

Department of Computer Science & Applications

A

**Revised Syllabus of
MCA - (I to VI Semester)**



Session 2017-2018 and onwards
(Effective from July 2017)

**DR. HARISINGH GOUR VISHWAVIDYALAYA, SAGAR (M.P.)
(A Central University)**

(Approved by BoS on dated 06-03-2017)

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In view of letter no. DOAA/2017/171 dated 24-05-2017 and another letter no. DOAA/2017/179 dated 01-06-2017 and decision of Board of Studies the following shall be rules and regulations regarding conduct of academic activities of the teaching programme:

1. Name of the program : **Master of Computer Applications (MCA)**
2. Duration of the program : 3 Years
 - (a) Minimum duration : 3 Years
 - (b) Maximum duration : As per University Ordinance
3. Structure of the program:

MCA Credit Distribution

Semester	Core Course (CC) Credits	Elective Course (EC) Credits	Open Elective (OE) Credits	Skill Based Course (SE) Credits	Total Credits
I	20	--	--	03	23
II	20	--	02	03	25
III	24	--	02	02	28
IV	16	08	--	02	26
V	12 (old)	06 (old)	-	--	18 (old)
VI	27 (old)	-	--	--	27 (old)
TOTAL	119	14	04	10	147

4. The medium of instruction shall be English (during examination). However lectures may be in Hindi and English both.
5. The minimum 50% listed practicals must have to be completed by the student before appearing in the End Semester Examination.
6. Every student has to attain minimum of 75% of attendance in every course of the programme, failing to which the student will be debarred from appearing in the End Semester Examination. He/ She has to appear in the same in next year as a backlog student after re-registration. In exceptional circumstances (like health problem, NCC, NSS, Sports, youth festival, cultural activity participation etc.) the Dean/HoD may allow student to appear in the End Semester Examination at the 65% attendance in the course.
7. **Scheme of Examination:**
 - (a) Mid Semester Examination (ME) : 20 Marks
 - (b) Internal Assessment (IA) : 20 Marks
 - (c) End Semester Examination (ESE) : 60 Marks



8. Internal Assessment (IA) :

(a) Theory: Each theory course shall have the methodology of Internal Assessment using assignment, presentation, group discussion, etc. depending on the number of students in the class and feasibility of adopting a particular methodology. The distribution of marks for internal assessment shall be as follows.

- (i) Evaluation of the assignment,
Presentation, group discussion etc. : 15 marks
 - (ii) Attendance : 05 Marks
- The marks of attendance shall be awarded as follows:
- (i) 75 % and below : 00 Marks
 - (ii) > 75 % and upto 80 % : 01 Marks
 - (iii) >80 % and upto 85 % : 02 Marks
 - (iv) >85 % and upto 90 % : 03 Marks
 - (v) >90 % and upto 95 % : 04 Marks
 - (vi) >95 % : 05 Marks

Note : 8.1 A student shall be eligible to appear in the End Semester Examination only if he/she has appeared in Mid Semester Examination and in Internal Assessment both of the same semester. For backlog student the Mid Exam score and Internal Assessment score will be carry forwarded. However, a backlog student may appear afresh in mid exam and internal assessment both depending upon requirement. A teacher who assigned for backlog examination has to make all necessary arrangements for evaluation.

(b) Practical/ Lab Courses:

Evaluation of Practical/ Lab Courses shall be as follows:

- (i) Performing and getting the experiment
checked regularly and incorporating the
suggestions in the practical note book : 15 marks
 - (ii) Attendance : 05 marks
- The marks for attendance shall be as follows:
- (i) 75 % and below : 00 Marks
 - (ii) > 75 % and upto 80 % : 01 Marks
 - (iii) >80 % and upto 85 % : 02 Marks
 - (iv) >85 % and upto 90 % : 03 Marks
 - (v) >90 % and upto 95 % : 04 Marks
 - (vi) >95 % : 05 Marks

(c) End Semester Examination for Practical/ Lab Courses :

It will consist of 60 marks as follows:

- (a) Assessment of performance in the experiment : 50 Marks
- (b) Viva-Voce of Experiment : 10 Marks

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9. Evaluation of Projects:

The project will be assigned individually and a group of students will be monitored by teachers of the department. It will be based on periodic assessment of the progress of the project and End Semester Examining as follows:

- (i) First periodic assessment of the progress after 08 weeks : 20 Marks
- (ii) Second periodic assessment after 04 weeks : 20 Marks
- (iii) End Semester Examination will consisted of
 - a. Evaluation of the project report : 50 Marks
 - b. Viva – Voce of the project report : 10 Marks

10. Evaluation of Field-Work/ Out-station-Visit:

It will be evaluated as follows:

- (i) Performance in the Field-Work / Out-station -visit and aptitude : 40 Marks
- (ii) End Semester Examination :
 - a. Evaluation of the report on the Field Work : 50 Marks
 - b. Viva-Voce on the report : 10 Marks

11. Evaluation of Seminars:

- (1) Documentation for the seminar : 20 Marks
- (2) First presentation of the seminar : 20 Marks
- (3) End Semester Examination : 60 Marks

End Semester Examination will consist:

- (i) Presentation of the seminar : 50 Marks
- (ii) Defend of the presentation : 10 Marks

12. The credit and teaching hours shall be distributed as under:

Theory	1- Credit = 15 hours / per week 2- Credit = 30 hours / per week 3- Credit = 45 hours / per week 4- Credit = 60 hours / per week
Practical	1- Credit = 30 hours / per week 2- Credit = 60 hours / per week
Tutorial	1- Credit = 15 hours / per week

- 13. In practical courses students have to maintain a practical file which will be regularly evaluated and signed by the course Incharge/ coordinator.
- 14. The conflict raised, if any, shall be resolved in the meeting of Departmental council or through the guidelines issued by HoD.
- 15. A tutorial shall be an interactive session with students and mode of conduct of tutorial shall be decided by concerned teacher/ course-in-charge.
- 16. The out department paper shall be from department other than the parent department. MCA students will earn this credit from papers offered in other departments as per their choice. It is mandatory for Sem. II, III and V. Moreover, students enrolled in year 2016-17 in MCA programme will earned this credit in Sem. III, IV, V.

MCA - I Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-121	Information Technology	03	01	-	04	20	20	60	100
CSA-CC-122	Digital System Design	03	01	-	04	20	20	60	100
CSA-CC-123	Programming and Problem Solving using C	03	01	-	04	20	20	60	100
CSA-SE-124	Professional Communication	03	-	-	03	20	20	60	100
CSA-CC-125	Discrete Mathematics	03	01	-	04	20	20	60	100
Software laboratory (Practicals)									
CSA-CC-126	Software laboratory - A	-	-	04	02	20	20	60	100
CSA-CC-127	Software laboratory - B	-	-	04	02	20	20	60	100
Total Credits		15	04	08	23	-	-	-	700

MCA -II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-221	Computer Architecture	03	01	-	04	20	20	60	100
CSA-CC-222	Data Structure	03	01	-	04	20	20	60	100
CSA-CC-223	Object Oriented Programming using C++	03	01	-	04	20	20	60	100
CSA-CC-224	Operating System	03	01	-	04	20	20	60	100
CSA-SE- 225	Organization Behaviour	03	-	-	03	20	20	60	100
Software laboratory (Practicals)									
CSA-CC-226	Software laboratory - A	-	-	04	02	20	20	60	100
CSA-CC-227	Software laboratory - B	-	-	04	02	20	20	60	100
Out Department Paper									
Out Department	Out Department	-	-	-	02	20	20	60	100
Total Credits		15	04	08	25	-	-	-	800
Paper offered for other Department									
CSA-OE-221	Computer Education – I	02	-	-	02	20	20	60	100

C : Credit, L : Lecture, T : Tutorial, P : Practical, ME : Mid Exam., IA : Internal Assessment, ESE : End Semester Exam.

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MCA -III Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-321	Data Communication and Networking	03	01	-	04	20	20	60	100
CSA-CC-322	Database Management System	03	01	-	04	20	20	60	100
CSA-CC-323	Java Programming	03	01	-	04	20	20	60	100
CSA-CC-324	Design and Analysis of Algorithm	03	01	-	04	20	20	60	100
CSA-CC-325	Probability, Statistics and Combinatorics	03	01	-	04	20	20	60	100
Software laboratory (Practicals)									
CSA-CC-326	Software laboratory - A	-	-	04	02	20	20	60	100
CSA-CC-327	Software laboratory- B	-	-	04	02	20	20	60	100
Participation / Presentation/ Visit									
CSA-SE-328	Departmental Seminar Participation/ Poster Presentation /Group Discussion/training	-	-	-	02	20	20	60	100
Out Department Paper									
Out Department	Out Department Paper	-	-	-	02	20	20	60	100
Total Credits		15	05	08	28	20	20	-	900
Paper offered for other Departments									
CSA-OE-321	Computer Education – II	02	-	-	02	20	20	60	100

MCA -IV Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-421	Computer Graphics	03	01	-	04	20	20	60	100
CSA-CC-422	Software Engineering	03	01	-	04	20	20	60	100
CSA-CC-423	Unix Programming	03	01	-	04	20	20	60	100
Elective I (Opt Any One of Following)									
CSA-EC-421	Data Warehousing and Data Mining	03	01	-	04	20	20	60	100
CSA-EC-422	Artificial Intelligence	03	01	-	04	20	20	60	100
CSA-EC-423	Theory of Computation	03	01	-	04	20	20	60	100
CSA-EC-424	Decision Support System	03	01	-	04	20	20	60	100
Elective II (Opt Any One of Following)									
CSA-EC-425	Parallel Computing	03	01	-	04	20	20	60	100
CSA-EC-426	Simulation and Modeling	03	01	-	04	20	20	60	100
CSA-EC-427	Microprocessor	03	01	-	04	20	20	60	100
CSA-EC-428	Management Information System	03	01	-	04	20	20	60	100
Software laboratory (Practicals)									
CSA-CC-424	Software laboratory - A	-	-	04	02	20	20	60	100
CSA-CC-425	Software laboratory - B	-	-	04	02	20	20	60	100
Participation / Presentation/ Visit									
CSA-SE -426	Industrial Tour / Seminar Participation (Outside Department)/ Minor project/training	-	-	-	02	20	20	60	100
Total Credits		15	04	08	26	-		-	800

C : Credit, L : Lecture, T :Tutorial, P : Practical, ME : Mid Exam., IA : Internal Assessment, ESE : End Semester Exam.

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MCA -I SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-121	Information Technology	03	01	-	4	20	20	60	100

UNIT- I Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generations of computers, classification of computers on the basis of capacity, purpose, generation, Introduction to Number System.
(12 Hours)

UNIT -II Computer languages: Machine language, assembly language, higher level language. Software - system software, application software.
(12 Hours)

UNIT -III Operating system: Batch, multi-programming, time sharing, network operating system, on-line and real time operating system, Distributed operating system, multi-processor, Multi-tasking. Assembler: Elements of assembly language programming, a simple assembly scheme, pass structure of assembler, design of two pass assemblers, a single pass assemblers, Macro definition & Call.
(12 Hours)

UNIT- IV Compilers & Interpreters: aspects of compilation, memory allocation, interpreters, Linker & Loaders. Software Tools: Software tools for program development, editors, debug monitors, programming environment, user interfaces.
(12 Hours)

UNIT- V Computer Network and Communication: Network types, network topologies, network communication devices, physical communication media. Internet and its Applications: E-mail, TELNET, FTP, World Wide Web, Internet chatting. Introduction to E-Commerce: Meaning, its advantages & limitations, Types of E-Commerce Applications.
(12 Hours)

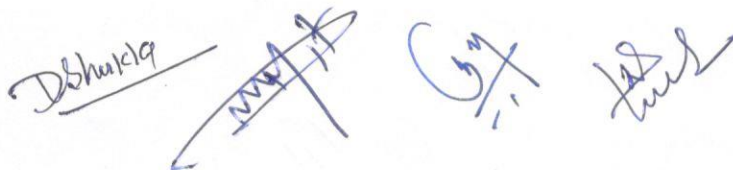
Essential Reading:

1. Rajaraman, "Fundamentals of Computers" (2nd Edi), PHI, New Delhi, 1996.
2. Petrick Norton, Fundamentals of Computers.
3. Dhamdhare M. "System Programming & O.S." (2nd Ed), TMH.

Suggested Reading:

1. Jain Satish, "Information Technology", BPB 1999.
 2. Ram B., "Computer Fundamentals", Wiley, 1997.
 3. Norton, Introduction to Computer, TMH.
 4. Katz, Excel 2010 : Made simple, AP Press.
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MCA -I SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-122	Digital System Design	03	01	-	04	20	20	60	100

- UNIT -I** Introduction to Digital Computer: Number System, 1's and 2's complement. BCD, De-Morgan's Theorem, Gray code, Duality Theorem, Boolean Algebra, Simplification using K-Map, (12 Hours)
- UNIT -II** Logic gates: NOT, AND, OR, NAND, NOR, XOR, XNOR. Implementation of basic gate using NAND and NOR, (12 Hours)
- UNIT -III** Combinational Circuits: Half Adder, Full Adder, Binary Adder and Subtracted. Decoder / Encoder, Multiplexer / De-multiplexer, (12 Hours)
- UNIT- IV** Sequential Circuits, Flip Flops - SR, D, JK, Master – Slave, Edge Triggered, Shift Registers (Any one type), Introduction to Counters: Synchronous as well as Asynchronous Counter (one example of Each) (12 Hours)
- UNIT- V** Memory System: Memory Hierarchy, Primary Memory – DRAM, SDRAM, DDR, DRAM. ROM, PROM, EPROM, EEPROM, Concepts of Auxiliary, Associative, Cache and Virtual Memory. (12 Hours)

Essential Reading:

1. Digital Computer Electronics by Morris Mano " Pearson Publication"
2. Fundamental of Computer, V. Rajaraman : (PHI).
3. Digital Principles and Applications 8th Edition, Leach, TMH.

Suggested Reading:

1. Logic in computer science : modelling and reasoning about systems, Huth, Cambridge University press.
 2. Subir Kumar, Foundation of Digital Electronics : (Pan Stanford) AM/ TB/882
 3. HUTH, Logic in computer Science : Modelling and reasoning a bout systems (Cambridge University Pres)
 4. Puri, Digital Electronics Circuit and Systems. TMH.
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MCA -I SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-123	Programming and Problem Solving using C	03	01	-	04	20	20	60	100

UNIT -I A Simple C program, basic data types operators like arithmetic, relational , logical , increment, decrement, conditional, bit-wise, assignment etc. Expressions, type conversions, conditional expressions.

(12 Hours)

UNIT -II Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, go to and labels.

(12 Hours)

UNIT -III Functions, basics, parameter passing (Call by Value ,Call by Reference) storage classes- extern, auto, register, static, Recursive functions, header files, Arrays- concepts, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays, address calculation in array.

(12 Hours)

UNIT -IV Pointers - concepts , initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers

(12 Hours)

UNIT -V File Handling in C, command line arguments. Structure, Union, Enumeration & type def Declaration and Initializing Structure, Accessing Structure members, Structure Assignments, Arrays of Structure, Passing Structure to function, C Pre-processor Directive, Macro Substitution, File Inclusion directive, Conditional Compilation.

(12 Hours)

Essential Reading:

1. Yashwant Kantikar , Let us C by BPB publication
2. E. Balaguruswami, Programming with C.TMH

Suggested Reading:

1. The 'C' Programming language, W. Kemighan : (Pearson Education India).
2. Programming with C, Third Edition, Gottfrid, TMH.
3. Saha, Basic Computation and Programming with C, Cambridge.

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MCA -I SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SE-124	Professional Communication	03	-	-	03	20	20	60	100

UNIT -I Self Development and Assessment: Self-Assessment, Self-Awareness, Perception and Attitudes, Values and Belief System, Personal Goal Setting, Career Planning, Building of Self-Confidence. **(9 Hours)**

UNIT -II Components of communication, Principles of communication barriers, listening skills Verbal Communication, Includes Planning, Preparation, Delivery, Feedback and Assessment of activities like Public speaking, Group Discussion, Oral Presentation skills. **(9 Hours)**

UNIT -III Written Communication: Technical Writing–Technical, Reports, Project Proposals, Brochures, Newsletters, Technical Articles, Technical Manuals, Official/Business, Correspondence: Business letters, Memos, Progress report, Minutes of meeting, Event reporting. **(9 Hours)**

UNIT -IV Ethics and Etiquettes: Business Ethics, Etiquettes in social as well as Office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics and ethics as an IT professional. **(9 Hours)**

UNIT -V Other Skills: Managing time, event management, Meditation, Improving Personal Memory, Study skills that include, Rapid reading, Notes taking, Complex problem solving. **(9 Hours)**

Essential Reading:

1. You Can Win – Shiv Khara – Macmillan Books – 2003 Revised Edition
2. Habits of Highly effective people – Stephen Covey
3. Business Communication? Asha Kaul

Suggested Reading:

1. Business Communication - M. Balasubramanyam
2. John Collin, "Perfect Presentation", Video Arts MARSHAL
3. Jenny Rogers "Effective Interviews", Video Arts MARSHAL
4. Raman Sharma, "Technical Communications", OXFORD
5. Sharon Gerson, Steven Gerson "Technical writing process and product".
6. Bovee Chatterjee, Business Communication today, Pearson Education.

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MCA -I SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-125	Discrete Mathematics	03	01	-	04	20	20	60	100

UNIT -I Set Theory : Introduction, Size of sets and cardinals, Subsets, Power sets, Complement, Union and Intersection, Demorgan's law, Ordered pairs and Set identities.
 Relations & Functions: Relations - Definition, Operations on relations, Composite relations, Properties of relations, Equality of relations, Partial order relation. Functions - Definition, Classification of functions, Operations on functions, Recursively defined functions.
 Notion of Proof: Introduction, Mathematical Induction, Strong Induction and Induction with Nonzero base cases.

(12 Hours)

UNIT- II Algebraic Structures: Definition, Properties, Types: Semi Groups, Monoid, Groups, Abelian Groups.
 Recurrence Relations: Introduction, Growth of functions, Recurrences from algorithms, Methods of solving recurrences.
 Combinatorics: fundamental counting principles, principle of inclusion and exclusion, pigeonhole principle, permutation and combination, Pascal's triangles.

(12 Hours)

UNIT -III Lattices: Introduction, Partial order sets, Combination of partial order sets, Hasse diagram, Introduction of lattices, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.
 Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra, Boolean functions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

(12 Hours)

UNIT -IV Propositional & Predicate Logic: Propositions, Truth tables, Tautology, Contradiction, Algebra of propositions, Theory of Inference and Natural Deduction. Theory of predicates, First order predicate, Predicate formulas, quantifiers, Inference theory of predicate logic.

(12 Hours)

UNIT -V Trees & Graphs: Trees - Definition, Binary trees, Binary tree traversal, Binary search trees. Graphs - Definition and terminology, Representation of graphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Multigraphs, Euler and Hamiltonian paths, Graph coloring.

(12 Hours)

Essential Reading:

1. K.H. Rosen, Discrete Mathematics and Its Applications, Tata McGraw Hill
2. J.P. Trembley & R.P. Manohar, Discrete Mathematical Structure with Appl to Computer Science. TMH

Suggested Reading:

1. Kenneth H. Rosen-203 Discrete Math & its Applications, 5th Ed.
2. C.L. Liu D. P. Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, TMH.

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MCA -I SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-126	Software laboratory - A	-	-	04	02	20	20	60	100

Programme based on C Language

(A) Basics/ Sequential program :

1. Write a C Program to Print Hello Word.
2. Write a C Program to Declaring Variable and Printing its Value.
3. Write a C Program to Calculate Area and Circumference of Circle.
4. Write a C Program to Calculate Area of Equilateral Triangle.
5. Write a C Program to Calculate Area of Right angle Triangle.
6. Write a C Program to Calculate Area of Circle.
7. Write a C Program to Calculate Area of Rectangle.
8. Write a C Program to Calculate Area of Square.
9. Write a C Program four digit number sum.
10. Write a C Program reverses of a given number.
11. Write a C Program to Find sum of two numbers
12. Write a C Program to Calculate sum of 5 subjects and find percentage
13. Write a C Program to Swap of two no's with using third variable
14. Write a C Program to Swap of two no's without using third variable.
15. Write a C Program to Swap of three no's with using third variable
16. Write a C Program to Swap of four no's with using third variable
17. Write a C Program to convert temperature from degree centigrade to Fahrenheit
18. Write a C Program to find gross salary.
19. Write a C Program to find distance in kilometre of given meter.

(B) Decision Making Statements Based on Programs

20. Write a C program to find given number is even or odd.
21. Write a C program to find given number is positive or negative.
22. Write a C program to find given number is equal or not.
23. Write a C program to find the largest of two numbers.
24. Write a C program to find the largest of three numbers.
25. Write a C program to find the smallest of two numbers.
26. Write a C program to find the smallest of three numbers.
27. Write a C program to checks whether it is a vowel or a consonant.
28. Write a C program to check whether a character is an alphabet or not.
29. Write a C program to find roots of quadratic equations with considered all cases.
30. Write a C program to find given year is leap year or not.

(C) Control Statements

31. Write a C program to find sum of first n natural number i.e.: $s=1+2+3+...+n$
32. Write a C program to find $sum=1+3+5+....$
33. Write a C program to find $sum=2+4+6..$
34. Write a C program to find $sum=1/1+1/2+1/3+...1/n$
35. Write a C program to find factorial of given number.
36. Write a C program to generate Fibonacci series of given limit.
37. Write a C program to find $sum=1/1!+1/2!+1/3!+.....1/n!$
38. Write a C program to find a reverse of a given number.
39. Write a C program to find power function a^b .

40. Write a C program to $\text{sum} = 1/2! + 1/4! + 1/6! + 1/8!$

(D) Recursion

41. Factorial

42. Reversing a string

43. Fibonacci Sequence

44. Tower of Hanoi

(E) Based on Array

45. Write a C program to create an array and display it.

46. Write a C program to find the total number of odd/even numbers in array.

47. Write a C program to find the sum of even or odd number in array.

48. Write a C program to swap a number in array.

49. Write a C program to reverse of an array.

50. Write a C program to find out maximum in array.

51. Write a C program to find out minimum in array.

52. Write a C program to search a key element in array.

53. Write a C program to arrange an array element either in increasing or decreasing.

54. Write a C program to create a matrix and display it.

55. Write a C program to find out the addition, subtraction, multiplication and division of two matrix.

56. Write a C program to find out the elements of diagonal of matrix.

57. Write a C program to find out the addition, subtraction, multiplication and division of diagonal of a matrix.

58. Write a C program to find maximum 4X3 array.

59. Write a C program to find maximum 3X4 array.

60. Write a C program to swap first element with last, second to second last and vice versa in 10X10 array.

61. Write a C program to 2D array of 7X5 which consist 0 and 1.

62. Write a C program to find total number of 0's and total number of 1's.

63. Write a C program to copy from one matrix A to another matrix B who's size 3X3.

64. Write a C program to transpose of given matrix 3X3.

(F) Based on String Manipulations

65. Counting number of vowels, consonants, words, white spaces in a string

66. Reversing a string and check for palindrome

67. Finding the number of occurrences of a sub string in a given string

68. Sub string replacing and removal

(G) Based on Pointer

69. Write a C program to swap two numbers by using call by value and call by reference.

70. Write a C program using call by reference to find area of circle and value would be display.

71. Write a C program to complete area of rectangle call by reference.

(H) Based on Structure

72. Program for Structures and Union

73. Program for Pointers

74. Program for Pointer with Structures

Any other as per teacher concern

Essential Reading:

1. Programming with C, Third Edition, Gottfried, TMH.

Approved by BoS on dated 06-03-2017

The bottom of the page features several handwritten signatures and initials in blue ink. From left to right, there is a signature that appears to be 'D. Shukla', followed by a signature that looks like 'Anurag', then a circular stamp or signature, and finally a signature that includes the number '13'.

MCA -I SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-127	Software laboratory - B	-	-	04	02	20	20	60	100

Practicals based on MS-OFFICE

MS-WORD

1. Text Manipulations and Text Formatting
2. Usage of Bookmarks, Footnotes, Columns & Hyperlink
3. Usage of Header, Footer, Bulleting and Numbering & Borders and Shading
4. Usage of Tables - Sorting & Formatting
5. Usage of Spell Check, Find and replace
6. Picture insertion and alignment
7. Creation of documents using templates
8. Mail Merge, Envelopes and Labels

MS-EXCEL

9. Cell Editing and Formatting
10. Usage of Formulae and Built-in functions
11. Data Sorting, filter, form, subtotal, validation, Goal seek
12. Inserting Clip arts, objects, pictures and Data Filter, Validation, Subtotals
13. Usage of auditing, comments
14. Graph
15. Usage of Auto Formatting, Conditional Formatting & Style

MS-POWER POINT

16. Inserting New slides, text box, object, charts, tables, pictures, movies and sound
17. Slide layout, Colour Scheme, Background and Design template
18. Preparation of organizational charts
19. Preset and custom animation, action buttons and settings, Slide Transitions and animations, view show, slide sorter view
20. Presentation using Wizards
21. Usage of Design templates

Any other as per teacher concern

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MCA -II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-221	Computer Architecture	03	01	-	04	20	20	60	100

UNIT -I Introduction: The VON NEUMANN model, the system Bus model, A Typical computer system. Data Representation: Binary numbers, binary codes, fixed point representation, floating point representation, error detection codes.

(12 Hours)

UNIT -II Computer Arithmetic: Introduction, addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operation, decimal arithmetic unit, and decimal arithmetic operations. Register Transfer and Micro operation: Register transfer language, register transfer, bus and memory transfer, arithmetic micro operations, logic micro operations, shift micro operations.

(12 Hours)

UNIT -III Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing & control, instruction cycle, memory reference instructions, input- output and interrupts, design of basic computer, design of accumulator logic. Micro programmed Control Unit: Control memory, address sequencing. Central Processing Unit: Introduction, general registers organization, stack organization, instruction formats, and addressing modes.

(12 Hours)

UNIT -IV Input-Output Organization: Peripheral devices, input – Output interface, asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input - output processor.

(12 Hours)

UNIT -V Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

(12 Hours)

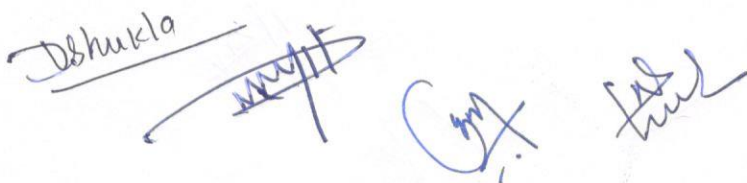
Essential Reading:

1. Mano ,M “Computer System and Architecture”, Pearson Education
2. Hayes.J.P, ”Computer Architecture and Organization”, McGraw Hill

Suggested Reading:

1. Linda Null, Essential of Computer Organization and Architecture, J&B.
 2. Essential of Computer Organization and Architecture, J&B.
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MCA II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-222	Data Structure	03	01	-	04	20	20	60	100

UNIT -I Abstract Data Types (ADT), Asymptotic Notations, Time and space complexity of algorithms, Elementary data structures and their applications, Abstract Data Types, Elementary data structures and their applications, Array Definition, Single and Multidimensional Arrays, application of arrays, String Operation. Sparse Matrices, Lower and Upper Triangular matrices,

(12 Hours)

UNIT -II Singly Linked Lists – Circular Linked Lists – Doubly Linked Lists – linked List in Array, Polynomial representation and addition. Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Operations Associated with Stacks.

(12 Hours)

UNIT -III Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queue, Deque and Priority Queue.

(12 Hours)

UNIT -IV Trees – Binary Trees – Binary Tree Traversals – Binary Tree Representations – Binary Search Trees – Threaded binary Trees – Application of Trees– Binary Search Tree (BST), Insertion and Deletion in BST, AVL Trees.

(12 Hours)

UNIT V Graph: Introduction, Graph Representation, Adjacency Matrix, Adjacency List, Graph Traversals, Depth First Search, Breadth First Search, Applications of Graph. Linear & Binary search, Hash table and Hashing. Sorting: Bubble sort, Insertion sort, Selection sort, Quick sort, Shell sort, Merge sort.

(12 Hours)

Essential Reading:

1. Data Structure using C by Tanbaum, Pearson Publication
2. Kruse, Data Structure and Programming Design in C, Pearson Education.

Suggested Reading:

1. Data structure and program design in C by R.L. Krus, PHI New Delhi
2. Data Structure Algorithms and applications JAVA, (Orient Blackwan) Silicon Press,
3. Main, Data Structures and other Objects using C++, 4th Edition, Pearson Education.

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MCA - II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-223	Object Oriented Programming using C++	03	01	-	04	20	20	60	100

UNIT -I Object-Oriented Programming Concepts: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming—Concept of streams, hierarchy of console stream classes, input/output. Function different types of function.

(12 Hours)

UNIT -II Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifies and static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes.

(12 Hours)

UNIT -III Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures Constructors and Destructors

(12 Hours)

UNIT- IV Overloading operators, rules for overloading operators, overloading of various operators, type conversion.. Introduction inheritance, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, order of execution of constructors and destructors, Concept of binding-early binding and late binding virtual functions, pure virtual functions, abstract classes, virtual destructors.

(12 Hours)

UNIT- V Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, re-throwing an exception, specifying exceptions Template concepts, Function templates, class templates.

(12 Hours)

Essential Reading:

1. E. Balaguruswamy, "Objected Oriented Programming with C++", TMH.
2. D . Parsons, "Object Oriented Programming with C++", BPB Publication.
3. R. Lafore, "Object Oriented Programming using C++", Galgotia Publication

Suggested Reading:

1. Budd, "Classic Data Structure in C++" Addison Wesley
2. Khateeb, Thampi, Computer Programming in C++, Pearson Education.
3. Chip Weams, Programming and Problem Solving with C++ (Jones & Bartlett Learning).
4. Dale, C++ Plus Data Structures, 5 Editions, JBI.
5. Horowitz, Sahni , Computer Algorithms/ C++ (Orient black soil)

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MCA- II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-224	Operating System	03	01	-	04	20	20	60	100

UNIT -I Introduction to Operating System: Operating System: Introduction, Objectives and functions. Evolution of Operating System, Process Description and control: process definition, process states, two state & five state process model, process creation & termination, CPU Scheduling : Types of scheduling, scheduling and performance criteria, scheduling algorithm.

(12 Hours)

UNIT- II Memory Management: Memory partitioning, paging, segmentation, virtual memory. Concurrency and Synchronization: Interposes communication and synchronization. Principles of concurrency, Mutual exclusion: Software approaches, hardware support, semaphores.

(12 Hours)

UNIT -III Deadlock & starvation: Principles of deadlock, deadlock prevention, deadlock avoidance, deadlock detection and recovery, starvation. Input/ Output Management: Principles of I/O hardware: I/O devices, I/O modules, I/O communication Techniques. Principles of I/O software: Goals, Interrupt handlers, device drivers.

(12 Hours)

UNIT -IV File Management: File system, file organization, file directories, file sharing, Record blocking, Error handling.

(12 Hours)

UNIT -V Distributed operating system: Motivation, Types of distributed system, Network structure, Network topology, and Distributed file system: Naming and transparency, Remote file access, Stateful versus stateless service.

(12 Hours)

Essential Reading:

1. William Stallings: "Operating System", PHI
2. Silberschatz and Galvin: "Operating System Concept", Addison Wesley

Suggested Reading:

1. Tanenbaum, A.S., "Modern Operating Systems", Prentice Hall of India Pvt. Ltd.
2. Tanenbaum, Distributed Operating System, Pearson Education India.

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MCA -II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SE- 225	Organization Behaviour	03	-	-	03	20	20	60	100

UNIT -I Introduction to organizational behaviour: The challenges facing management approach to organizational behaviour. Management -functions of a management, Management Roles, Management Skills, Foundation of Individual Behaviour-Ability, Biographical characteristics and Learning.

(9 Hours)

UNIT- II Organization: Organization structure, Common organizational design, New design options, authority and responsibility, centralization and decentralization, work design and technology – requisite task attribute theory, Job characteristic model, social information process model. Conflict – source and types of conflicts in organization, conflict management. Negotiation – Bargaining policies, Negotiation process.

(9 Hours)

UNIT- III Motivation : primary and secondary motives, Maslow's theory of motivation, Hertzberg's two factor theory, Adam's equality theory, McGregor's theory X and theory Y. McClelland's theory, leadership– it's theories and skills, Contemporary issues in leadership, trust and leaders.

(9 Hours)

UNIT -IV Job satisfaction: Measuring job satisfaction, outcome of job satisfaction, with respect to productivity, turnover, absenteeism, etc.

(9 Hours)

UNIT -V Job Enrichment: Job rotation, MBO techniques, Human resource policies and practices – Training and development programme, Types of training & Training methods. Introduction of Communication Process and it's benefits.

(9 Hours)

Essential Reading:

1. Robbins Stephen P., 'Organizational Behavior' 10th Edition, Mc Graw Hill.
2. Luthans Fred, 'Organizational Behavior',
3. Weihrich Koont, 'Principal of Management' Mc Graw Hill.

Suggested Reading:

1. Franklin Terry, 'Principal of Management', AITBS, New Delhi.
2. Obrian, Management Information System,
3. Ashok Arora, Management Information System, (Excel).
4. Chandan, Organizational Behaviour, Vikas Publication.

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MCA - II Semester

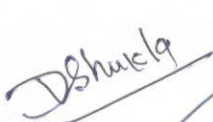
Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-226	Software laboratory - A	-	-	04	02	20	20	60	100

Based on C++ Language

1. C++ program to check whether a number is not a perfect number or not
2. C++ program to print all perfect numbers in given max range
3. Perfect numbers in given range by C++ program
4. C++ program to test or check an Armstrong number
5. C++ program to test or check an Armstrong number using for loop
6. Print all Armstrong numbers less than 500
7. Print all Armstrong numbers in given range by c++ program
8. Check given number is prime number or not using c++ program
9. Print all prime numbers from 1 to 100 using c++ program
10. C++ program to find all prime numbers in given max range
11. Program to find prime in given ranges number in c++
12. Code for sum of prime numbers in c++
13. C ++ code of sum of prime in given range
14. Write a c++ program to whether check given number is strong number or not
15. Find strong in given range using c++ program
16. C++ program to check given number is odd or even
17. C++ program to print all odd numbers in given range
18. C++ code to print all odd and even numbers in given range
19. C++ code to get sum of all odd numbers in given range
20. Check the given number is palindrome number or not by c++ program
21. Test palindrome number in c++ using for loop
22. How to test a number is palindrome or not in c++ using function
23. Palindrome numbers in given range by c++

Any other as per teacher concern

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MCA -II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-227	Software laboratory - B	-	-	04	02	20	20	60	100

Programme based on Data Structure using C++

1. Stack and their operation using Array
2. Queues and their operation using array
3. Circular Queue and De-Queue and their operation
4. Linked List and their operations
5. Doubly Link list and their operation
6. Linear, Binary and Hash Searching
7. Insertion, Selection, Bubble, Quick and merge Sorting
8. Heap and Bucket Sorting
9. Creating on Simple tree and Binary Search Tree
10. Binary tree Traversal [inorder, preorder, postorder]
11. Creating on Simple Graph and Multi Graph
12. Graph Traversal [breadth first, depth first]
13. Polynomial addition using linked list
14. Conversion of Infix to Prefix and Postfix Expressions and Evaluation
15. Various Program for Tree and Graph Application

Any other as per teacher concern

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MCA -II Semester

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
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CSA-OE-221	Computer Education – I	02	-	-	02	20	20	60	100

UNIT – I Generations of Computer, Block Diagram of a Computer, Applications of Computers, Advantages and Disadvantage of Computer, CPU, Keyboard, mouse, joystick, track ball, light pen, Data Scanning devices image scanner, OCR, OMR, MICR, Bar code reader, card reader, Voice Recognition Device.

(6 hours)

UNIT- II Monitor, Printer laser pointer, dot matrix printer, ink jet printer, Memory hierarchy, Cache Memory, Primary Memory RAM, DRAM and SRAM, ROM, Secondary Memories.

(6 hours)

UNIT - III Application Software, System Software, Communication Software, Application Software, Programming Language Translators, Assembler, Compiler, Interpreter, Utility Programs, Computer Languages, Machine language, Assembly language, High level language.

(6 hours)

UNIT - IV Number System: Decimal Number System, Binary Number System, Octal Number System and Hexadecimal Number System and their conversions.

(6 hours)

UNIT - V First compliment & Second Compliment Logic Gates- AND, OR, NOT, Universal Logic Gates- NOR, NAND.

(6 hours)

Essential Reading:

1. Computer Fundamentals, Forth Edition by P.K. Sinha and Priti Sinha
2. Computer Fundamentals Architecture and Organization, Third Edition by B. Ram.

Suggested Reading:

1. Digital Principle and Applications, Six Edition by Donald P Leach, Albert Paul Malvino and Goutam Saha
2. Fundamentals of Computers, Fourth Edition by V. Raja Raman

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MCA - III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-321	Data Communication and Networking	03	01	-	04	20	20	60	100

- UNIT -I** Introduction to Data Communication and Networking: Uses of Computer Networks, Network Hardware, Network Software Internet Reference Models (OSI and TCP/IP) Physical Layer: Basis for Data Communication, Guided Transmission Media , Wireless Transmission Medium, Circuit Switching and Telephone Network, High Speed Digital Access Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Data Link Control and Protocols, Example Data Link Protocol Medium Access Layer: Channel Allocation Problem, Multiple Access, CSMA, CSMA/CD, CSMA/CA
(12 Hours)
- UNIT -II** Local Area Network: Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN, Blue tooth, Connecting devices:-Repeaters, Hub, Bridges, Switch, Router, Gateways, Virtual LAN, Example Networks: X.25, Frame Relay, ATM, ISDN.
(12 Hours)
- UNIT -III** Network Layer: Network Layer Design Issues, Routing Algorithms (Optimality principle, Static Routing Algorithms, Shortest Path, Flooding, Dynamic routing Algorithms, Distance Vector, Link State routing.), Congestion control Algorithms (Principles, Policies, Algorithms), Quality of Service (Requirements, Techniques, Integrated Services & Differentiated Services), Network Layer Protocols (IP Addressing , CIDR & NAT, IP layer protocols (ICMP, ARP, RARP, DHCP, BOOTP), IPv6)
(12 Hours)
- UNIT -IV** Transport layer: Transport Layer Service, Elements of Transport protocols, Internet protocols (UDP and TCP). Application Layer: DNS- Domain Name System, Electronic Mail, World Wide Web, Multimedia (Audio Compression, Streaming Audio, Voice over IP, Video Compression, Video on Demand)
(12 Hours)
- UNIT -V** Network Security: Cryptography, Symmetric key Algorithms (DES, AES), Public key Algorithms-RSA, Digital Signatures, Firewall
(12 Hours)

Essential Reading:

1. Tananbaum A.S., "Computer Networks", 3rd Ed, PHI, 1999.
2. Stallong W, "Data & Computer Communications", 8th Edition, PHI
3. B. Forouzan, "Data Communication and Networking", First Edition, 1999, Tata McGraw Hill.

Suggested Reading:

1. Cryptography and network Security, 3rd Edi. , Foroyzan (TMH).
2. Kurose, "Computer Networking 6 Edition, A Top down approach", Pearson.
3. Dye, "Network Fundamental" CCNA Exploration", Pearson.
4. Cisco, "CCNA Exploration, Wan Accessing the Wan", Pearson
5. Jan Garba, "An Introduction to Network Programming with JAVA", JAVA 7 Compliant.

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MCA -III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-322	Database Management System	03	01	-	04	20	20	60	100

- UNIT- I** Basic concepts: database & database users, characteristics of the database, database systems, concepts and architecture, data models, schemas & instances, DBMS architecture & data independence, database languages & interfaces, data modelling using the entity-relationship approach. **(12 Hours)**
- UNIT- II** Relational data Model & Algebra: Basics of the Relational Model-From E/R Diagrams to Relational Designs. Relational data base design, function dependencies & normalization for relational databases: functional dependencies, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition Relational Algebra: Relational Operations-Extended Operators of Relational Algebra-Constraints on Relations **(12 Hours)**
- UNIT- III** SQL : Simple Queries in SQL-Sub queries-Full-Relation Operations - Database Modifications Defining a Relation Schema-View Definitions- Constraints and Triggers: Keys and Foreign Keys-Constraints on Attributes and Tuples Modification of Constraints-Schema-Level Constraints and Triggers. **(12 Hours)**
- UNIT -IV** Index Structures: Indexes on Sequential Files-Secondary Indexes-B-Trees-Hash Tables-Bitmap Indexes. Query Execution: Physical-Query-Plan Operators-One-Pass, two-pass & index based Algorithms, Buffer Management, Parallel Algorithms Estimating the Cost of Operations-Cost-Based Plan Selection -Order for Joins-Physical- Query Plan. **(12 Hours)**
- UNIT -V** Concurrency control & recovery techniques: concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, Recovery techniques: recovery concepts, database backup and recovery from catastrophic failures. **(12 Hours)**

Essential Reading:

1. Elmsari and Navathe, "Fundamentals of database systems", Pearson Education
2. C. J. Date, An Introduction to Database System, Vol. 1, Norasa Publishing House

Suggested Reading:

1. Desai, B., "An introduction to database concepts", Galgotia publications

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MCA -III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-323	Java Programming	03	01	-	04	20	20	60	100

UNIT- I Overview and characteristics of Java, Java program Compilation and Execution Process Organization of the Java Virtual Machine , JVM as an interpreter and emulator, Instruction Set, class File Format, Verification, Class Area, Java Stack, Heap, Garbage Collection, Security Promises of the JVM, Security Architecture and Security Policy, Class loaders.

(12 Hours)

UNIT -II Java Fundamentals, Data Types & Literals Variables, Wrapper Classes, Arrays ,Arithmetic Operators, Logical Operators , Control of Flow , Classes and Instances , Class Member Modifiers Anonymous Inner Class Interfaces and Abstract Classes , inheritance , throw and throws clauses , user defined Exceptions ,The String Buffer Class tokenizer, applets, Life cycle of applet.

(12 Hours)

UNIT -III Threads: Creating Threads , Thread Priority ,Blocked States , Extending Thread Class , Runnable Interface , Starting Threads ,Thread Synchronization , Synchronize Threads , Sync Code Block , Overriding Synced Methods , Thread Communication , wait , notify and notify all.

(12 Hours)

UNIT -IV AWT Components , Component Class, Container Class, Layout Manager Interface Default Layouts, Insets and Dimensions, Border Layout, Flow Layout, Grid Layout, Card Layout Grid Bag Layout AWT Events, Event Models, Listeners, Class Listener, Adapters, Action Event Methods Focus Event Key Event, Mouse Events, Window Event

(12 Hours)

UNIT- V Input/ Output Stream , Stream Filters, Buffered Streams ,Data input and Output Stream, Print Stream Random Access File, JDBC, Database connectivity with Oracle, Object serialization, Sockets, development of client Server applications, design of multithreaded server, Remote Method invocation.

(12 Hours)

Essential Reading:

1. Bill Verrens, Inside the Java Virtual Machine, Tata McGraw Hill
2. Herbert Scheldt, The complete reference Java, Seventh Edition, Tata McGraw Hill
3. Sierra and Bates, Head First Java, O'Reilly
4. Herbert Schildt Java2 (The Complete reference) Fourth Edition TMH, Fifth Reprint Chapters 2,3,4,5,6,7,8,9,10,11,12,13,17,19,20,21,22)
5. R Lafore "Object Oriented Programming": Pearson

Suggested Reading:

1. Horstmann Cay, Big Java , Wiley –India
2. Horstmann, "CORE JAVA" Pearson Education
3. Deitel, Java "How to Program (Early Objects) Pearson Education India.
4. Jan. Grave, "An Introduction to Network Programming with JAVA" JAVA 7 Compatible.
5. E. Balaguruswami "OOps using Java"-TMH

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MCA –III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
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CSA-CC-324	Design and Analysis of Algorithm	03	01	-	04	20	20	60	100

- UNIT -I** Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences and their solution methods: substitution method, iteration method and master method (including proof).
Sorting Techniques: Sorting in polynomial Time (Insertion sort, Merge sort, Heap sort, and Quick sort), Sorting in Linear Time (Counting sort, Radix Sort, Bucket Sort, Medians and order statistics)
(12 Hours)
- UNIT –II** Advanced Data Structure: Balanced Search Tree, AVL Tree, Red Black Tree, Augmenting Data Structure, Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets, All kinds of Algorithms on these data structures, Dictionaries and priority Queues, mergeable heaps, concatenable queues
(12 Hours)
- UNIT –III** Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree - Kruskal's Algorithms, Prim's Algorithms, Shortest Path Algorithm - Kruskal's Algorithm, Dijkstra's and Bellman Ford Algorithm.
(12 Hours)
- UNIT –IV** Dynamic Programming paradigm, Warshall's and Floyd's Algorithm, Optimal Binary Search trees, Matrix multiplication Problem, 0/1 Knapsack Problem, maximum network flow problem, naïve string matching algorithm, Rabin-Karp Algorithm
(12 Hours)
- UNIT –V** Backtracking, n-Queen's Problem, Hamiltonian Circuit problem, Subset-Sum problem, Branch and bound, Assignment problem, Traveling salesman problem.
NP - completeness: Informal concepts of deterministic and nondeterministic algorithms, P and NP, NP-completeness, statement of Cook's theorem, some standard NP-complete problems.
(12 Hours)

Essential Reading:

1. Jon Kleinberg and Eva Tardos, Algorithm Design, Pearson Edition, 2006.
2. "Algorithms" Sanjoy Dasgupta, Christos Papadimitriou Umesh Vazirani TMH

Suggested Reading:

1. "Introduction to Algorithms", T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, PHI
2. Aho, Design and Analysis of Computer Algorithm, PEI.
3. Basse, Computer Algorithm, Introduction to Design and Analysis, Pearson.

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MCA –III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-325	Probability, Statistics and Combinatorics	03	01	-	04	20	20	60	100

UNIT –I Sample Space, Events, probability axioms, Law of addition of Probability, Law of Multiplication of Probability. Joint probability, conditional probability, Bayes rule
(12 Hours)

UNIT- II Random Variables: Discrete and Continuous, Probability Mass function, Probability Density Functions, Expectation.
(12 Hours)

UNIT –III Basic Statistics :_Measure of central tendencies, measures of dispersion , Theory of least square and Line fitting, correlation Coefficient, Rank Correlation and its coefficient, Linear Regression.
(12 Hours)

UNIT –IV Permutation and Combination: Distinct & non-distinct object. Generating functions for combinations
(12 Hours)

UNIT –V Enumerators for permutations, Distribution of distinct objects. Problem solving on distribution .
(12 Hours)

Essential Reading:

1. Ross, S., “A first course in probability”, Collier Macmillan, New Your, 1976.
2. Lili, C. L., “Introduction to combinatorial Mathematics”, McGraw Hill, 1996.
3. Hogg, R. V. Et., Al., “Introduction to Mathematical statistics”, American Pub., N York

Suggested Reading:

1. Ross, S, An Introduction to Probability Models, Academic Press.
2. Chapra, Numerical Methods for Engineer, TMH.
3. Jones, Gareth, Elementary Number Theory, Jones, Springer.
4. Conte, Elementary Numerical Analysis and Algorithmic Approach, TMH.
5. Buraldi, Introductory Combinatorics, Pearsonn.

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MCA –III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-326	Software laboratory – A	-	-	04	02	20	20	60	100

Programme Based on SQL

1. SQL Command for DDL and DML
2. Working With Primary, Foreign key, Unique Key, Alternate Key and other Key
3. Working with Integrity Constraints, Data Constraints, Column and table level Constraints
4. Working with Predefine Function
5. Apply various operations on Table like Manipulation Data, Grouping Data From Tables etc.
6. Working with All Type of SQL Joining
7. Working with View
8. Working with Indexes
9. Show the Concept of Normalization
10. Working with Nested Query and Sub Query
11. Programming With PL/SQL
12. Working with Cursor
13. Working With Different type of Triggers
14. Working with Backup & Recovery Process
15. Working With Security & Authorization in SQL

Any other as per teacher concern

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MCA –III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
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CSA-CC-327	Software laboratory - B	-	-	04	02	20	20	60	100

Programme Based on Java Language

1. Write common Programs using Java like Factorial, Reversing a string, Fibonacci sequence, Prime Number, Armstrong number etc.
2. Working With Lopping and Branching Concept
3. Working with Inner and Outer Class
4. Program Based on All Type of Inheritance
5. Apply Various Access protection Method in inheritance in Difference Way
6. Handling on Exception
7. Creating on Own Exception and Package
8. Working With all Constructors and Destructor in Simple class and inheritance
9. Working With Interface, Abstract and Final Class
10. Program Based on Threads Model (life cycle, Synchronization and messaging, Inter thread communication, Priority etc.)
11. Program Based on Applets
12. Program Based on Vector and Wrapper Class
13. Working with Frames/Panel and various controls & Events
14. Working With Stream
15. Working With JDBC

Any other as per teacher concern

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MCA –III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SE-328	Departmental Seminar Participation/ Poster Presentation /Group Discussion /training	-	-	-	2	20	20	60	100

This is activity & participation based course:

Note:

- (i) Students have to participate in Seminar/ Poster Presentation/Group Discussion/ training program and record their attendance to the course- coordinator.
- (ii) Course coordinator will arrange the activities for ME, IA, ESE.
- (iii) A summary of academic content of activity and a copy of certificate obtained will have to be submitted by students to the course coordinator for mid-term & internal evaluation (time to time) and same to the End Sem. Exam.
- (iv) There may participation by students in three different (or some similar) activities relating to exam., assessment and evaluation.
- (v) There will be individual participation of students in each activity.

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MCA -III SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-OE-321	Computer Education – II	02	-	-	02	20	20	60	100

UNIT – I Introduction of Computer Networks: Characteristics of a Computer Network, Benefits of Networks, Types of Computer Networks, Network Cables, Network Topologies.

(6 hours)

UNIT- II Operating System: Introduction, Functions of Operating System, Type of OS, basic scheduling FIFO, Round Robin.

(6 hours)

UNIT - III Programming Language: Introduction of C, data types, operators, statements Input & Output statements, control statements, simple programming using C.

(6 hours)

UNIT - IV Cyber Crime: Types of Cyber Crime, Hackers, Intrusion, Virus, Denial of Service (DOS Attack), Network Security, crime detection and control.

(6 hours)

UNIT - V DBMS: Introduction keys and creation tables, File System, Database security, Database architecture and updation, Basic SQL Query, DDL, DML, DCL.

(6 hours)

Essential Reading:

1. Computer Fundamentals, Forth Edition by P.K. Sinha and Priti Sinha
2. Digital Principle and Applications, Six Editions by Donald P Leach, Albert Paul Malvino and Goutam Saha.
3. Fundamentals of Computers, Fourth Edition by V. Raja Raman.
4. DataBase System Concept, Fifth Edition, by Abraham Silberschatz and S. Sudarshan, Mc Graw Hill.

Suggested Reading:

1. Computer Fundamentals Architecture and Organization, Third Edition by B. Ram.
2. Fundamentals of Database Systems, Fifth Edition by Ramez Elmasri and Shamkant B. Navathe.

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						M E	IA		
CSA-CC-421	Computer Graphics	03	01	-	04	20	20	60	100

- UNIT -I** Introduction to Computer Graphics, Types of refresh graphics displays, Interactive devices, CRT. Raster scan graphics : Video basics, Scan conversion. **(12 Hours)**
- UNIT -II** Line drawing algorithms: Digital Differential Analyzer, Bresenham's algorithm. Polygon filling, edge fill algorithm, seed fill algorithm **(12 Hours)**
- UNIT-III** Polygon Meshes in 3D, curves, cubic & surfaces, Solid modeling Geometric Transformation: 2D, 3D transformations, window to view port transformations, acromatic and color models. Graphics Hardware: Hardcopy & display techniques, Input devices, image scanners **(12 Hours)**
- UNIT -IV** Shading Tech: Transparency, Shadows, Object reflection, Gouraud & Phong shading techniques. Visible surface determination techniques for visible line determination, **(12 Hours)**
- UNIT -V** Z-buffer algorithm, scan line algorithm, algorithm for oct-trees, algorithm for curve surfaces, visible surfaces ray-tracing, recursive ray tracing **(12 Hours)**

Essential Reading:

1. Foley et. al., "Computer Graphics Principles & practice", AWL
2. Rogers, D. F. "Procedural Elements for computer graphics" . McGraw Hill, 2008

Suggested Reading:

- 1, Hearon, D. and Baker,M. "Computer Graphics" PHI, 2008

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-422	Software Engineering	03	01	-	04	20	20	60	100

UNIT -I Software Crisis, Software Processes, Software life cycle models: Waterfall, Prototype, Evolutionary and Spiral models, Overview of Quality Standards like ISO 9001, SEI-CMM Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics. Cost estimation, static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk management.

(12 Hours)

UNIT -II Software Requirement Analysis and Specifications: Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioral and non-behavioral requirements, Software Prototyping.

(12 Hours)

UNIT -III Cohesion & Coupling, Classification of Cohesiveness& Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.

(12 Hours)

UNIT -IV Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calendar time Component, Reliability Allocation. Software process, Functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing,

(12 Hours)

UNIT -V Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards, Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.

(12 Hours)

Essential Reading:

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 3rd ed., McGraw Hill Int. Ed., 1992.
2. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2001.
3. Pankaj Jalote, Software Engineering a prices Engineering, Veiled India.

Suggested Reading:

1. Leach, Introduction to software Engineering.
2. Pendrycz, software Engineering An Engineering Approach, Wiley India.
3. Yogesh Singh, Software Testing, (Cambridge University Press).

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-423	Unix Programming	03	01	-	04	20	20	60	100

- UNIT -I** Unix Operating System – Features of Unix, kernel structure: kernel, shell and file system, Files and directories structure, shell, directories and file names, file permissions, basic commands of Unix, Introduction of Unix Editors. (12 Hours)
- UNIT -II** Advance command handling : mail , lp ur, tr, crypt, cut, split, paste, cmp, comm, diff, head, tail, chmod, chown, sort, kill, etc., command line structures, creating new commands. (12 Hours)
- UNIT -III** I/O redirection Pipes and Filters, grep family, stream editor(sed), pattern scanning and processing language awk. (12 Hours)
- UNIT -IV** Shell Programming- Shell scripts, The Bourne, Korn and C shell, Shell variables and shell scripts, meta characters and environment variables, arguments and parameters, Conditional statements and loops of both shells. (12 Hours)
- UNIT -V** Introduction of UNIX system calls: Types of systems calls, Input output, processes, signals and interrupts. Device management etc. related system calls and their uses (12 Hours)

Essential Reading:

1. R Morgan & McGilton, "Introducing Unix systems-v", McGraw Hill International.
2. M. G. Venkateshmurthy, "Unix and Shell programming", Pearson Education.

Suggested Reading:

1. Y. Kanitker, "Unix Shell Programming", BPB.
2. Maurice Bach, "The design of the Unix Operating System", PHI

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						M E	IA		
CSA-EC-421	Data Warehousing and Data Mining	03	01	-	04	20	20	60	100

- UNIT -I** The Compelling Need for data warehousing: Escalating Need for strategic information, failures of Past decision-support systems, operational versus decision-support systems, data warehousing – the only viable solution, data warehouse defined Data warehouse
(12 Hours)
- UNIT- II** The building Blocks: Defining Features, data warehouses and data marts, overview of the components, metadata in the data warehouse Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope and content
(12 Hours)
- UNIT -III** Principles of dimensional modeling: Objectives, From Requirements to data design, the STAR schema, STAR Schema Keys, Advantages of the STAR Schema Dimensional Modeling: Updates to the Dimension tables, miscellaneous dimensions, the snowflake schema, aggregate fact tables, families of STARS
(12 Hours)
- UNIT- IV** OLAP in the Data Warehouse: Demand for Online analytical processing, need for multidimensional analysis, fast access and powerful calculations, limitations of other analysis methods, OLAP is the answer, OLAP definitions and rules, OLAP characteristics, major features and functions, general features, dimensional analysis,
(12 Hours)
- UNIT -V** Data Mining Basics: What is Data Mining, Data Mining Defined, The knowledge discovery process, OLAP versus data mining, data mining and the data warehouse, Major Data Mining Techniques, Cluster detection, decision trees, memory-based reasoning, link analysis, neural networks, genetic algorithms, moving into data mining, Data Mining Applications, Benefits of data mining.
(12 Hours)

Essential Reading:

1. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2003.
2. Sam Anahony, "Data Warehousing in the real world: A practical guide for building decision support systems", John Wiley, 2004

Suggested Reading:

1. Kamber and Han, "Data Mining Concepts and Techniques", Hartcourt India P. Ltd., 2001
2. Principles of Data Mining, Handa : (Pearson Education India).

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						M E	IA		
CSA-EC-422	Artificial Intelligence	03	01	-	04	20	20	60	100

UNIT -I Scope of AI-Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction. Problem solving-State space search; Production systems,
(12 Hours)

UNIT- II Search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis
(12 Hours)

UNIT -III Knowledge Representation Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning: conflict resolution, backward reasoning: use of no backtrack. Structured Knowledge Representation: Semantic Nets: slots, exceptions and default frames, conceptual dependency, scripts.
(12 Hours)

UNIT -IV Handling uncertainty-Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic. Learning-Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.
(12 Hours)

UNIT -V Expert Systems-Need and justification for expert systems, knowledge acquisition, Case studies: MYCIN, RI.
(12 Hours)

Essential Reading:

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. N.J. Nilsson, "Principles of AI", Narosa Publ. House, 1990
3. Introduction of Artificial Intelligence and Expert Systems. D. W. Patterson.

Suggested Reading:

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. Nils J. Nilsson, Artificial Intelligence a new synthesis, Elsevier
3. Norvig, Artificial Intelligence, Pearson Education.

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-EC-423	Theory of Computation	03	01	-	04	20	20	60	100

- UNIT- I** Alphabets, Strings and Languages; Automata and Grammars, Finite Automata (FA), Deterministic finite Automata (DFA)-Formal Definition, State transition diagram, Transition table, Language of DFA, Nondeterministic finite Automata (NFA), Equivalence between two FSM's, Limitations of FSM, Application of finite automata, (12 Hours)
- UNIT -II** Finite Automata with output- Moore & Melay Machine. Regular expression (RE), Definition, Operators of regular expression and their precedence, Algebraic laws for Regular expressions, (12 Hours)
- UNIT -III** Regular expression to FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages. Context free grammar (CFG) and Context Free Languages (CFL): Definition, Examples, Derivation, Derivation trees, Ambiguity in Grammar, Inherent ambiguity, Ambiguous to Unambiguous CFG, Useless symbols, Simplification of CFGs, Normal forms for CFGs: CNF and GNF. (12 Hours)
- UNIT -IV** Push Down Automata (PDA): Description and definition, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, (12 Hours)
- UNIT- V** Basic model, definition and representation, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions (12 Hours)

Essential Reading:

1. "Introduction to Automata Theory Language and Computation", Hopcroft H.E. and Ullman J. D., Pearson Education.
2. "Theory of Computer Science", Automata Languages and computation", K.L.P.Mishra and Chandrashekar, 2nd edition, PHI.
3. System Software (Che adap), Beck (Pearson Education India).

Suggested Reading:

1. Compiler Design, Chattopadhyaya Santanu (PHI Learning Pvt. Ltd.).
2. Compiler Design in C, Alleh Holub : (Pearson Education India).
3. An Introduction to formal languages and automata, 6 Edition, Peter Linz.

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-EC-424	Decision Support System	03	01	-	04	20	20	60	100

- UNIT - I** Introduction to the concept of Decision Support System: Definition Need for Computerized DSS and support technology characteristics and capabilities of DSS. Components of DSS: Data management subsystem, Model Management Sub system knowledge management subsystem, User interface subsystem classification of DSS.
(12 Hours)
- UNIT- II** DSS development Strategies: Development process, DSS technology levels & tools Algeria's. & Hemistich: Tube search, genetic Algeria's simulation.
(12 Hours)
- UNIT -III** Introduction to artificial neural network, (NLP) Natural Language Processing and its applications.
(12 Hours)
- UNIT -IV** Introduction to data warehousing & Data mining: Data visualization & multi dimensionality. An overview of GDSS (Group Decision Support System) and Decision Conferencing.
(12 Hours)
- UNIT - V** Introduction to Expert System and its Applications in Management. Introduction to GIS & Concept of virtual reality. Executive Information System (EIS), Expert System: Basic Concept structure and working.
(12 Hours)

Essential Reading:

1. Bennis, J.L.: "Building Decision Support System" Addison Wesley Pub., Comp, 1983.
2. Sprague, R.H. & Watson, HJ (Edu.): "Decision Support System, Putting Theory and Practices" Prentice Hall, New Jersey, 1986.

Suggested Reading:

1. Keen, P.G.W. & Morton, M, S, S.: "Decision Support System: An organizational Perspective", Addison Wesley Pub.
2. David: "Applied Decision Support System", PHI, 1989.

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-EC-425	Parallel Computing	03	01	-	04	20	20	60	100

- UNIT- I** Concept, need and requirement, generalized structure of parallel computer, classification of parallel computer, various concepts in pipelining, Architecture: Vector processor, message passing and shared memory multiprocessors, **(12 Hours)**
- UNIT- II** types of parallelism: data, temporal. Conditions of parallelism, Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Program flow mechanisms **(12 Hours)**
- UNIT- III** Data flow approach. Elementary Algorithms: Matrix manipulation, Graph connectivity and traversal, Tree traversal, Sorting and searching on PRAM. **(12 Hours)**
- UNIT- IV** Complexity of Parallel algorithms: Various processor interconnection schemes: mesh, hypercube, perfect shuffle etc., High Performance Computing approach for complex problems: problems in Computational Geometry, Permutations and Combinations, Fourier transforms, traversing combinational spaces, Decision and Optimization. **(12 Hours)**
- UNIT- V** Task Scheduling: DAG, Priority of task, Homogenous and heterogeneous scheduling different scheduling algorithms. **(12 Hours)**

Essential Reading:

1. Ratan Ghosh, Rajat Moona, Phalguni Gupta, "Foundation of Parallel Processing" NAROSA.
2. V. Rajaraman "Elements of Parallel Computing" PHI.

Suggested Reading:

1. Selim Akl, "The Design and Analysis of Parallel Algorithms", PHI.
2. M.R.Bhujade, "Parallel Computing", New Age International Publications.
3. Kai Hwang, "Advanced computer architecture"; TMH

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-EC-426	Simulation and Modeling	03	01	-	04	20	20	60	100

UNIT -I System Models - Continuous and discrete models - Static and Dynamic Models - Principles used in modelling - system studies - system analysis - design and postulation

(12 Hours)

UNIT -II System simulation: Types of Models, Techniques of simulation - Monte Carlo Method - Comparison of analysis and simulation – Types of system - Simulation Numerical

(12 Hours)

UNIT -III Computation for simulation - Applications of digital analog and hybrid computers in continuous system simulation - Real time simulation.

(12 Hours)

UNIT -IV Exponential growth models, exponential decay models – Logistic curves -Generation of growth models - system models- system dynamic diagrams

(12 Hours)

UNIT- V Discrete system Simulation : Discrete events - Generation of arrival patterns - Simulation of telephone systems - Simulation languages - GPSS programming General description - simscript programs, simscript system concept.

(12 Hours)

Essential Reading:

1. Banks, J, Carson S and Nilson B L, "Discrete Event System Simulation "PHI
2. Deo N "System simulation with digital computers" PHI
3. Law A M and Kelton W D "Simulation Modeling and analysis" Mc Graw Hill

Suggested Reading:

1. Geoffrey Gordon., System simulation –, Prentice Hall of India Pvt. Ltd.1999.
2. Maryanski F., Digital Computer Simulation , CBS Distributors.
3. Simulation Modeling and Analysis (Averillm Law) : TMH.

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						M E	IA		
CSA-EC-427	Microprocessor	03	01	-	04	20	20	60	100

- UNIT -I** History of Microprocessor, 8085 Microprocessor architecture, buses, register, flags. 8085 pin configuration & function of each pin. Fetch, Decode and execute operations. Op-code Fetch, execute cycle, T state, Machine cycle. Memory and I/O read and write cycles WAIT state, interrupt timing diagram. Addressing modes of 8085. Data transfer, Arithmetic, Logical, Rotate, Branch and machine control instructions. **(12 Hours)**
- UNIT -II** Development of 8085 assembly language programs, time delays. Concept of stack and Instruction related to stack. 8085 interrupts, RST, RIM, SIM instructions. Subroutines and conditional call instruction **(12 Hours)**
- UNIT- III** Memory mapped I/o and I/O mapped I/O. Address decoding, interfacing of memory chips with 8085. Interfacing of input/output chips with 8085. Block diagram, Pin description and Interfacing of 8255(PPI) with 8085 Microprocessor. Interfacing of keyboard, display, **(12 Hours)**
- UNIT -IV** ADC and DAC to 8255. Block diagram, Pin description and Interfacing of 8253(PIT) with 8085 Microprocessor. **(12 Hours)**
- UNIT -V** 8086 Microprocessor architecture, Addressing Modes, 8086 pin configuration & function of each pin. 8086 maximum mode/minimum mode, Introduction and advance features of 8088, 80186, 80286, 80386 and 80486 microprocessor. **(12 Hours)**

Essential Reading:

1. Microprocessor 8085 and its Interfacing, By Sunil Mathur, Second Edition, PHI Learning Pvt. Ltd.
2. Microprocessor Architecture, Programming, and Applications with the 8085 –Ramesh S. Gaonkar Pub: Penram International.

Suggested Reading:

1. 8085 Microprocessor And its Applications, By A. Nagoor Kani, Third Edition, TMH Education Pvt. Ltd.

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-EC-428	Management Information System	03	01	-	04	20	20	60	100

UNIT-I Management Information System : The General Management System, Control systems, MIS Planning, MIS Design and Development, Components of MIS, Open Systems v/s Closed Systems.

(12 Hours)

UNIT -II Open Loop Control System v/s Closed Loop Control System, Information and Decision, MIS v/s EDP Systems, Role and Importance of MIS, MIS Organization, Stages of Growth of MIS, Management Control Systems.

(12 Hours)

UNIT -III Definition of Office Automation, Need for Office Automation, Office Functions Needed to be Automated Office Automation Systems, Document Management Systems, Advantage of Office Automation, Disadvantages of Office Automation.

(12 Hours)

UNIT-IV Information Resource Management, Business Processes v/s Information Systems, Information Systems for Management, Transaction Processing System, Management Report System, Office Information System, Operational Control and Research Systems, Decision Support Systems, Knowledge Based Systems.

(12 Hours)

UNIT-V Information System as a System, software Development Life Cycle (SDLC) Systems Analyst, Case Scenario, Feasibility Study, Systems Analysis (Requirement Analysis), Data Flow Diagram, Data Dictionary, Process Description, Software Requirement Specifications (SRS).

(12 Hours)

Essential Reading:

1. Ashok Arora, Akshaya Bhatia, "Information Systems for Managers", 1st Edi. Excel Books.
2. Kenneth C. Handan, Java P Landan, "Management Information System", 8 Edi. Prentice Hall.
3. Murdick R. G., Ross J. E. & Claggiest J. R., "Information System for Modern Management" PHI, 1997.

Suggested Reading:

1. James A. O. Brien, "Management Information System" Golgotha, Publication, 1999.
2. Locus, "Analysis, Design and Implementation of information System", 3rd Edi. McGraw Hill.
3. Anderson Lavid, "Management Information System", Tata McGraw Hill, 1999.

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MCA -IV SEMESTER

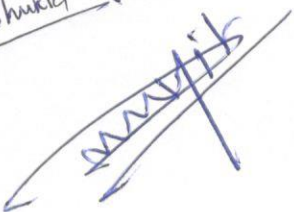
Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-CC-424	Software laboratory - A	-	-	04	02	20	20	60	100

Practical based on Computer Graphics

1. Drawing on a Line using DDA and Bresenham's Algorithm
2. Drawing on a Circle using Bresenham's Midpoint Algorithm
3. Drawing on a Ellipse using midpoint ellipse drawing Algorithm
4. Drawing on a Rectangle and Polygon in simple way
5. Implementation on edge fill algorithm.
6. Implementation on seed fill algorithm
7. Implementation on Scan-line Polygon Fill Algorithm
8. Implementation on 2D Transformation
9. Implementation on 3D Transformation
10. Working with Colour Model
11. Drawing on a Bezier curves
12. Drawing on B-Spline curves
13. Implementation on Cohen-Sutherland-Hodgeman Polygon clipping Algorithm
14. Implementation on Z-buffer algorithm
15. Implementation on Morphing

Any other as per teacher concern

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MCA -IV SEMESTER

Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						M E	IA		
CSA-CC-425	Software laboratory - B	-	-	04	02	20	20	60	100

Practical based on Unix Programming

1. Commands for Files and Directories related
2. Command for Disk related
3. Command for Mathematical related
4. Command for Background and Foreground Process Management
5. Working with vi & vim Editor
6. Commands for I/O redirection Pipes and Filters
7. Commands for Printing
8. Commands for Networking
9. Commands for User Management
10. Commands for Group Management
11. Creating on Shell and Environment Variable
12. Programming with conditional and looping statements
13. Commands for Backup and restore process
14. Working with KDE & Gnome graphical interfaces.
15. Commands for Device Related

Any other as per teacher concern

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MCA -IV SEMESTER

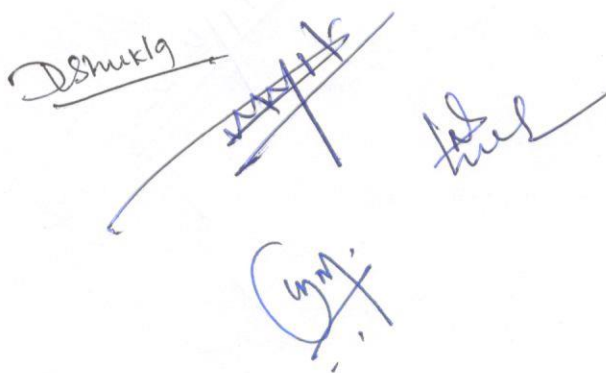
Course Code	Course Title	L	T	P	C	Sessional		ESE	Total
						ME	IA		
CSA-SE -426	Industrial Tour / Seminar Participation (Outside Department)/ Minor project/training	-	-	-	02	20	20	60	100

This is activity & participation based course:

Note:

- (i) Students have to participate in Seminar/ Poster Presentation/ Group Discussion/ Training program and record their attendance to the course- coordinator.
- (ii) Course coordinator will arrange the activities for ME, IA, ESE.
- (iii) A summary of academic content of activity and a copy of certificate obtained will have to be submitted by students to the course coordinator for mid-term & internal evaluation (time to time) and same to the End Sem. Exam.
- (iv) There may participation by students in three different (or some similar) activities relating to exam., assessment and evaluation.
- (v) There will be individual participation of students in each activity.

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MCA -V Semester

Code	Title	L	T	P	Credit	Sessional	End	End
CSA-C-521	Systems Programming	3	-	-	03	40	60	100
CSA-C-522	Object Oriented Programming And Design with UML	3	-	-	03	40	60	100
CSA-C-523	UNIX and Shell Programming	3	-	-	03	40	60	100
	Elective I (any one of following)	3	-	-	03			
CSA-E-524	Distributed Systems					40	60	100
CSA-E-525	AI and Expert System					40	60	100
CSA-E-526	Multimedia and Web Technology					40	60	100
	Elective II (any one of following)	3	-	-	03			
CSA-E-527	Bio-Informatics					40	60	100
CSA-E-528	Data Mining					40	60	100
CSA-E-529	Mobile Computing					40	60	100
	Software laboratory (Practicals)							
CSA-CC-530	Software Laboratory V (a)	-	-	04	02	40	60	100
CSA-CC-531	Software Laboratory V (b)	-	-	02	01	40	60	100
		15	3	06	18			700

MCA - VI Semester

Major Project based on Industrial Training

Code	Title	L	T	P	Credit	Sessional	End	Total
CSA-C-621	Major Project (External) based on Industrial Training	-	-	-	06	120	180	300
CSA-C-622	Comprehensive Viva-Voce based on project	-	-	-	15	80	120	200
CSA-C-623	Seminar on project - topic/others	-	-	-	06	80	120	200
	TOTAL	-	-	-	27	--	--	700

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MCA – V SEMESTER

CSA-C-521	Systems Programming	3	-	-	03	40	60	100
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UNIT- I Systems Programming – What is systems programming, Difference between systems programming and application programming. System software and machine architecture. Traditional (CISC) machines- VAX architecture, Pentium Pro architecture, RIC machine – ultra SPARK, Power PC, Cray architecture.

UNIT - II Assemblers–Basic assembler functions–machine dependent assembler features– machine independent assembler features – assembler design options – one pass assembler, multi pass assembler – assembler implementation – MASM, SPARC assemblers, Loaders and Linkers basic loader functions, machine dependent loader features, machine independent loader featured, loader design options-linkage editors, dynamic linkage editors, dynamic linking, bootstrap loaders, examples-DOS linker

UNIT- III Macro processors – basic macro processor functions – machine dependent and machine independent macro processor architectures – design options – implementation examples – MASM, ANSI C macro processor.

Compiler – Basic compiler functions – Grammar Lexical Analysis, symmetric Analysis, code generation machine dependent and independent compiler features – intermediate form of the programme, machine dependent code optimization, structured variables, machine independent code optimization, storage allocation, block structured languages, compiler design options.

Reading Material:

1. Leland L. Beck, “System Software – An Introduction to system programming”, Addison Wesley.
 2. John J. Donovan., “Systems Programming”, TMH 1995.
 3. Dhamdhare, D. M., “Operation Systems and Systems Programming”, TMH.
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MCA – V SEMESTER

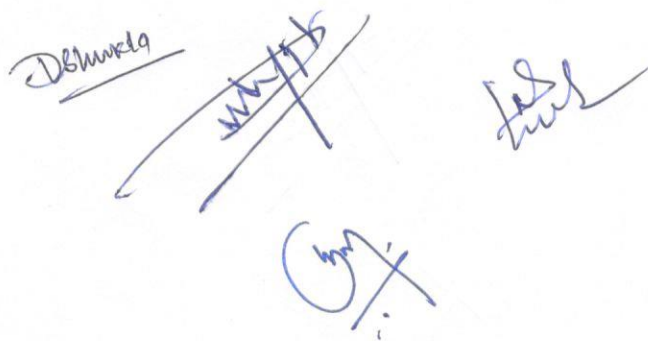
CSA-C-522	Object Oriented Programming And Design with UML	3	-	-	03	40	60	100
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- UNIT-I** Introduction: Two views of software Development: SSAD and OOAD, Why Object – Orientation? , Benefits of OO Modeling.
The Object Paradigm: Object and Classes, Abstraction and Encapsulation, Method and Message, Interface and Polymorphism, Access Control.
- UNIT- II** The Object Modeling: Links and Associations, Generalization and Specialization, Aggregation and Composition, Association, Cardinality, Navigability Icons, Relationship and adornments.
- UNIT-III** Introduction to UML: Overview, Conceptual Model of the UML, Architecture, Software Development Life Cycle.
Structural Diagrams: Class, Object, Component, Deployment, Package.
Behavioral Diagrams: Use Case, Sequence, Activity, State Transaction.
Implementation OO Language: Introduction, Abbreviated ATM Model, Implementing Structure, Implementing Functionality.

Reading Material:

1. Grady Booch, Benjamin / Cummings, “Object Oriented Analysis and Design with Applications”, Pearson Education.
 2. J. Rumbaugh, M Blaha, W. Premerlani, “Object Oriented Modeling and Design” PHI.
 3. Grade Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”. Pearson Education.
 4. Grade Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language Reference Guide”, Pearson Education.
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Approved by BoS on dated 06-03-2017

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MCA – V SEMESTER

CSA-C-523	UNIX and Shell Programming	3	-	-	03	40	60	100
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- UNIT - I** Unix Operating System – Features of Unix, kernel structure: kernel, shell and file system, Files and directories structure, shell, directories and file names, file permissions, basic commands of Unix, Introduction of Unix Editors.
- UNIT - II** Advance command handling : mail , lp ur, tr, crypt, cut, split, paste, cmp, comm, diff, head, tail, chmod, chown, sort, kill, etc., command line structures, creating new commands, I/O redirection Pipes and Filters, grep family, stream editor(sed), pattern scanning and processing language awk.
- UNIT- III** Shell Programming- Shell scripts, The Bourne, Korn and C shell, Shell variables and shell scripts, meta characters and environment variables, arguments and parameters, Conditional statements and loops of both shells.
Introduction of UNIX system calls: Types of systems calls, Input output, processes, signals and interrupts. Device management etc. related system calls and their uses.

Reading Material:

1. R Morgan & McGilton, "Introducing Unix systems-v", McGraw Hill International.
 2. M. G. Venkateshmurthy, "Unix and shell programming", Pearson Education.
 3. Y. Kanitker, "Unix Shell Programming", BPB.
 4. Maurice Bach, "The design of the Unix Operating System", PHI
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**MCA – V SEMESTER
(Elective –I)**

CSA-E-524	Distributed Systems	3	-	-	03	40	60	100
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UNIT -I Introduction to Distributed Systems : Goals of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.

UNIT-II Process and synchronization in Distributed Systems: Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.

Consistency, Replication, fault tolerance and security : Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

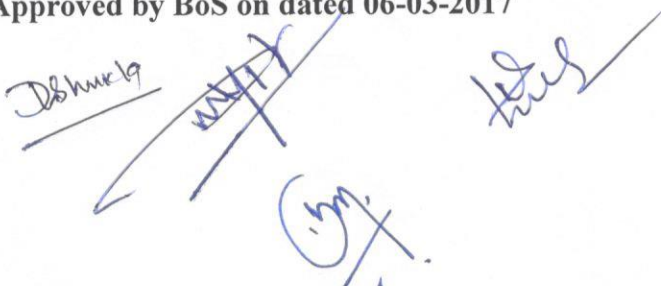
UNIT-III Distributed Object Based and File Systems: CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, sun network file system.

Distributed shared memory: DSM servers, shared memory consistency model, distributed document based systems: the world wide web, distributed co-ordination based systems: JINI

Reading Material:

1. Andrew S. Tanenbaum, Marten Van Steen, “Distributed Systems Principles and Paradigms”, Pearson Education.
 2. George Coullos, “Distribute System: Design and Concepts”, Pearson Education.
 3. Harry Singh, “Progressing to Distribute Multiprocessing”, PHI.
 4. B.W. Lampson, “Distributed Systems Architecture Design & Implementation”, Springer.
 5. Parker Y. Verjies J. P., “Distributed Computing Systems Synchronization Control & Communications”, PHI.
 6. Robert J. & Thieranf, “Distributed Processing Systems”, PHI.
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MCA – V SEMESTER
(Elective –I)

CSA-E-525	AI and Expert System	3	-	-	03	40	60	100
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- UNIT-I** General Issues and Overview of AI: The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays.
- UNIT-II** Problem Solving, Search and Control Strategies: General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search.
Heuristic Search Techniques: Hill climbing, branch and bound technique, best first search & A* algorithm, problem reduction & AO* algorithm, constraint satisfaction problems.
Knowledge Representations: First order predicate calculus, resolution principle & unification Planning: Overview an example domain the block word, component of planning systems, goal stacks planning.
- UNIT-III** Expert Systems: Introduction to expert system and application of expert systems, various expert system shells, knowledge acquisition, case studies, MYCIN. Learning: Rote learning, learning by induction, explanation based learning.

Reading Material:

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", TMH.
 2. Eugene Charnick, "Artificial Intelligence", Pearson.
 3. Dan. W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI.
 4. Nils J. Nilson, "Principles of Artificial Intelligence", Narosa Pub.
 5. Clocksin & C. S. Melish, "Programming in PROLOG", Narosa Pub.
 6. M. Sasikumar, S. Ramani etc., "Rule based Expert System", Narosa Pub.
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MCA – V SEMESTER
(Elective –I)

CSA-E-526	Multimedia and Web Technology	3	-	-	03	40	60	100
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UNIT –I Internet, Growth of Internet, Owners of internet, Anatomy of Internet. APRANET and Internet history of World Wide Web. Evolution of WWW, Basic features, WWW Browser, WWW Servers, HTTP, Universal Resource Locator, Search Engines and their Categories, Searching Criterion, WWW and Hypertext. Basics of Browsers, Electronic Mail, FTP, Telnet, and Internet Relay chat.

UNIT-II **Internet Technology and Protocols;** Internet protocols, TCP/IP and its format TCP/IP based packages SLIP, PPP Network and Network Devices: Network Architecture, Ethernet, FDDI and ATM. Addressing in Internet: DNS, Domain Name and their Organization, Understanding the Internet protocol Address. Client Server concepts, their architecture and application. Getting Connected – Items needed to connect.

Web Publishing: Overview, web hosting, Document interchange Standards, Component of web publishing, Document Management, Web Page Design Consideration and Principles, How to register a web page on search engine, Publishing Tools.

HTML: Anatomy of HTML document, versions of html, elements of html syntax, head & body sections, building html documents insertion texts, images, hyperlinks, backgrounds and color controls , different, html tags, table: table layout and presentation , use of font size & attributes, list types and its tags.

UNIT- III JavaScript overview, JavaScript and the www, JavaScript vs. VB script, JavaScript vs. java, JavaScript versions, script element, inline JavaScript, including JavaScript. Functions: functions introduction, calling functions. Java script comments: comments overview, when to comment, types of comments Variables: variables overview, declaring variables, types of variables, casting variables, alert box. Expressions: arithmetic operators, assignment operators, logical operators, expressions and precedence. Statements: if statement, for statement, while statement, break/continue.

Reading Material:

1. Alexix Leon and Mathews Leon, "Internet for everyone", Vikas Pub.
 2. Mansoor Alam, "Internet and Web design", Pragya Pub.
 3. V.K. Jain, "O-Level module – M 1.2 Internet & web page designing", BPB Pub.
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MCA – V SEMESTER
(Elective –II)

CSA-E-527	Bio-Informatics	3	-	-	03	40	60	100
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UNIT-I Bio-informatics an overview: Introduction, Objectives of bio-informatics, Kind of data used, information molecules, basic structure of nucleic acids, DNA, RNA, DNA sequencing and polymerase chain reaction (PCR) protein structure functions, protein folding and characterization

UNIT-II Biological databases: Introduction, types of databases, nucleotide and protein sequence databases. Major bio-informatics databases, introduction to bio-statistics, data integration date analysis, operating system (LINUX, UNIX) HTML, XML, CML. BSML

Sequence analysis, models for sequence analysis, methods for alignments (dot matrices) methods for optical alignment (gap penalties and scoring matrices tools for sequence alignment- Fasta, BLAST, PSI- BLAST, Mukltiple sequence alignment (MSA) - tools and applications, Phylogenetic analysis, phylogentic trees, distance matrix, (MD) and character based method, methods of phylogenetic evaluation, gene prediction methods, gene prediction tools, gene mapping tools, gene mapping, DNA sequencing algorithm for alignment of sequencing fragments, DNA micro arrays.

UNIT-III Proteomics: Proteome analysis, tools for proteome analysis, different structural proteins, protein classification, methods of structure prediction (known folds and unknown folds). Protein function prediction, metabolic pathways, gene networks their properties and analysis.

Reading Material:

1. Attwood, "Introduction to Bio-informatics", Pearson Education.
 2. David W Mount, "Bioinformatics - sequence and Genome analysis".
 3. S. C. Rastoge, "Bioinformatics - concepts skills and applications", PHI.
 4. Irfan K Khan, "Recent advances in Bioinformatics".
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MCA – V SEMESTER

(Elective –II)

CSA-E-528	Data Mining	3	-	-	03	40	60	100
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UNIT - I **Introduction :** Data mining introduction, Data mining verses query tools, Data mining in marketing, Practical applications of data mining, Architectures of data mining system, Designing Graphical user interface based on a data mining query language.

Measuring Data Mining effectiveness: Accuracy, speed and cost, Embedding data mining into your business process.

UNIT - II Mining Spatial Database: Spatial Data Cube Construction and Spatial OLAP, Spatial Association Analysis, spatial Clustering Methods, spatial Classification and Trend Analysis, Mining Raster Databases.

Mining Multimedia Databases: Similarity search in Multimedia Data, Multidimensional Analysis of multimedia Data, classification and prediction Analysis of multimedia Data, Mining associations in multimedia data.

Mining Time-series and sequence Data: Trend Analysis, Similarity search in time series analysis, Sequential pattern mining, periodicity analysis.

Mining Text Database: Text data analysis and information retrieval, text mining : Keyword – based Association and document classification.

Mining the world wide web: Mining the web link structure, Automatic Classification of web documents, construction of a multilayered web Information Base, Web Usage Mining.

UNIT - III Decision Trees: Definition, Where to use decision trees, The General Idea, How the Decision Tree work, Strengths and weakness.

Neural Networks: Definition, Where to use Neural Networks, The general Idea, how the Neural Networks Works, strengths and weaknesses.

Reading Material:

1. Jiawei Han and Micheline Kamber, “Data mining: Concept and Techniques”, Elsevier.
 2. Alex Berson and Stephen J. Smith, “Data warehousing, data mining & OLAP”, TMH.
 3. Pieter Adriaan’s and Dolf Zantinge, “Data mining”, Pearson Education.
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MCA – V SEMESTER

(Elective –II)

CSA-E-529	Mobile Computing	3	-	-	03	40	60	100
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UNIT- I Overview of OSI Model : Significance of layered Model , PDUs, SDUs, IDUs, Higher layer Protocols. Switching and Components, Introduction, Applications, history, of wired & wireless Communication systems. Radio Transmission: frequencies, signal propagation, antenna, types of modulation, FHSS, DSSS. Multiple Access technology for Wireless Communication: FDMA, TDMA, CDMA. **Cellular System:** Introduction, types.

UNIT-II Mobile Data Communication: Cellular Telephony, Structure, Fading, Small scale fading, Multi-path Fading, Speech Coding, Error Coding and Correction, Hand off Management, Switching and authentication, MTSS interconnections, frequency hopping, frequency reuse. Circuit Switched Data Services & Packet Switched Data Services on Cellular Networks, Personal Communication Systems (PCS) Architecture, Digital Enhanced Cordless Telecommunications (DECT,) Personal Access Comm. System (PACS).

Digital Cellular Systems and Standards: GSM System overview, Architecture, GSM Protocol Model, GSM Mobility Management, SMS security aspects. Broadcast System overview. General Packet Service (GRPS) Architecture, GRPS Network, Interfaces and Procedures (2.5G), 3G

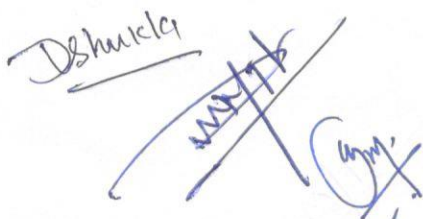
Mobile Services: UMTS and International Mobile Tele-communications (IMT-2000), W-CDMA and CDMA 2000, Quality of service in 3G .

UNIT- III WLAN : Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, IEEE 802.11 Standards , Protocols for WLAN, MACA, MACAW, Infrared technology. Wireless Application Protocol (WAP) model, architecture, Gateway, WAP protocols and WML. Introduction to Bluetooth technology. Wireless in Local Loop (WLL) architecture, products. Satellite as a switch, Components of VSAT system, VSAT topologies, access schemes.

Reading Material :

1. Jochen Schiller, "Mobile Communication", Pearson Education.
2. Yi –Bing Lin and Imrich Chlamtac, "Wireless and Mobile Network Architectures", Wiley India.
3. Raj Pandaya, "Mobile and Personal Communication System & Services".
4. Uwe Hansmann, Lothar Merk, "Principles of Mobile Computing", Wiley India.

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MCA – V SEMESTER

CSA-C-530	Software Laboratory V (a)	-	-	04	02	40	60	100
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Practical based on Elective - I

(A) DISTRIBUTED SYSTEM:

1. How many ways to server are connect to a client?
2. Explain the Bully and Ring Algorithm.
3. Write the procedure of recovery and security.
4. What is the distributed file system and explain its type?
5. Describe the following:
 - (a) CORBA
 - (b) COM
 - (c) DSM Servers

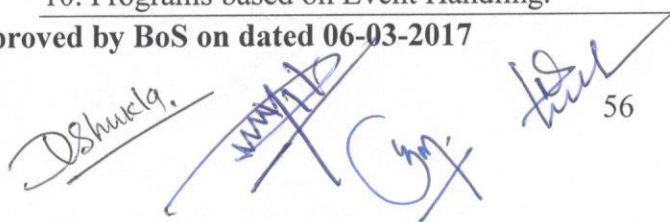
(B) AI AND EXPERT SYSTEM:

1. What is knowledge? With the help of block diagram, explain the different components of knowledge based system?
2. What is AI technique? Explain different AI techniques.
3. Explain the difference between data knowledge belief and hypothesis?
4. Explain the characteristics of AI problem with example?
5. Discuss and compare hill climbing and best first search technique?
6. Write and explain AO* algorithm?
7. Consider 8-puzzle problem. Construct state space for above mentioned problem. Draw state space diagram. Write some rules for performing. Search in defined state space.
8. Explain A* algorithm?
9. What is learning? Draw and explain the block diagram of general learning model?
10. With the help of block diagram explain the components of a typical expert system.

(C) MULTIMEDIA AND WEB TECHNOLOGY:

1. Create Web Page and apply some block level tags, text level tags
2. Create Web Page and apply background color, text color, horizontal rules and special characters.
3. Create Web Page and include ordered list, unordered list, definite list and Nested list.
4. Create Web Page and include links to
 - a. Local page in same folder.
 - b. Page in different folder
 - c. Page on the Web
 - d. Specific location within document
5. Create Web Page and include images with different alignment and wrapped text
6. Create tables and format tables using basic table tags and different attributes.
7. Create a frameset that divides browser window into horizontal and vertical framesets.
8. Create Web Page and apply style rules.
9. Create Web Page including control structures using JavaScript.
10. Programs based on Event Handling.

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MCA – V SEMESTER

CSA-C-531	Software Laboratory V (b)	-	-	02	01	40	60	100
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Practical based on Elective - II

(A) MOBILE COMPUTING:

- Q.1 What are the basic differences between wirelesses WANS and WLANS and what are the common features?
Consider mode of operation, administration, frequencies, capabilities of nodes, services, national /International regulations.
- Q.2 Name reasons for the development of wireless ATM and find the Institutions, companies, and organizations behind the standardization efforts. What is one of the main differences to internet technologies from this point of view?
- Q.3 What type of support for mobility and wireless access is needed in the fixed network? Show the influences of mobility support on the user and control plane respectively?
- Q.4 Name the requirements for a mobile IP and justify them. Does mobile IP fulfill them all?
- Q.5 Compare the different types of transmission errors that can occur in wireless and wired networks. What additional role does mobility play?

(B) DATA MINING:

- Q.1 An E-mail database is a database that stores a large number of electronic mail (e-mail) messages. It can be viewed as a semi structured database consisting mainly of text data. Discuss the following:-
- How can such as e-mail database be structured so as to facilitate multidimensional search, such as by sender, by receiver, by subject, by time, and so on?
 - What can be mined from such an e-mail database?
 - Suppose you have roughly classified a set of your previous e-mail messages as junk, unimportant, normal, or important. Describe how a data mining system may take this as the training set to automatically classify new e-mail messages or unclassified ones?
- Q.2 An object cube can be constructed by generalization of an object oriented database into relatively structured data prior to performing multidimensional generalization. Discuss how to handle set –oriented data in an object cube?
- Q.3 Write note on Data mining (300 words)?
- Q.4 Give detail description for measuring Accuracy explanation & Integration?
- Q.5 Explain the architectures of Data mining?

(C) BIO INFORMATICS:

- Q.1 What is the scope of bio-informatics? Why is it a multi disciplinary field?
- Q.2 What are the various types of protein databases? Which are the most important examples of these types?
- Q.3 PSI-BLAST is a popular program for exploring protein family relationship. Discuss the areas of application of this program.
- Q.4 DNA microchips are being used for gene expression analysis. Explain in your own words. What are DNA arrays? What are oligonucleotide arrays and what are the pros and cons of these relative to each other. Include in your answer how each would perform for expression sample isolated from other species. Assume you are starting from some cells that you want to do a gene expression analysis on.
- Q.5 Gene duplication occurs within the Tryptophan Synthesis pathway.
Give the names of at least two homologous enzymes within the Tryptophan Synthesis pathway

MCA – VI Semester

CSA-C-621	Major Project (External) based on Industrial Training	-	-	-	06	120	180	300
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Guidelines

1. Every student shall be spending more than 2 months for Industrial Training preferably on a live project. A proposal shall be seen by the concerned teachers of the project undertaken.
2. The report in hard bound copy (with attached CD and attached coding) should contain the system design, analysis, feasibility, methodology, screen shots, output etc.
3. The report should contain the original certificate obtained from the Industry / Company about the originality of the work done there. The certificate must indicate the work has been done by the candidate himself/ herself in the industrial environment. The coding must be attached at the end of project report in print as well as in CD.
4. Every report should attach a declaration certificate of the candidate that his/ her contribution in project report is original and performed by himself / herself. Each student will submit a project separately on a distinct topic.
5. There will be project monitoring by the teachers of department also .Groups of students will be notified by HoD assigning teachers.
6. Teachers have to make Mid-term valuation of project in 40% of MM.
7. Before submission of the project, the concern teacher has to sign on the project and there shall be signature of HoD also.
8. At the end, the project will be evaluated by the HoD or by a committee constituted. The score of mid-term evaluation will be added to the End term valuation.
9. The HoD (or departmental council) will resolve the conflicts raised (if any) whose decision shall be final.
10. Few Lectures by the concerned teachers have to be given on topics-Proposal preparation, Methodology, Software and Hardware requirements, Coding, Design, Testing, Validation, Report Writing, Project Presentation.

Approved by BoS on dated 06-03-2017

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MCA – VI Semester

CSA-C-622	Comprehensive Viva-Voce based on project	-	-	-	15	80	120	200
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Guidelines

1. There shall be viva voce (discussion) with students who is involved in completing the project.
2. There shall be mid-term evaluation in 40% of MM in the form of viva voce.
3. The concern teacher will conduct Viva Voce for Mid-term valuation.
4. The conflict raised, if any, shall be resolved in the meeting of Departmental council or through the guidelines issued by HoD.

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MCA – VI Semester

CSA-C-623	Seminar on project topic/others	-	-	-	06	80	120	200
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Guidelines

1. It will be based on the live demonstration of the project completed by student. The student will have to make a power point presentation regarding live demonstration of the output.
2. There shall be mid-term evaluation in 40% of MM in the form of Seminar Presentation.
3. The concern teacher will conduct seminar for Mid-term valuation.
4. Only one student on one topic of project will give presentation.
5. The conflict raised, if any, shall be resolved in the meeting of Departmental council or through the guidelines issued by HoD.

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