and kernel.

MFC fundamentals, Structure of MFC applications, Creating Main window using MFC, Processing messages.

Unit 2

Windows basic controls and classes: Message box, Menus, Basic SDI classes, Application class, Document class, View class, Mainframe Class. *CframeWnd and* Message maps, Menu message handler and Timer settings, CMenu, Object and functions, CWind( ), Child windows, CWind::create( ), dialogues and common dialogue classes, Static controls and Dynamic controls, Message handling with controls, simple dialog based program, Data transfer function, DDV functions, Cstring, Communication between dialogs, Modal and Modeless dialogs, CcmdUI

Unit 3.

Graphics and Text Drawing : GDI and device context, GDI object and device context settings, stock drawing objects, CDC classes and examples, setViewportOrg( ), CClientDC object, setROP2( ), OnPaint( ), setting text, background colour and background display mode, fast drawing and bit map graphics.

Advanced Windows Controls and Multitasking :Updown controls, spin controls, slider controls, progress bar, tool bar, status bar, tree views and calendar controls, property sheets and wizards, thread basics, multiple threads, suspending and resuming threads, synchronization, semaphore, event objects, CCriticalSection and Timed Lock Request.

Unit 4.

Document View Architecture: Document view frame work , Initializing application, storing and retrieving documents, CDocument and CView class, OnDraw( ), Document template, RUNTIME_CLASS macro, application wizard, class wizard, adding message handler using class wizard, designing user interface, printing the view, serialization and CArchieve, splitter windows and filing, Collection classes, MDI app;lication, CForm View class, Form program.

Unit 5.

ActiveX controls and ODBC classes : ActiveX and OLE, COM and COM interface, MFC and ActiveX, ActiveX projects, ActiveX control program and control properties, stock caption properties, ActiveX methods, stock DoClick methods, ActiveX events, ActiveX control containers. ODBC classes: ODBC, Database drivers, DSN, connecting VC++ program to remote database. CDatabase class, open, close, CRecordSet class, establishing connection, Movefirst, Movenext, Movelast, Moveprev functions, adding, editing and deleting records, Edit, AddNew and Update functions, sorting and filtering records, m_strSort and m_strFilter variables, create simple database editing programs.

Reference books:

1. Shirley Wodtke, MFC C++ classes, 1997
2. John Paul Muller, Visual C++ from the Group-TMGH,1998.
3. Herbert Schildt, MFC programming, 1996
4. Robert D. Thompson, MFC programmersreference, 1998
5. Michael J. Young, Mastering Visual C++ 6.0, 2000

MCA3E04 SOFT COMPUTING

Contact Hours/ week : 3 **Credit : 3**

UNIT 1

Introduction to soft Computing Paradigm, Artificial Neural Networks – fundamental concepts, Evolution, Basic models, impoertant terminologies, MP – Neuron, Linear separability, Hebb network.

Supervised learning networks – Perceptron network: Theory, Learning rule, Architecture, Training process, Training algorithm for single output class.

Back-propagation network : theory, Architecture, Training process, Learning factors, testing.

UNIT 2

Associative Memory networks: introduction, Training algorithms for pattern association: Hebb rule, Outer Products rule. Autoassociative Memory Networks: Theory, architecture, training process and algorithm, testing.

Unsupervised Learning networks :Kohenen self-Organizing feature maps: Theory, Architecture, Training algorithm.

Adaptive Resonance Network – Theory: fundamental architecture, operating principle and algorithm.

ART-1: Architecture, training process and algorithm.

UNIT 3

Introduction: Fuzzy systems – Historical perspective, Utility and limitations, uncertainity and information, fuzzy sets and membership, Chance vs Fuzziness.

Classical sets and Fuzzy sets: Classical set (Operations, properties, mapping to functions). Fuzzy sets (operations, properties, Alternative fuzzy set operations).

Classical Relations and Fuzzy relations: Cartesian product, crisp relations (cardinality, operations, properties, composition), Fuzzy relations (cardinality, operations, properties, Fuzzy Cartesian products and composition), Tolerance and equivalence relation, Crisp equivalence and tolerance relations, Fuzzy tolerance and equivalence relations

UNIT 4

Properties of membership functions, Fuzzification and Defuzzification: Features of the membership functions, various forms, Fuzzification, defuzzification to crisp sets, -cuts for fuzzy relations, Defuzzification to scalars.

Logic and Fuzzy systems: Classical logic, proof, Fuzzy logic, approximate reasoning, other forms of the implication operation. Natural language, Linguistic hedges, Fuzzy rule based systems, Graphical techniques for inference.

Development of membership functions: Membership value assignments (intuition, inference, rank ordering)

U**NIT5**

Genetic Algorithms: Fundamentals of genetic algorithm: history, basic concepts, creation of offsprings, working principle, Encoding, fitness function, reproduction.

Genetic modeling: inheritance operators, cross over, inversion and deletion, Mutation operators, Bit-wise operators used in GA, Generational cycle, convergence, application (any one).

Text Books :

1. Sivanandan, Deepa, Principles of Soft Computing, 2nd Edn, Wiley India.

2. Rajasekharan and Viajayalakshmipai, Neural Networks, Fuzzy Logic and Genetic Algorithm, PHI, 2003. (For Unit 5)

Reference Books:

1. B. Yegnanarayana, Artificial Neural Networks, PHI
2. Satish Kumar, Neural Networks a class room approach, 2nd Edn, McGraw Hill.
3. Ross, Fuzzy Logic with Engineering Applications, 3rd Edn, Wiley India

MCA4E05 ARTIFICIAL INTELLIGENCE

Contact Hours/ week : 3 **Credit : 3**

UNIT 1

Introduction - Overview of AI applications. Introduction to representation and search.
The Propositional calculus, Predicate Calculus, Using Inference Rules to produce Predicate Calculus expressions, Application – A Logic based financial advisor.

UNIT 2

Introduction to structure and Strategies for State Space search, Graph theory, Strategies for state space search, Using the State Space to Represent Reasoning with the Predicate calculus (Sate space description of a logical system, AND/OR Graph).
Heuristic Search : introduction, Hill-Climbing and Dynamic Programming, The Best-first Search Algorithm, Admissibility, Monotonicity and informedness, Using Heuristics in Games.

UNIT 3

Building Control Algorithm for Statespace search – Introduction, Production Systems, The blackboard architecture for Problem solving.
Knowledge Representation – Issues, History of AI representational schemes, Conceptual Graphs, Alternatives to explicit Representation, Agent based and distributed problem solving.

UNIT 4

Strong Method Problem Solving **–** Introduction,Overview of Expert System Technology, Rule Based Expert system, Model -Based, Case-Based and Hybrid Systems (Introduction to Model based reasoning, Introduction to Case Based Reasoning, Hybrid design), Introduction to Planning.
Reasoning in Uncertain Situation – introduction, logic based Adductive Inference.
Introduction to PROLOG , Syntax for predicate Calculus programming, ADTs, A production system example.

U**NIT5**

Machine Learning: Symbol Based – Introduction, Frame –work. The ID3 Decision tree Induction algorithm. Inductive bias and Learnability, Knowledge and Learning, Unsupervised learning, Reinforcement Learning,
Machine Learning : Connectionist – Introduction, foundations, Perceptron learning.
Machine learning : Social and emergent: Models, The Genetic Algorithm, Artificial Life and Social based Learning.

Text book :

1. George F Luger, Artificial Intelligence – Structures and Strategies for Complex probel solving, 5thEdn, pearson.

Reference Books:

1. E. Rich, K. Knight, S B Nair, Artificial intelligence, 3rdEdn, McGraw Hill.
2. S. Russel and p. Norvig, Artificial intelligence – A Modern Approach, 3rdEdn, pearson
3. D W Patterson, introduction to Artificial Intelligence and Expert Systems, PHI, 1990

MCA4E06 LINUX KERNEL

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction: Characteristics, multi-tasking, multi-user access, multiprocessing, architecture independence, demand load executable, paging, dynamic cache for hard disk, shared libraries, POSIX 1003.1 support, various formats for executable files, Memory protected mode, support for national keyboards and fonts, different file systems, TCP/IP, SLIP and PPP *support*; Compiling the kernel; Configuration facilities; Kernel architecture; Processes and tasks; Important data structures, task structure, process table, files and inodes, dynamic memory management, queues and semaphores, system time andtimers; Main algorithms, signals, interrupts, booting the system, timer interrupt, scheduler; System call, working, getpid,nice, pause, fork, execve, exit, wait; Implementing new system calls.

Unit 2

Memory Management: Architecture independent memory model; Pages of memory; Virtual address space; Converting the linear address; Page directory; page middle directory; page table; Virtual address space; user segment; virtual memory areas; brk system call; Mapping functions; Kernel segment; Static and dynamic memory allocation in the kernel segment; Block device caching; Block buffering; update and bdflush processes; Buffer cache list structures; Paging; Page cache and management; Finding free page; reloading a page.

Unit 3

Inter-process communication**:** Synchronization; Communication via files, locking; Pipes; System V IPC, access permissions, numbers and keys, semaphores, message queues, shared memory, ipcs and ipcrm commands; IPC with sockets; Unix domain socket implementation.

Unit 4

File System**:** Basic principles; Representation in the kernel; Mounting; Superblock operations; Inode; Inode operations; File structure; File operations; File opening; Directory cache; Proc file system; Ext2 file system; Structure; Directories in ext2 file system; block allocation.

Unit 5

Device Drivers: Character and block devices; Polling and interrupts; Interrupt mode; Interrupt sharing; Bottom halves; Task queues; DMA mode; Hardware detection; Automatic interrupt detection; Driver implementation; setup function; init; open and release; read and write; IOCTL; select; lseek; mmap; readdir; fsync and fasync; check_media_change and revalidate.

Reference books:

1. M beck , Linux Kernel Internals, Second edition, Addison Wesley. 1998
2. Robert Love, Linux Kernel Development, SAMS, 2003
3. Bovet and Cesati, Understanding the Linux Kernel, 3rdEdn, O'Reilly

MCA4E07 INFRASTRUCTURE, RESOURCES AND EDUCATION MANAGEMENT IN E-LEARNING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

IT Infrastructure for colleges and schools: Essential systems for college web-site and portals; Use of Wiki, College and School Management System, LMS and Online Library Services, Virtual Labs.

Unit 2

LAN Configurations: The Internet Gateway – NKN/NME-ICT connectivities, DNS, Proxy and Apache server, Radius Authentications server; WiFi, Why and what about security in networks and systems. Providing browser agnostic and Operating Systems compatible user services; Maintenance of user laptops and tablets configurations.

Unit 3

Campus Services: Email services – using college own server vs. Using Gmail, Yahoo, and such free email services. Virtual Campus – Online access to college IT services, Campus Activities, Webinar and synchronous virtual classroom services. Managing e-Groups.

Unit 4

Open Education Resources: NPTEL, MIT Open Courseware Wikipedia and contributing to wikipedia; some popular open education portals; Useful scientific databases and Open Access Publishing; Introduction to cloud based services and collaboration across colleges, teachers and students communities.

Unit 5

Pedagogy management in e-learning: The Problem Based Learning Model; Gagne's Theory of Instruction; Bloom's Taxonomy and Lesson Plans; A block-diagrammatic view of learning and lesson management. Pedagogy and Instruction Design; The TALEEM Lesson Plans.

Textbooks:

1. E-Learning and the science of instruction (http://www.amazon.com/Learning-Science-Instruction-Guidelines-Multimedia/dp/0787986836/#reader_0787986836)

2. Pedagogy management in e-learning: http://www.ascilite.org.au/ajet/e-jist/docs/vol9_no2/papers/full_papers/kanuka.htm

References:

Unit 1

Wiki: http://en.wikipedia.org/wiki/Wikipedia:Policies_and_guidelines, http://www.slideshare.net/webworks/why-use-a-wiki-an-introduction-to-the-latest-online-publishing-format
College and School Management System: http://www.fedena.com/
LMS: http://en.wikipedia.org/wiki/Sakai_Project
Online Library Services: http://www.greenstone.org/
Virtual Labs: http://vlab.co.in/

Unit 2

NKN/NMEICT connectivities: http://www.nme.bsnl.co.in/
Apache Server: http://httpd.apache.org/docs/2.2/vhosts/examples.html
Radius Authentications server: http://en.wikipedia.org/wiki/RADIUS
WiFi: http://computer.howstuffworks.com/wireless-network.htm

Unit 3

Managing e-groups: https://espace.cern.ch/e-groups-help/default.aspx

Unit 4

NPTEL: http://nptel.ac.in/
Open Access publishing: http://en.wikipedia.org/wiki/Open_access

Unit 5

Problem based learning: https://csapoer.pbworks.com/f/First+Principles+of+Instruction+%28Merrill,+2002%29.pdf
Gagne's Theory of Instruction: http://home.gwu.edu/~mcorry/corry1.htm, http://edutechwiki.unige.ch/en/Nine_events_of_instruction
Bloom's Taxonomy: http://en.wikipedia.org/wiki/Bloom%27s_taxonomy

MCA4E08 ACCOUNTING & FINANCIAL MANAGEMENT

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Financial accounting-scope and functions-accounting conventions and concepts-recording of business transactions-Journal-ledger, Cash book-Trial Balance.Accounting standards in India.

Unit 2

Preparation of final accounts-Trading account, Profit and loss account and Balance sheet with adjustments-Depreciation, methods of providing depreciation.

Unit 3

Analysis and interpretation of financial statements-Ratio analysis-meaning and significance-classification of ratios- common size statements-comparative analysis-Trend Analysis, Cash flow statements, fund flow statements.

Unit 4

Financial Management-Nature scope and objectives-overcapitalization and undercapitalization –cost of capital- working capital-factors affecting working capital-operating cycle.
Meaning and significance of capital budgeting decisions. Capital market-mutual funds market.

Unit 5

Cost concepts-elements of cost-cost sheet -Marginal costing-practical applications in business decisions - Cost volume profit analysis-Break even analysis-Budgetary control-nature & Scope. Nature and scope of standard costing-variance analysis.

References:-

1.Jain an d Narang, Financial Accounting ,Kalyani Publishers, 12thEdn
2. S.N.Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 5 edn,2010
3. Ashoka Banerjee, Financial Accounting, Excel Publications
4. Ambariosh Gupta, Finanacial accounting and Management, Pearson Education
5. Narayana Swami, Financial Accounting – A managerial perspective, 3rdedn, PHI
6. I.M.Pandey, Financial Management, 10thedn, Vikas Pub House.
7. Edwards, Marriott and Mellets, Introduction to Accounting, 3rdEdn, Sage.

MCA5E09 OPERATIONS RESEARCH

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Linear programming: Formulation, Graphical Solution-2 variables, Development of Simplex Method,Artificial Variable Techniques, Big- M method, Two-Phase method, Reversed Simplex method.

Unit 2

Duality in LPP and it's formulation, Dual Simplex Method, Bounded variable method, Applications of LPP, Transportation problems, Assignment Problem, Traveling Sales persons problem.

Unit 3

Integer Programming problem (IPP), Cutting Plane algorithm, Branch and bound method of solving IPP, Dynamic programming problems and it's characteristics, Deterministic Dynamic Programming Problem.

Unit 4

Sequencing Problem, Processing n jobs through two machines and their mechanics, Processing n jobs through m machines, Processing 2 jobs through m machines, Project scheduling by PERT / CPM,Difference between PERT / CPM, Constructing the network, Critical path analysis, Float of an activity,Three time estimated for PERT, project cost by CPM.

Unit 5

Stochastic process, Classification of stochastic process, Discrete parameter Markov chains, Continuous Parameter Markov Chains, Birth and Death Processes, Queuing model and it's characteristics, Classification of Queuing Model (M/M/1): FCFS(birth and death model)z//.

Reference Books

1. Thaha H.A.- Operation Research, 9THEdn, Pearson

2. Sharm J.K, Mathematical Models in Operation Research, TMGH, 1989.
3. Trivedi, . Probability, Statistics with Reliability, Queuing and Computer Science Applications, PHI
4. Winston, Operations Research Applications and Algorithms, 4thedn, CENGAGE, 2003

MCA5E10 SIMULATION AND MODELING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction: simulation, Merits and demerits, Areas of application, System and Environment, Components of System, Discrete and Continuous systems, types of models. Steps in simulation study, Simulation Examples, Concepts in Discrete event simulation, Event scheduling Vs Time advance algorithms.Manual simulation Using Event Scheduling, List processing. Simulation in Java, Simulation in GPSS.

Unit 2

Statistical Models: Useful statistical model, Discrete distribution, Continuous distribution,Queuing Models: Characteristics of queuing systems, queuing notations, long run measures of performance of queuing systems, Steady state behavior of Markovian models (M/G/1, M/M/1, M/M/c), Steady state behavior of finite population models, Network of Queues.

Unit 3

Random Numbers: Roles of random numbers in simulation, pseudo random number generation techniques- there properties, methods of testing PRN sequence. Random Varieties: Generation, Inverse transformation techniques, Acceptance Rejection techniques, Direct transformation technique and Convolution method.

Unit 4

Input Modeling: Data collection, identifying the Distribution, parameter estimation, Goodness of fit tests. Input models without data, Multivariate and Time series input models. Verification and Validation of Models: Model building, Verification, and Validation, Verification of simulation models, Calibration and Validation of models.

Unit 5

Output Analysis for a Single Model: Types of simulations with respect to output analysis, Stochastic nature of output data, Measure of performance and their estimation, Output analysis of terminating simulators, Output analysis for steady state simulation. Comparison and Evaluation of Alternative System Design: Comparison of two system design, Comparison of several system design, Meta modeling,Optimization via simulation.

Case Studies: Simulation of manufacturing systems, Simulation of computer systems, Simulation of super market, Simulation of pert network.

Text book:

1. Jerry Banks. John S. Carson & Barry L. Nelson - Discrete Event system simulation PHI India 2001.

Reference books:

1. Geoffrey Gordon, System Simulation, 2nd Edition, Prentice Hall, India, 2002.
2. N.Deo System simulations with Digital computers, PHI 1979.
3. James A Payne, Introduction to Simulation : Programming Techniques & Methods of Analysis MGH 1988 .
4. Sengupta , System Simulation and Modeling, Pearson, 2014

MCA5E11 DESIGN AND ANALYSIS OF ALGORITHMS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction, recursive algorithms, time and space complexities, randomized algorithms, repeated element, primalitytesting.

Divide and conquer- general method, finding maximum and minimum, merge sort, quick sort, selection, Strassen's matrixmultiplication, convex hull algorithm.

Unit 2

Greedy method : general method, knapsack problem, tree vertex splitting, job sequencing with deadlines, optimal storageon tapes.

Unit 3.

Dynamic programming : General method, multistage graphs, all pairs shortest paths, dfs, bfs, connected components,biconnected components and dfs.

Unit 4

Back tracking : general method, 8 queens, sum of subsets, graph colouring, Hamilton cycles.

Branch and bound : General method, traveling salesperson problem.

Unit 5

Lower bound theory, comparison trees, Oracles and advisory arguments, Lower bounds through reduction, Basic conceptsof Np – Hard and Np – Complete problems.

Reference books:

1. Horowitz, Sahni&Rajasekaran, Fundamentals of Computer algorithms, 2nd edn, University Press.
2. Aho, Hopcroft, Ullman, The Design and analysis of computer algorithms, Pearson
3. Baase and Gelder, Computer Algorithms Introduction to Design and analysi, 3rd edn, Pearson, 2000
4. A Levitin, Introdunction to the Design and analysis of algorithms, 2nd edn, Person.

MCA5E12 INFORMATION STORAGE AND MANAGEMENT

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Storage System: Evolution of storage technology and architecture, Data center infrastructure, Information life cycle. Components of a storage system environment, Disk drive components and performance parameters, Logical components of the host. RAID implementation and impact on performance.Intelligent storage system, components, intelligent storage array.

Unit 2

Storage Technologies: Direct attached storage: types, benefits, interfaces. Parallel SCSI – architecture, communication model, addressing, command model. Storage area network: components, connectivity, ports, fibre channel architecture, zoning, topologies. Network attached storage: NAS devices and benefits, NAS file I/O, NAS components, NAS implementations, NAS File sharing protocols, NAS I/O operations, Factors affecting NAS performance and availability.

Unit 3

Storage Networks and Virtualization: IP SAN: iSCSI, FCIP. Content addressed storage: Fixed content and archives, types of archives, Features of CAS, CAS architecture, Object storage and retrieval in CAS. Storage virtualization: Forms of virtualization, Taxonomy, Configurations, Challenges, Types of virtualization.

Unit 4

Backup, Archive, and Replication - Backup: Purpose, Backup considerations, Granularity, Recovery considerations, Backup methods and process, Backup and restore operations, Backup topologies, Backup technologies. Local Replication: Use of local replicas, Data consistency, Local replication technologies, Restore and restart considerations, Creating multiple replicas. Remote Replication: Methods, Technologies.

Unit 5

Storage Security and Management: Storage security framework, Risk triad, storage security domains, Security implementations in storage networking. Managing the storage infrastructure: Monitoring, Management activities, Management challenges and solutions.

Reference Books:

1. EMC Education Services, Information Storage and Management**,** Wiley Publishing, 2009.
2. Robert Spalding, Storage Networks: The Complete Reference, Osborne/Tata McGraw Hill 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne,2nd Edition, 2001.
4. Meeta Gupta, "Storage Area Network Fundamentals", Pearson Education, 2002.

MSA5E13 MOBILE COMPUTING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction to Mobile computing: Functions, types of networks, architecture for mobile computing, design considerations for mobile computing.

Unit 2

Evolution of telephony, multiple access procedures, satellite communication systems, mobile computing through telephone, IVR, Voice XML, Bluetooth, RFID, WiMAX, Mobile IP, IPv6.

Unit 3

GSM – architecture, entities, call routing, PLMN interfaces, GSM addresses and identifiers, network aspects in GSM, mobility management, GSM frequency allocation, authentication and security. SMS –architecture and types. GPRS – GPRS and packet data network, GPRS network architecture, GPRS network operations, Data services in GPRS.

Unit 4

WAP – WAP protocol stack, WAP application environment, WML &WMLScript, WAP Push architecture, Protocols used in WAP, WAP Gateway. CDMA & 3G – Spread-Spectrum Technology, CDMA v/s GSM, IS-95 standards, 802.11 standards, Third generation networks and applications on 3G, WLAN architecture.

Unit 5

Voice over IP – H.323 Framework, SIP, Real time protocols, Convergence technologies, Call routing, VoIP applications, Mobile VoIP, Voice over WLAN.

Text Book:

1. AsokeTalukder, Hasan Ahmed, and RoopaYavagal. Mobile Computing, Technology, Applications and Service Creation, 2d Edition, McGraw Hill Education (India) Pvt. Ltd., New Delhi. 2010.

Reference Books:

1. Raj Kamal. Mobile Computing, Oxford University Press. 2007.
2. ItiSahaMisra. Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill Education Pvt. Ltd., New Delhi. 2009.
3. Schiller, Mobile communication, 2nd edn, Pearson
4. Perahia and Stacey, Next Generation Wireless LANs, Cambridge, 2009
5. Shende, Mobile computing for beginners, ShroffPubl& Distributers, 2012
6. ReezaB'Far, Mobile computing principles, Cambridge, 2005

MCA5E14 GEOGRAPHICAL INFORMATION SYSTEMS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction to GIS, Defining GIS and Introduction to Spatial data, thematic characteristics of spatial data, sources of spatial data: census, survey data, air photos, satellite images, field data. Satellite Navigation Systems, Models of the Earth; Geoid and Ellipsoid, Datum and Projections, Spatial and attribute data modelling and Management: Spatial entities - Spatial data structures; Raster and Vector GIS implementation architecture; Desktop GIS, GIS Server, Web GIS applications.

Unit 1

Free and Open Source Software for GIS, Standards and Interoperability, Open Geospatial Consortium- Web Map Servers- Web Feature Servers- Metadata standard, XML, Geographic Markup Language.

Unit 1

Customization of GIS Overview- the need and benefit of Customization – programming for GIS applications - the enhancement of GIS functionalities through customization – Automation of redundant processes - Data development/update automation – Discuss various case studies that involve customization.

Unit 1

Spatial databases, creating a spatially-enabled database, GIS objects, building spatial indexes, spatial queries and spatial functions, Building applications with spatial database, GIS Integration with R and Big Data.

Unit 1

Web mapping, Web Mapping Services-OpenLayers-Goggle maps-yahoo maps and Microsoft map services, Mashups. GeoRSS. Web GIS Implementation: Web Map servers and Data servers

Case studies: Design and proto-typing; Potential Application domains; Agriculture, Irrigation, Transportation, Environmental Management, Sales & Marketing.

References

1. Heywood.L, Comelius.S and S. Carver (2006) An Introduction to Geographical Information Systems, Dorling Kinderseley (India) Pvt. Ltd.
2. Burrough P A 2000 P A McDonnell [2000] Principles of Geographical Information systems, London: Oxford University Press.
3. Lo.C.P., Yeung. K.W. Albert (2002) Concepts And Techniques of Geographic Information Systems, Prentice-Hall of India Pvt ltd, New Delhi
4. Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (2005) Geographic Information Systems and Science.Chichester: Wiley. 2nd edition

MCA5E15DATA MINING

Contact Hours/ week : 3 **Credit : 3**

Unit 1:

Introduction – kinds of data and patterns – technologies, applications, major issues.
Data objects and attribute types – statistical descriptors of data – Data visualization, measuring data similarity and dissimilarity.
Data preprocessing – data cleaning - data integration - data reduction – data transformation and discretization.

Unit 2:

Data warehouse – Basic concepts – DW modeling (Data cube and OLAP), Design & usage, Implementation, Data generalization by attribute oriented induction
Mining frequent patterns – basic concepts - frequentitemset mining methods, Pattern Evaluation methods.

Unit 3:

Classification and prediction – basic concepts, Decision tree induction – Bayes classification – rule based classification – model evaluation and selection – Techniques to improve classification accuracy.

Unit 4:

Advanced classification methods – Bayesian Belief networks, Back propagation – Using frequent patterns, Lazy learners.
Cluster analysis - categorization – partitioning methods – hierarchical methods – density based methods – grid based methods – evaluation of clustering .

Unit 5:

Probabilistic Model based clustering.
Outlier detection – outliers and outlier analysis – outlier detection methods – statistical and proximity based approaches..
Overview of spatial, multimedia, text and web mining.

Text book:

1. J. Han, M. Kamber& J. Pei, Data Mining - Concepts and Techniques, 3rdEdn, Morgan Kauffman, 2012.

Reference Books:

1. K.P. Soman, ShyamDiwakar and V. Ajay, Insight into Data mining Theory andPractice, Prentice Hall of India, 2006.
2. Alex Berson and Stephen J. Smith, Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill, 2007.

3. G. K. Gupta, Introduction to Data Mining with Case Studies, 2nd edn, PHI.
4. Witten, Frank and Hall, Data Mining – Practical Machine Learning Tools and Techniques, 3rd Edition, Morgan Kauffman, 2011.
5. A K Pujari, Data Mining Techniques, 2nd edn, Universities Press, 2013.

MCA5E16 SOFTWARE ARCHITECTURE

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Software Architecture - Foundations - Software architecture in the context of the overall software life cycle – Key architectural Principles, Common Application Architecture, Design Principles, Architectural Styles - Global Analysis - Factors affecting the architecture development of a software.

Unit 2

Conceptual Architecture View, Module Architecture View, Styles of the Module Viewtype - Execution Architecture View, Code Architecture - View. Component-and-Connector Viewtype - Styles of Component-and-Connector Viewtype - Allocation Viewtype and Styles – Documenting Software Interfaces, Documenting Behavior - Building the Documentation Package.

Unit 3

Archetypes and Archetype Patterns.Model Driven Architecture with Archetype Patterns. Literate Modeling, Archetype Pattern. , Customer Relationship Management (CRM) Archetype Pattern, Product Archetype Pattern, Quantity Archetype Pattern, Rule Archetype Pattern. Design Patterns, Creational Patterns, Patterns for Organization of Work, Access Control Patterns.

Unit 4

Service Oriented Architecture, Service Variation Patterns, Service Extension Patterns, Object Management Patterns Adaptation Patterns, Communication Patterns, Architectural Patterns, Structural Patterns, Patterns for Distribution.

Unit 5

Patterns for Interactive Systems. Adaptable Systems, Frameworks and Patterns, Patterns for Concurrent and Networked Objects, Patterns for Resource Management, Pattern Languages

Reference Books

1. Hofmeister, Nord, Soni, Applied Software Architecture, Addison-Wesley
2. Paul Clements et al., Documenting-software-architectures-views-and-beyond, 2nd edn, Pearson
3. Arlow&Neustadt, Enterprise Patterns And MDA-Building Better Software With Archetype Pattern An UML, Pearson, 2004
4. Frank Buschmann, ReginеMeunier, Hans Rohnert, Peter Sommerlad, Michael Stal, Pattern-Oriented Software Architecture, Vol 1 - A System Of Patterns, Wiley.
5. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design Patterns, Pearson

MCA6E17 CLOUD COMPUTING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

CLOUD COMPUTING BASICS Cloud computing components- Infrastructure-services-storage applications database services – Deployment models of Cloud- Services offered by Cloud- Benefits and Limitations of Cloud Computing – Issues in Cloud security- Cloud security services and design principles.

Unit 2

VIRTUALIZATION FUNDAMENTALS :Virtualization – Enabling technology for cloud computing- Types of Virtualization- Server Virtualization- Desktop Virtualization – Memory Virtualization – Application and Storage Virtualization- Tools and Products available for Virtualization.

Unit 3

SAAS AND PAAS: Getting started with SaaS- Understanding the multitenant nature of SaaS solutions- Understanding OpenSaaS Solutions- Understanding Service Oriented Architecture-PaaS- Benefits and Limitations of PaaS. Security as a Service.

Unit 4

IAAS AND CLOUD DATA STORAGE UnderstandingIaaS- Improving performance through Load balancing- Server Types within IaaS solutions- Utilizing cloud based NAS devices – Understanding

Cloud based data storage- Cloud based backup devices- Cloud based database solutions-Cloud based block storage.

Fundamentals of of big data and hadoob

Unit 5

CLOUD APPLICATION DEVELOPMENT - Client Server Distributed Architecture for cloud – Traditional apps vs. Cloud apps - Client side programming model: Web clients. Mobile clients- Server Side.Programming Technologies : AJAX, JSON, Web Services (RPC, REST)-MVC

Design Patterns for Cloud Application Development.

Reference Books:

1. Anthony T .Velte, Toby J.Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Tata McGraw Hill Edition, Fourth Reprint, 2010
2. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, “Virtualization, Business Models, Mobile, Security and more, Jones & Bartlett Learning Company, 2013
3. Ronald L.Krutz, Russell vines, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley Publishing Inc., 2010.
4. Kumar Saurabh, Cloud Computing, Wiley India
5. Gautam, Enterprise Cloud Computing Technology Architecture Applications, Shroff

MCA6E18 LINUX DEVICE DRIVERS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

An introduction to Device Drivers: The role of the device driver, Splitting the kernel, Classes of devices and modules, Security issues.

Building and running modules: Kernel modules Vs applications, User space and kernel space, Concurrency in kernel, Current process, Compiling and loading, The kernel symbol table,

Error handling in init_module, Usage count, I/O ports and I/O memory, Advantages and disadvantages of user space.

Unit 2

Char Drivers: Major and minor numbers, Dynamic allocation of major numbers, Removing a driver from the system, dev_t and kdev_t, File operations, File structure, open and release, Introduction to race conditions, Read and write, Device file system.

Enhanced Character driver operations: ioctl, Blocking I/O, Poll and select, Asynchronous notification.

Flow of Time: Time intervals in kernel, Knowing the current time, Delaying execution, Task queues, Kernel timers.

Unit 3

Hardware Management: I/O Ports and I/O Memory, Using I/O ports, Using digital I/O ports, An overview of parallel ports, Using I/O memory.

Interrupt Handling: Overall control of interrupts, Installing an interrupt handler, Implementing a handler, Tasklets and bottom half processing, Tasklets, The BH mechanism, Interrupt sharing, Interrupt driven I/O, Race conditions, Circular buffers, Spin locks, Lock variables.

Kmod and Advanced Modularization: Loading modules on demand, Requesting modules in the kernel, The use space side, Module loading and security, Intermodule communication.

Unit 4

Mmap and DMA: Memory management in Linux, Address types, High and low memory, The memory map and struct page, page Tables, Virtual memory areas, The mmap device operation, The kiobuf interface, Direct memory accessing and Bus mastering.

Network Drivers: Connecting to the kernel, Thenet_device structure, Opening and closing, Packet Transmission, Controlling transmission concurrency, Packet reception, The interrupt handler, The socket buffers, MAC address resolution, Multicasting.

Unit 5

Overview of Peripheral Buses: The PCI Interface, PCI Addressing, PCI Interrupts, PC/104, PC/104+, MCA, EISA, SBus, NuBus, External Buses, USB.

Physical Layout of The Kernel Source: Booting the kernel, Theinit process, The kernel directory, The fs directory, The mm directory, The net directory, ipc and lib, Drivers.

Reference Books:

1. Alessandro Rubini and Jonathan Corbet. “Linux Device Drivers. “, 3rdedn. O’Reilly.
2. S. Venkateswaran, Essential Linux Device Drivers, Pearson Edn, 2008.

MCA6E19 HIGH PERFORMANCE COMPUTING

Contact Hours/ week : 3 **Credit : 3**

Unit 1: Parallel Processing Concept

Levels of parallelism (instruction, transaction, task, thread, memory, function)- Models (SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation etc)- Architectures: N-wide superscalar architectures, multi-core, multi-threaded

Unit 2: Parallel Programming with CUDA

Processor Architecture, Interconnect, Communication, Memory Organization, and Programming Models in high performance computing architectures: (Examples: IBM CELL BE, Nvidia Tesla GPU,

Intel Larrabee Microarchitecture and Intel Nehalem microarchitecture- Memory hierarchy and transaction specific memory design- Thread Organization

Unit 3: Fundamental Design Issues in Parallel Computing

Synchronization- Scheduling- Job Allocation-Job Partitioning- Dependency Analysis- Mapping Parallel Algorithms onto Parallel Architectures- Performance Analysis of Parallel Algorithms

Unit 4: Fundamental Limitations Facing Parallel Computing and power aware techniques

Bandwidth Limitations- Latency Limitations- Latency Hiding/Tolerating Techniques and their limitations- Power-aware Processing Techniques-Power-aware Memory Design- Power-aware Interconnect Design-Software Power Management.

Unit 5: Advanced Topics

Petascale Computing-Optics in Parallel Computing- Quantum Computers- Recent developments in Nanotechnology and its impact on HPC

References

1. George S. Almasi and AlanGottlieb, Highly Parallel Computing, Benjamin Cumming Publishers.

2. Kai Hwang ,Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw Hill 1993

3. David Culler, Jaswinder Pal Singh, Anoop Gupta, Parallel Computer Architecture: A hardware/Software Approach, Morgan Kaufmann, 1999.

4. K. Hwang& Z. Xu, Scalable Parallel Computing – Technology, Architecture, Programming., McGraw Hill 1998.

5. William James Dally and BrianTowles, Principles and Practices on Interconnection Networks, Morgan Kauffman 2004.

6. Hubert Nguyen , GPU Gems 3, Addison Wesley, 2008, (Chapter 29 to Chapter 41)

7. Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, Introduction to Parallel Computing, , 2nd edition, Pearson, 2003.

8. David A. Bader (Ed.), Petascale Computing: Algorithms and Applications, Chapman & Hall/CRC, 2008.

MCA6E20DIGITAL IMAGE PROCESSING

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Steps in Digital image Processing, Elements of Visual perception, Image Sensing and Acquisition, Image sampling and quantization, Basic pixel relationships,
Basic Intensity Transformation functions – Negatives, Log transforms, Power law transformations, Piecewise Linear Transformation functions.

Unit 2

Histogram processing, Fundamentals of spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Filtering in the Frequency domain : DFT of one and two variables, Properties of 2-D DFT, Basics of filtering in the Frequency domain. Image smoothing filters (Ideal Lowpass, Gaussian Lowpass), Image sharpening filters (ideal Highpass, Gaussian Highpass, Laplacian in the Frequency domain. Selective filtering – Notch filters.

Unit 3

Image restoration and reconstruction : Model, noise models, restoration in the presence of noise only – spatial filtering, Periodic noise reduction by frequency domain filtering.

Linear, Position **–** invariant degradation.

Color models – RGB and HIS.

Unit 4

Image compression : Fundamentals, Compression methods (Huffman, Arithmetic coding, LZW coding, run Length coding, Wavelet coding). Digital watermarking.

Morphological Image Processing: Erosion and dilation, opening and closing, Hit-or-miss transformation, Morphological algorithms (Boundary extraction, Thinning, thickening, skeletons, pruning).

Unit 5

Image segmentation : Fundamentals, Point and line and edge detection, Thresholding, Region-based thresholding.

Representation and description : Representation – Boundary following and chain codes, skeletons. Boundary descriptors – Simple descriptors, shape numbers.Regional descriptors – simple descriptors.

Text Book :

1. Gonzalez and Woods, Digital Image Processing, 3rdEdn, Pearson.

Reference Book:

1. Anil K. Jain, Fundamentals of Digital image Processing, Prentice Hall, US Ed., 1989.
2. William K. Pratt, Digital Image Processing: PIKS Scientific Inside, Wiley Interscience, 4th Ed., 2007
3. Bernd Jahne, Digital Image Processing, Springer, 6th Ed., 1997
4. Sonka, Hlavac, Boyle, Digital Image Processing and Compurter Vision, Cengage, 2008

MCA6E21CYBER FORENSICS

Contact Hours/ week : 3 **Credit : 3**

UNIT 1

Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in LawEnforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists.

Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement - Computer Forensic Technology - Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined -Data Back-up and Recovery-The Role of Back-up in Data Recovery - The Data- Recovery Solution.

UNIT 2

Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options obstacles-- Types ofEvidence - The Rules of Evidence-Volatile Evidence - General Procedure - Collection and Archiving - Methods of Collection -Artifacts - Collection Steps - Controlling Contamination: The Chain of Custody. Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene – Computer Evidence Processing Steps - Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication – Practical Consideration -Practical Implementation

UNIT 3

Computer Forensics analysis and validation: Determining what data to collect and analyze,validating forensic *data.* addressing data-hiding techniques, performing remote acquisitions Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

Processing Crime and Incident Scenes: Identifying digital evidence. collecting evidence in private-sectorincident scens, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case.

UNIT 4

Current Computer Forensic tools: evaluating computer forensic tool needs, computer lOrensics software tools, computer forensics hardware tools, validating and testing forensics software

E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in email, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones arid mobile devices.

U**NIT5**

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures.Examining NTH disks.Understanding whole disk encryption, windows registry.NI Microsoft startup tasks. MS-DOS startup tasks, virtual machines.

Reference Books:

1. Jhon R. Vacca, Computer Forensics, Computer Crime Investigation, Firewall Media, New Delhi.

2. Nelson. Phillips Enfinger.Steuart, Computer Forensics and Investigations, CENGAGE Learning

3. Britz, Computer Forensics and Cyber Crime – An Introduction, 2nd Edn, Pearson.

MCA6E22 M– COMMERCE

Contact Hours/ week : 3 **Credit : 3**

Unit1

ELECTRONIC COMMERCE :Introduction -The e-commerce environment - The e-commerce marketplace -Focus on portals, Location of trading in the marketplace - Commercial arrangement for transactions - Focus on auctions - Business models for e-commerce - Revenue models - Focus on internet start-up companies – the dot-com - E-commerce versus E-business.

Unit2

MOBILE COMMERCE :Introduction – Infrastructure Of M– Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non– Internet Applications In M– Commerce – Wireless/Wired Commerce Comparisons

Unit3

MOBILE COMMERCE: TECHNOLOGY: A Framework For The Study Of Mobile Commerce – NTT Docomo's I– Mode – Wireless Devices ForMobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks

Unit4

MOBILE COMMERCE: THEORY AND APPLICATIONS :The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption Of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – M–Commerce In The Automotive Industry – Location– Based Services: Criteria For Adoption And Solution Deployment – The Role Of Mobile Advertising In Building A Brand – M– Commerce Business Models.

Unit5

BUSINESS– TO– BUSINESS MOBILE E-COMMERCE: Enterprise Enablement – Email And Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking AndMaintenance/Management – Remote IT Support –Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security.

Reference Books:

1. Dave Chaffey, E-Business and E-Commerce Management, Third Edition, 2009, Pearson Education
2. Brian E. Mennecke, Troy J. Strader, Mobile Commerce: Technology, Theory and Applications, Idea Group Inc., IRM press, 2003.
3. P. J. Louis, M-Commerce Crash Course, McGraw- Hill Companies, 2001.
4. Paul May, Mobile Commerce: Opportunities, Applications, and Technologies of Wireless BusinessCambridge University Press 2001.
5. Michael P. Papazoglou, Peter M.A. Ribbers, e-business organizational and Technical foundation,Wiley India 2009
6. Pandey ,SaurabhShukla, E-commerce and Mobile commerce Technologies , Sultan Chand , 2011

MCA6E23 BIG DATA ANALYTICS

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

Unit 2

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating

Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP)

Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

Unit 3

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the

Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce

Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.

Unit 4

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration - Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud.

Unit 5

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere

BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques;

Systems and applications

Reference Books

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Tom White, Hadoop: The Definitive Guide, 3rd Edn, O'reily Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Pub, 2012
4. Anand Rajaraman & Jeffrey D Ullman, Mining of Massive Datasets, Cambridge University Pres, 2012.
5. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
6. Glen J. Myyat, Making Sense of Data, John Wiley & Sons, 2007
7. Pete Warden, Big Data Glossary, O'Reily, 2011 .
8. Han, Kamber, Data Mining Concepts and Techniques, 3rd Edn, Morgan Kauffman, 2012.
9. Da Ruan, Guoquing Chen, Etienne E.Kere, Geert Wets, Intelligent Data Mining, Springer,2007
10. Paul Zikopoulos ,Dirk deRos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corigan , Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Pub, 2012

11. Michael Mineli, Michele Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Wiley Publications,2013
12. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Pub, 2011

MCA6E24 SOFTWARE PROJECT MANAGEMENT

Contact Hours/ week : 3 **Credit : 3**

Unit 1

Software Project and Characteristics, Project Constraints, Project Life Cycle and Process Life Cycle. Factors in Designing a Project Structure, Types of Project Organization Structures, Different Management Styles. Project Enabling Processes and Project Facilitating Processes. Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, Software Project Management activities, SPM Framework, Common problems with software projects.

Unit 2

Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Elements of a Project Plan. Steps to a Well Defined Project Plan. Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Methods of representing WBS, Application of the WBS. Structure of a Software Project Management Plan.

Unit 3

Software project estimation, Software Effort estimation techniques. Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Activity Planning, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts. Project Schedule Management. Ways to Organize Personnel.

Unit 4

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index(SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

Unit 5

Concept of Software Quality, Activities of Software: Quality Planning, Quality Assurance, Quality Control, Tools and techniques for Quality Control. Software Quality Attributes, Software Quality Indicators, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring,

Reference Books:

1. Manish Kumar Jha, Software Project Management, Dhanpat Rai & Co
2. Bob Hughes, Mike Cotterell, Software Project Management, Rajib Mall : Tata McGraw Hill

LAB COURSES

MCA1P01 Lab I (C / DBMS/OS)

Hours/Week : 8 +1

Credit : 3

Section A – C programming, (3 +1 Hours / Week)

Faculty-in-charge shall prepare a list of experiments at the beginning of the semester. For the ESE, question will be selected from this list. All exercises must be done under Linux environment.

Sr No	Program Description	Minimum Number of Programs

1	Simple programs with formatted I/O	1
2	Using typedef	1
3	If and switch	2
4	Loop constructs	3
5	Employing Break and continue	1
6	With goto	1
7	Simple functions (include pass by value and pass by reference)	2
8	Simple recursive functions	1
9	Simple programs using 1D array (use function(s))	2
10	Search (use function(s))	1
11	Sort(use function(s))	2
12	Matrix operations (use function(s))	2
13	String Operations	1
14	Simple programs with pointers	1
15	Program employing array of pointers / pointer to pointer / Pointers to functions	2
16	Employing enumerated types	1
17	Employing Bit fileds	1
18	Employing structure(use function(s))	1
19	Employing Union (use function(s))	1
20	File Operations (Sequential and Random) employ functions and structures	2
21	Command line arguments	1
	Total	30

Section B : Operating System (2 hours per week)

Faculty-in-charge shall prepare a list of experiments at the beginning of the semester. Use C/C++ for high level programming.

i. Linux basic and essential commands
ii. Editors in Linux
iii. Linux Shell programming : minimum 5 programs

Section C : Database Management Systems (3 Hours per week)

Faculty-in-charge shall prepare a list of experiments at the beginning of the semester. Use PostgrSQL for the lab exercises. ESE questions will be set based on the list provided by the faculty-in-charge. Exercises shall include the following components:

1. Create databases and tables, different types of Constraints, SQL queries to add/delete/retrieve data.
2. SQL queries : Update, modify, Alter, Join, nested queries etc.
3. Index, operators and functions, views, arrays, transactions, cursors, triggers, etc.
4. PostgreSQL Administration
5. PostgreSQL Programming - Pl/pgSQL
6. Case study – design of database for a simple application like payroll and its implementation.

ESE SCHEME OF EVALUATION

1. Record of work done duly certified : 10
2. C program : 20
3. DBMS : 20
4. Viva based on C : 10
5. Viva based on DBMS lab assignments : 10
6. Viva based on Linux lab assignments : 10

Total : 80

For 2 and 3
Program/Query writing : 5
Execution without errors: 5
Output : 5
Questions based on the program and/or Modification: 5

MCA2P02 Lab II (DS /C++/CG)

Hours/Week : 8 +2

Credit : 3

Section A : Data Structures (3+1 hours/ week)

Faculty-in-charge shall prepare a list of experiments at the beginning of the semester. Use C++ under Linux for implementation. Employ class concepts and features of C++ in all exercises.

Sr No	Topic / Description	Minimum Number of Programs
1	Singly linked list	3
2	Doubly linked list	1
3	Stack/Queue with Arrays	1
4	with SLL	1
5	Infix to postfix	1
6	Postfix evaluation	1
7	Circular array queue	1
8	Create Binary tree	1
9	Recursive tree traversal	1
10	Non-recursive tree traversal	1
11	Binary search tree	1
12	AVL tree / Heap sort	1
13	Dijkstra's algorithm/ Prim's algorithm/ Kruskal	1
14	Selection / Insertion / Bubble / Binary& Sequential search	2
15	Quick sort / merge sort	2
17	Graph representation and traversal	1
	Total	20

Section B – C++ (3 Hours / Week)

Faculty-in-charge shall prepare a list of experiments at the beginning of the semester. For the ESE, question will be selected from this list. All exercises must be done under Linux environment.

Sr No	Topic /Description	Minimum Number of Programs
1	Class, constructors, destructors – simple programs	6
2	Friend function	1
3	Friend class	1
4	Function overloading	1
5	Operator overloading	1
6	Programs illustrating Inheritance , Virtual base class, Polymorphism, virtual functions	4
7	C++ Files	1
8	STL	1
9	C++ I/O based exercises	2
	Total	18

Section C– Computer Graphics(2 +1 Hours per week)

Faculty-in-charge shall prepare a list of experiments, based on the topics specified below, at the beginning of the semester. For the ESE, question will be selected from this list. All exercises must be carried out using OpenGL (under Windows or linux).

Sr No	Topic / Description	Minimum Number of Programs
1	OpenGL Point and Line functions with different attributes Simple OpenGL programs with I/O and Mouse support	2
2	Line drawing algorithms	2

3	Circle Drawing	1
4	Line Clipping	1
5	Polygon Clipping	1
6	2D transformations	1
7	3D View based	2
8	3D transformations	1
9	3D object representations	1
10	Visible surface detection methods	1
11	Illumination / Rendering	1
	Total	14

ESE SCHEME OF EVALUATION

1. Record of work done duly certified : 10
2. DS program using C++ : 20
3. CG program : 20
4. Viva based on C++ : 15
5. Viva based on DS : 10
6. Viva based on CG exercises : 5

Total : 80

For 2 and 3

Program writing : 5

Execution without errors: 5

Output : 5

Questions based on the program and/or Modification: 5

MCA3P03 Lab III (Java / NPA/Microprocessor)

Hours/Week : 7+1

Credit : 3

Section A– Java Programming (3 Hours per week)

Faculty-in-charge shall prepare a list of experiments, based on the topics specified below, at the beginning of the semester. For the ESE, question will be selected from this list. All exercises must be done under Linux environment.

Sr No	Topic / Description	Minimum Number of Programs
1	Simple programs employing class – covering basic class concepts.	2
2	Nested and Inner class	1
3	String manipulation	1
4	Command line arguments	1
5	Inheritance, Method overloading /overriding, Abstract class	3
6	Packages – Covering important concepts in package	2
7	Exception handling	1
8	Thread and multi-threaded applications	3
9	Applet	2
10	AWT	2
11	Event driven programs	2
12	Database connectivity - jdbc	2
	Total	22

Section B : System & Network Administration (2+1 hours per week)

Select any 20 topics from the following list. Faculty-in-charge shall prepare a detailed description of experiments.

Sr No	Topic / Description
1	LILO Configuration.
2	Runlevel Configuration

3	X Window Configuration
4	Module Management
5	Mounting and Unmounting using fstab
6	User and group Management.
7	Job Scheduling(at, crontab, batch, tmpwatch, logrotate)
8	Printer Setup.
9	Backup (tar, cpio, dd etc.)
10	Setting hostname and IP address.
11	TCP/ IP Configuration.
12	Telnet Configuration.
13	Configuring NIS
14	Configuring DHCP.
15	Configuring SAMBA server.
16	Setting Domain Name Services.
17	FTP Configuration.
18	NFS Configuration.
19	Web Server Configuration
20	Implement simple programs using pipe and fifo.
21	Program to implement message queue.
22	Program to implement Semaphores.
23	Program to implement shared memory
24	Implement client server communication using TCP.
25	SMTP and POP3
26	TCP chat program.
27	UDP chat program.
28	Socket program.
29	TCP – wrappers
30	Implement client server communication using UDP.

Section C– Microprocessor (2 Hours/week):

List of experiments to be prepared by the faculty in tune with the theory syllabus (Introduction and advanced) covering major concepts,

1. 8085 Programming - with Kit or Simulator : Minimum 5 programs.
2. 8086 Programming with assembler (such as MASM) : Minimum 5 programs
3. Exercises using Microcontroller simulators (any one microcontroller) : Minimum 3

ESE SCHEME OF EVALUATION

1. Record of work done duly certified : 10
2. Java program : 20
3. S & NA program : 20
4. Viva based on Java : 10
5. Viva based on S & NA : 10
6. Viva based on Microprocessor : 10

Total : 80

For 2 and 3

Program writing : 5

Execution without errors: 5

Output : 5

Questions based on the program and/or Modification: 5

MCA4P05 Lab IV (Advanced Java / SP&CD/ Web Technology)

Hours/Week : 7+1

Credit : 3

Section A– Advanced Java Programming (2+1 Hours/week)

Faculty-in-charge shall prepare a detailed list and description of experiments based on the following topics.

Sr No	Topic / Description

1	Simple Servlet Program to Print Environment Variables.
2	Program to Display Cookie – ID
3	Servlet Program to Implement Database Connection.
4	Program to Implement RMI.
5	Program to Implement Client Server Communication Using RMI
6	Program to Implement Database Connection Using RMI
7	Implementation of CORBA.
8	Program to Implement Client Server Chat Application Using RMI
9	Listing Objects Using JNDI
10	Directory Searching Using JNDI
11	Implement Session Bean
12	Implement Entity Bean
13	Display a Message Using JSP
14	Implement Database Connection Using JSP.

Section B : System Programming and Compiler Design (2 Hours/week)

Implement the following:

Sr No	Topic / Description
1	Simple Assembler
2	Using LEX and YACC - validation of expressions, validation of variable names, implementation of calculator.
3	Implementing any three parsing algorithm
4	Implement Symbol Table
5	Intermediate code Generator
6	Code Optimizer.

Section C : Web Technology (3 Hours/week)

The faculty should design necessary exercises to familiarize the students with the different tools. Students are expected to use the basic concepts and features to develop ***simple*** web applications. The following topics should be covered. For the ESE, only PHP and Java Script will be included, other topics will be evaluated through extensive Viva voce based on the recorded experiments.

Sr No	Topic / Description	Number of Hours
1	Simple web pages using HTML5 (incorporate features of HTML5).	2
2	Simple programs with Java Script	6
3	Application incorporating Java Script	5
4	Application with JQuery	4
5	Programs with PHP	6
6	Application with PHP (cookies, FTP, Database connections etc)	5
7	Application with XML	4
8	Application with Json	4
9	Application with AJAX.	5
10	Application with any oe CMS	4

ESE SCHEME OF EVALUATION

1. Record of work done duly certified : 10
2. AJP program : 20
3. PHP / Java Script : 20
4. Viva based on AJP : 10
5. Viva based on SP & CD : 10
6. Viva based on Web Technology : 10

Total : 80

For 2 and 3

Program writing : 5

Execution without errors: 5

Output : 5
Questions based on the program and/or Modification: 5

MCA3P04 Case Study I and MCA4P06 Case Study II

Hours/Week : 6 **Credit : 2**

The objective of the course is to inculcate self-learning skill in mastering software development tools. The department shall select one or more of Development tools such as .Net, Python, HTML/PHP/JavaScript, Android and Mathlab. The teacher-in-charge shall give an overview of the tool and if required arrange for lectures by external experts. The teacher may also help the students to find online tutorials/courses. A set of lab assignment shall be prepared by the teacher. Each student is expected to solve a problem using the tool(s) selected. Unlike project work, the focus should be on coding and testing of programs. A report with the statement of problem, description of solution, code and output is to be submitted for the external evaluation.

ESE Scheme of evaluation

4. Report duly certified : 20
5. Demonstration of the software : 30
6. Viva based on the Tool and Software : 30

MCA5Pr01 MINI PROJECT

Hours/Week : 10 **Credit : 4**

The objective of the course is to familiarize students with the software development life cycle. Students can work in groups (maximum 3 per group). Expected outcome is that the students get exposure to all major phases / activities in software development life cycle, including documentation. ESE is in tune with Major Project.

Component	% of marks
Understanding of the problem/requirements/ concepts related to the project	15
Adhering to methodology (Software engineering phases or research methodology) and the candidates understanding of the components of methodology	15
Quality of Modeling of the problem and solution/ database design / form design / reports / testing (For research projects - relevance /novelty of the work(s)/ use of data/ proposal of new models /analysis of algorithms/ comparison and analysis of results /findings)	20

Quality of presentation / demonstration	15
Quantum of work / effort - assessed through the content of report, presentation and viva.	25
Organization and content of report	10

MODEL QUESTION PAPERS (SEMESTER 1 & 2)

INSTRUCTIONS TO QUESTION PAPER SETTER

Semester : 1 Course : MCA1C01 DISCRETE MATHEMATICS							
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION

UNIT	SECTION A	SECTION B
1	3	1
2	3	1
3	2	1
4	2	1
5	2	1

Model Question

FIRST SEMESTER MCA DEGREE EXAMINATION

MCA1C01 DISCRETE MATHEMATICS

Time: 3 Hrs **Max Marks: 80**

Section A
Answer any ten questions. Each question carries three marks.

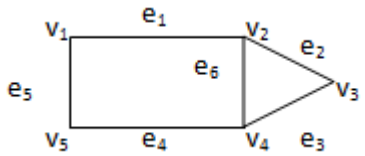
1. Construct the truth table for $(P \to Q) \wedge (Q \to R) \to (P \to R)$.
2. Define tautology and contradiction. State whether the formula $(P \to Q) \vee (Q \to P)$ is a tautology or contradiction.
3. Symbolize the statements, '*for any x and y, if x is taller than y, then y is taller than x*' and '*x is father of mother of y*'
4. If A={1,2,3}, B={a,b,c} and C={α,β}, find $A \times (B \times C)$ and $B \times (C \times A)$.
5. Draw the venn diagram for $(A - B) \cup (B - C) \cup (A - C)$.
6. Let f:R → R be defined by f(x)=2x+5. Show that f(x) is invertible and find $f^{-1}(2)$ and $f^{-1}(4)$.
7. If A={1,2,3,4,5} and R is a relation defined on A- R:{(a,b): a|b}. Find R^c and R^{-1}.
8. Define equivalence class. Find the equivalence class of a if integers a and b have same residue modulus m (m>1).

9. State pigeon hole principle. Using pigeon hole principle, show that given 5 points inside a square, 2 are within $\sqrt{2}$ of each other.

10. Compute the number of ways in which 3 boys and 2 girls are to be seated such that no two boys and no two girls sit together.

11. Define closure of graph with an example.

12. Find the complement of the following graph.



(10 x 3 = 30)

SECTION B

Answer all questions. Each question carries ten marks.

13. (a) i. Define converse, contra positive and inverse of proposition. (3)

ii. Without constructing truth table, show that $P \rightarrow Q \wedge (P \rightarrow Q)$ are logically equivalent. (4)

iii. Obtain the formula having the simplest possible form which is equivalent to formula $(P \rightarrow Q) \rightarrow (Q \rightarrow P) \wedge R$. (3)

OR

(b) i. Define universal and existential quantifier. (2)

ii. Obtain PDNF of $P \rightarrow (P \rightarrow Q) \wedge (Q \vee P)$ (4)

iii. Obtain PCNF of $P \rightarrow (Q \wedge R) \wedge (P \rightarrow \neg Q) \rightarrow R$ (4)

14.

a. i. Show that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

ii. Show that for sets A, B and C, $A + B + C = A + B + C$ (5+5)

OR

b. **i.** If $f : A \rightarrow B$, $g : B \rightarrow C$ and $h : C \rightarrow D$, prove that $h \circ (g \circ f) = (h \circ g) \circ f$ (6)

ii. Define an even function. Let f(x) and g(x) be even function. Prove that fog(x) is also even.
(4)

15. a. Define binary relation and state its properties. State the applications of n-ary relations.

OR

b. i. Explain Warshall's algorithm with suitable example. (5)

ii. Let R be a relation defined on I such that $a=b \bmod 3$. Check whether R is an equivalence relation. If so, find out the partition on I.
(5)

16. a i. Define recurrence relation. Define a sequence recursively for all integers $k \geq 2$

- $C_k = C_{k-1} + k.\ C_{k-2} + 1$, $C_{0=1}$, $C_1 = 2$. Find C_2, C_3, C_4 and C_5
- $C_k = C_{k-1} + C_{k-2} + 2k + 1$, $C_{0=1}$, $C_1 = 2$. Find C_2, C_3, C_4 and C_5 (6)

ii. If C(n,r)=56 and P(n,r)=336, find r. Also find n if 2P(n,2)+50=P(2n,2)
(4)

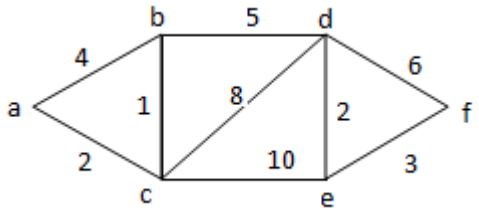
OR

b. i. If there are 44 chairs positioned around 5 tables in a row, show that one table must have at least $\lceil 44/5 \rceil$ chairs around it.
(4)

ii. Use principle of inclusion or exclusion to solve the following.
In a conference held in Mumbai, 500 delegates attended it. 200 of them would take
tea, 350 would take coffee and 10 did not take either tea or coffee:

- How many can take both tea and coffee
- How many can take tea only
- How many can take coffee only.
(6)
-

17. a i. . Using Dijkstra's algorithm, find the shortest path for the following.



ii. Differentiate between complete binary tree and full binary tree. (7+3)

OR

b. i. Define cut vertex, cut set and bridge of graph with suitable examples. (5)

ii. Define Hamiltonian graph and Eulerian graph with suitable examples. (5)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 1 Course : MCA1C02 Digital systems and Introduction to Microprocessors							
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	2	1
2	3	1
3	3	1
4	2	1
5	2	1

Model Question

FIRST SEMESTER MCA DEGREE EXAMINATION

MCA1C02 DIGITAL SYSTEMS AND MICROPROCESSORS

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. Briefly discuss the significance of 2's complement numbers and their use.
2. Discuss the main differences between SOP and POS circuits and their implementation.
3.
4. What is the underlying principle of K-Map and Tabular method simplification? Illustrate with examples.
5. Show how a 2 to 4 decoder circuit can be modified to 1 to 4 Dmux.
6. Discuss how and when the following are used for design of a combinational circuit: Decoder, Multiplexer, ROM, PLA and PAL.
7. Write down the different steps followed in the design of synchronous sequential circuits.
8. What are the disadvantages of ripple counters and how they are overcome?
9. What are the characteristics of a logic family and write the typical values for a standard

TTL family.

10. What is section counter technique is ADC and how is it useful?
11. What is addressing mode in a processor and What are the different addressing modes in 8085 processor?
12. Explain the complete functioning of the following instructions in 8085 processor:
    i) ADD B ii) RST1

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. **a)** i) State DeMorgan's theorem and illustrate it with examples. (3)

ii) State Duality Theorem illustrate with suitable examples. (3)

iii) Convert the following expression in Sum of Minterms and Product of Maxterms:
F(A,B,C,D) = B'D + A'D + BD (4)

OR

b) i) Explain how parity is used for error checking. Show a scheme to generate even parity and transmission and checking at receiving end. (3)

ii) Simplify the following expression using Boolean laws and draw the final circuit:
F = (A' + B) (A + B + D) D' (4)

iii) What are the universal gates and why they are called so? (3)

14. a) .i). With the help of a neat diagram explain the design of a BCD adder circuit. (5)

ii) Simplify the following function using K-Map and draw the final circuit. (5)
F = A'B'CE' + A'B'C'D' + B'D'E' + B'CD' + CDE' + BDE'

OR

b) i) Simplify the following Boolean function using Tabular method finding the essential prime implicants and draw the circuit: F(A,B,C,D) = Σ(0,2,3,5,7,8,10,11,14,15) (6)

ii) Compare the functions and applications of ROM, PLA and PAL (4)

15. a. Design a counter with the following repeated binary sequence: 0, 1, 3, 7, 6, 4. Use T Flip Flops. Treat the unused states as dont care condition. Analyze the final circuit for self correction. (7+3)

OR

b. i) With the help of a neat circuit diagram explain the functioning of 7495 Universal Shift register.
(6)

ii) With the help of circuit diagram and waveforms explain the function of a 4 bit Johnson's counter.
(4)

16. a. i) With the help of a circuit diagram explain the function of a TTL inverter totem-pole circuit and compare this with CMOS circuit.
(5)

ii) With the help of a block diagram explain the principle of successive approximation technique of ADC.
(5)

OR

b. i) Discuss the need for tri-state devices in a digital circuit and with the help of a neat circuit explain the function of a tristate gate.
(5)

ii. With the help of a circuit diagram and waveforms explain the continuous A/D conversion.
(5)

17. a). With the help of a neat internal block diagram explain the architecture of 8085 microprocessor.
(8)

OR

b .i.)Explain the different operations taking place in each machine cycles while a CALL instruction is executed (5)

ii) With the help of the internal block diagram explain the hardware interrupts of 8085 processor.
(5)

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 1 Course : MCA1C03 OPERATING SYSTEMS							
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	2	1
2	3	1
3	3	1
4	2	1
5	2	1

Model Question

FIRST SEMESTER MCA DEGREE EXAMINATION

MCA1C03 OPERATING SYSTEMS

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. List the salient features of Real-time systems.
2. What do you mean by system calls? Give any two examples.
3. Explain the concept of multithreading.
4. Define “Critical section” and “Semaphores”.
5. Explain the CPU scheduling criteria.
6. Explain Thrashing.
7. Explain the relevance of Virtual memory concept in modern operating systems.
8. Compare Windows and Linux directory structure.
9. Explain the basic principle of RAID.
10. Explain “STREAMS”.
11. List the distinguishing features of Distributed Operating systems.
12. Explain the terms Stateful and stateless services.

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. **a)** Give a detailed account of Operating system services.

OR

b) Discuss the structure of a typical operating system.

14. a) Explain any two preemptive and any one non-preemptive scheduling algorithm. Illustrate the algorithms taking suitable example.

OR

b) What are the methods for handling deadlock? How will you prevent deadlock?

15. a) Explain the need for paging and segmentation. Discuss the different page replacement algorithms.

OR

b) Discuss : i. Free space management ii. NFS

16. a) Discuss Kernel I/O subsystems.

OR

b) Give a detailed account of Disk scheduling and Disk structure.

17. a) Explain the design issues of distributed systems.

OR

b) Give a comprehensive account of Protection.

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 1 Course : MCA1C04 FUNDAMENTALS OF PROGRAMMING							
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	2	1
2	3	1
3	2	1
4	3	1
5	2	1

Model Question

FIRST SEMESTER MCA DEGREE EXAMINATION

MCA1C04 FUNDAMENATALS OF PROGRAMMING

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. List the important features of Algorithms.
2. Give the functions of Linkers and Loaders.
3. List an explain the storage classes in C.
4. Give the syntax of switch and while statements.
5. Explain break and continue statements with examples.
6. Write a recursive function to find the sum of first n natural numbers.
7. What is a string? List and explain any three string functions.
8. Differentiate between array of pointers and pointer to array. Give suitable examples.
9. What do you mean by dynamic memory allocation?
10. How will you declare a user defined type? Give example.
11. Give a suitable example illustrating the use of command line arguments.
12. What is a macro? Give example.

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. a) i. Explain features and structure of c programs.
    ii. What is a flow chart? Explain its relevance in programming. Draw a flow chart to find the product of first n natural numbers.
    (5+5)

OR

b) i. Discuss classification of programming languages.

ii. What is a pseudo code? How is it different from algorithms? Give an example of pseudo code. (4+6)

14. a) i. List and explain data types in C.
    ii. Write a program to find the sum of all odd integers from a list of n integers.
    (4+6)

OR

b) i. Explain type casting and type def with suitable examples.

ii. List and explain different types of if statements in C. Write a program using nested if to find the largest among a list of four integers.
(4+6)

15. a) i. Explain the different parameter passing mechanism. Include suitable examples.
    ii. Write a function to add two matrices passed as arguments and return their sum.
    (4+6)

OR

b) i. What is the relevance of function in structured programming? What is a function prototype?

ii. Write a function to search a list of integers passed to it and return the location of the value if the search is successful and -1 otherwise.
(4+6)

16. a) i. Explain pointer arithmetic with examples.
ii. Given a list (array) of integers. Write a function to find the sum and average of the list, employing pointers.
(4+6)

OR

b) i. Differentiate between Structure and Union. Give examples for each.
ii. Declare a structure for storing the details of a book. Use it in a program to read the details of a book and print it.
(5+5)

17. a) Give detailed account of file processing n C.

OR

b) i. Write a program which accepts three numbers as command line argument and print the smallest value.
ii. Write short note on C Preprocessors and Conditional compilation. (4+6)

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 1				**Course : MCA1C05 DATABASE MANAGEMENT SYSTEMS**			
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	3	1
2	3	1
3	2	1
4	2	1
5	2	1

Model Question

FIRST SEMESTER MCA DEGREE EXAMINATION

MCA1C05 DATABASE MANAGEMENT SYSTEMS

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. Differentiate between DBMS and File system.
2. Explain the difference between procedural and non-procedural DML
3. What is a transaction? Discuss the ACID properties of a transaction
4. What is key attribute? Define weak and strong entity set
5. Differentiate between primary key, candidate key and super Key in ER model.
6. What is normalization? Explain 3rd Normal form.
7. Differentiate between natural join and outer join.
8. Define the DIVISION operator in relational algebra using basic operators.
9. Explain the operations SELECT and PROJECT in relational algebra with suitable example.
10. Give the syntax and meaning of the following SQL functions: (i) INITCAP and ii) UPDATE
11. Explain with syntax and example, the CREATE TABLE command
12. Given the following relations :

    EMP (Name, Eno, Deptno, Salary)

    DEPT (Deptno, Dname,Location)

    Write a query in SQL to find the name of the employee of each department who is getting highest salary.

(10 x 3 = 30 marks)

Section B
Answer all questions. Each question carries ten marks.

13. (a) With a neat diagram, explain the DBMS component modules in detail

Or

(b) Draw and explain the three level architecture of the database system.

14. (a) Discuss the conventions for displaying an ER schema as an ER diagram

Or

(b) Construct an ER daigram with all major components for a banking enterprise with entity sets customer, branch, loan, payment, account etc along with your own assumptions.

15. (a) Let R= (A, B, C, D, E, F) be a relation scheme with the following dependencies: C->F, E->A, EC->D, A->B. Determine if EC is a key for R?

Or

(b) Define Functional dependency. Give the inference rules of functional dependencies.

16. (a) Define the five basic operators of relational algebra with an example each.

Or

(b) Consider the following relation schemes:

Project (Project#, Project_name, chief_architect)

Employee (Emp#, Empname)

Assigned_To (Project#, Emp#)

Give expression in Tuple calculus and Domain calculus for each of the queries below:

(i) Get the employee numbers of employees who work on all projects.

(ii) Get the employee numbers of employees who do not work on the COMP123 project.

17. (a) What are views? Explain how views are different from tables.

Or

(b) Explain entity integrity and referential integrity rules in relational model. Show how these are realized in SQL.

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 2 Course : MCA2C08 DATA STRUCTURES AND ALGORITHMS USING C++							
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts -(a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	2	1
2	2	1
3	3	1
4	3	1
5	2	1

Model Question

SECOND SEMESTER MCA DEGREE EXAMINATION

MCA2C07 DATA STRUCTURES & ALGORITHMS

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. What is a constructor? What are the different types of constructors in C++?
2. What is an inline function? Give example.
3. What is a virtual function? Give example.
4. What is a Name Space?
5. Give Node structure of a doubly linked list. Write appropriate class declaration.
6. Declare a class stack and write essential member functions.
7. Explain circular Queue implemented with arrays. What is its advantage?
8. Define Tree and Binary tree. What are the properties of a Binary tree.
9. Give a brief description of any one application of binary trees.
10. What is a binary search tree? In which order a binary tree should be traversed to get a sorted list as output? Explain with suitable example.
11. Explain with example how a graph can be represented with adjacency list.
12. Write the basic principle of merge sort algorithm.

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. a. With suitable examples, explain friend function and friend class.

OR

b. With suitable examples, explain function overloading and operator overloading.

14. a) Give detailed account of file processing n C++.

OR

b) With suitable examples explain different types of inheritance supported in C++.

15. a. i. Explain Postfix notation. Write a function to convert an infix expression to postfix.
ii. Write a function to delete the first node from a Singly Linked List of integers.
7+3

OR

b. i. Write a function to concatenate two singly linked list.
ii. Write any two advantages of header node.
iii. Write note on array representation. 4+3+3

16. a. Write a Non-recursive function to traverse a Binary tree inorder. Include class declarations and functions for stack/Queue if employed. Comment on the time complexity of your algorithm.

OR

b. i. Write a function to count the number of nodes in a Binary tree.
ii. Discuss structure and applications of AVL trees. 5+5

17. a. Define graph? List and explain any two applications of graph. Write and explain Prim's algorithm. Illustrate with suitable example.

OR

b. Define MinHeap and MaxHeap. Give examples. Write and explain necessary functions for Heap sort.

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 2			**Course : MCA2C09 COMPUTER ORGANIZATION AND ARCHITECTURE**				
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	2	1
2	2	1
3	3	1
4	3	1
5	2	1

Model Question

SECOND SEMESTER MCA DEGREE EXAMINATION

MCA2C09 COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. With suitable example explain 2's complement scheme for signed integer representation.
2. Compare CISC and RISC.
3. What do you mean by bus arbitration?
4. Differentiate between program controlled IO and Interrupt driven IO.
5. Explain fetch-execute cycle.
6. How will store floating point numbers?
7. Give the basic principle of array multiplier.
8. Give the memory hierarchy.
9. What are the different types of DRAMs?
10. Explain any one page replacement strategy used in Cache memory.
11. Explain the idea of hardware multithreading.
12. List the advantages of pipeline processing.

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. a)Explain the different measures used in accessing the performance of computer systems.

OR

b) i. Explain the role of stacks.

ii. Explain instruction sequencing. (4+6)

14. a) Give a detailed account of Interrupts in relation to IO operations.

OR

b) Give a detailed account of USB standard.

15. a) Explain 3-bus organization of processors.

OR

b) With suitable example explain Booth algorithm.

16. a) Explain the organization and working of virtual memory.

OR

b) Discuss different cache mapping techniques.

17. a) Discuss the major issues related to pipelining.

OR

b) Explain the basic organization and advantages of Vector processing and shared memory multiprocessors.

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 2				**Course : MCA2C10 COMPUTER NETWORKS**			
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	3	1
2	2	1
3	2	1
4	2	1
5	3	1

Model Question

SECOND SEMESTER MCA DEGREE EXAMINATION

MCA2C10 COMPUTER NETWORKS

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. List four main applications of Internet.
2. What are the features of an optical fiber?
3. List the services provided by Data Link Layer.
4. Write a note on simplex stop-and-wait protocol.
5. What is fast Ethernet?
6. Compare and contrast Pure ALOHA and Slotted ALOHA.
7. Write short notes on hierarchical routing.
8. Explain Flooding.
9. What is Cryptography?
10. Write short notes on Simple Transport Protocol.
11. Write the functions of LLC.
12. What is the difference between connection oriented communication and connectionless communication.

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. (a) Discuss OSI reference model as network architecture.

Or

(b)Discuss LAN, WAN, MAN with respect to speed, coverage (area) and topology.

14. (a) Explain the sliding window protocol in detail.

Or

(b) Compare and contrast error detection with error correction.

15. (a) Discuss the frame format for 802.3 LAN.

Or

(b) Discuss CSMA/CD protocol used in LAN .

16. (a) What is an IP address? Explain the different classifications of IP address.

Or

(b) Discuss any four methods of congestion control in datagram subnets.

17. (a) Explain about the TCP header and working of the TCP protocol.

Or

(b) What is UDP? Explain the structure of UDP header?

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER		
Semester : 2	**Course : MCA2C11 PRINCIPLES OF MANAGEMENT**	
Section A	**Section B**	

Total no of questions	Mark per question	No of questions to be answered	Time per question	Total no of questions	Mark per questio n	No of questions to be answered	Time per question
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION

UNIT	SECTION A	SECTION B
1	3	1
2	3	1
3	2	1
4	2	1
5	2	1

Model Question

SECOND SEMESTER MCA DEGREE EXAMINATION

MCA2C11 PRINCIPLES OF MANAGEMENT

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. Discuss the key factors of Systems Approach of Management?
2. Explain the different types of Plan?
3. Briefly explain the essential skills required for a manager?
4. Discuss MBO and its key features?
5. Distinguish between structured Interview and unstructured Interview?
6. Explain the various steps involved in Controlling?
7. What are the key elements of Organisational Behavior? Explain?
8. Discuss the various determinants of Job Satisfaction?
9. Explain the term Brand Equity?
10. Explain Global Marketing?
11. Discuss on the limitations of financial accounting?
12. Explain the objectives for providing depreciation?

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. (a) Compare and contrast the works of Fayol and Taylor?

OR

(b)What are tha major advantages and disadvantages of informal organisations from the viewpoints of management and workers?

14. (a)Give a detailed account of the staffing process?

OR

(b) “Motivation is need based”. In the light of this observation, point out how Maslow's need hierarchy help management in initiating the motivational process?

15. (a)Define group cohesiveness? Explain the relationship between group cohesiveness and productivity?

OR

(b) What is team? What are the different types of team in an organization? Explain the process of team building?

16. (a)Explain the Complete life cycle of a product?

OR

(b)Discuss the various sales promotion tools?

17. (a)Explain the various accounting conventions and concepts?

OR

(b) What are the various subsidiary books in accounting? Explain the preparation of purchases day book and sales day book?

(5 x 10 = 50 marks)

INSTRUCTIONS TO QUESTION PAPER SETTER							
Semester : 2				**Course : MCA2C12 DACOMPUTER GRAPHICS**			
Section A				**Section B**			
Total no of questions	**Mark per question**	**No of questions to be answered**	**Time per question**	**Total no of questions**	**Mark per question**	**No of questions to be answered**	**Time per question**
12	3	10 10 x 3 = 30	5 to 8 minutes	5 either-or questions - each containing two parts - (a) and (b)	10 marks per each part 5 x 10 = 50	All five questions selecting one part from each question	20 to 25 minutes

UNIT WISE DITRIBUTION		
UNIT	**SECTION A**	**SECTION B**
1	3	1
2	3	1
3	2	1
4	2	1
5	2	1

Model Question

SECOND SEMESTER MCA DEGREE EXAMINATION

MCA2C12 COMPUTER GRAPHICS

Time: 3 Hrs **Max Marks: 80**

Section A

Answer any ten questions. Each question carries three marks.

1. Write any three significant features of OpenGL.
2. Give the basic principle of DDA algorithm.
3. What do you mean by fill Area Primitives? List any three with their functions.
4. List and explain any three line attributes.
5. Write a recursive algorithm for flood fill.
6. Draw block diagram for 2D viewing pipeline.
7. Give the 2D transformation matrices for Reflection and Shear.
8. Give the 3D composite transformation matrix.
9. Differentiate parallel and Perspective projections.
10. Explain the basic concepts in 3D line clipping.
11. Explain quadric and super quadric surfaces.
12. What is rendering?

(10 x 3 = 30 marks)

Section B

Answer all questions. Each question carries ten marks.

13. (a) i. Explain working of Raster Scan display. 3

ii. Write and explain Mid-point circle generating algorithm. 7

OR

(b) i. Obtain the points in a line with end points (10, 10) and (18, 6) using Bresenham's algorithm. 6

ii. Write a complete OpenGL program to display a circle within a square using OpenGL primitive functions.

14. (a) Write and explain Scan-Line Polygon filling algorithm.

OR

(b) i. Explain Window to viewport transformation. 3

ii. Write and explain Sutherland – Hodgeman Polygon filling algorithm. 7

15. (a) i. Given a triangle defined by A(10, 10), B(20, 10) and C(15, 20). Using composite matrix for general 2D rotation, find the new coordinates of A, B and C if the triangle is rotated about (15, 15) through $45^{o.}$. 6

ii. Write notes on Raster methods for 2D transformations. 4

OR

(b) i. Derive transformation matrix for general 3D rotation. 6

ii. Discuss transformation between 3D coordinate systems. 4

16. (a) Give a detailed account of orthogonal projections.

OR

(b) Give a detailed account of Perspective projections.

17. (a) i. Explain spline representation of 3D objects. 5

ii. Write and explain A-buffer method. 5

Or

(b) i. Discuss basic illumination models. 5

ii. Discuss basic Ray tracing algorithm. 5

(5 x 10 = 50 marks)