

**MASTER OF COMPUTER APPLICATIONS  
M C A  
1st SEMESTER**

With effect from 2008-09 admitted batch

**MODEL QUESTION PAPERS**

**Chairman  
Board of Studies  
(2005-08)**

Dept of Computer Science and Systems Engineering  
College of Engineering  
Andhra University  
Visakhapatnam

**MASTER OF COMPUTER APPLICATIONS**  
**Course Structure and Scheme of Examination**

**1<sup>st</sup> Year – 1<sup>st</sup> SEMESTER**

<b>With effect from 2008-09 admitted batch</b>						
<b>Code</b>	<b>Name of the Subject</b>	<b>Periods</b>		<b>Max Marks</b>		
		<b>Theory</b>	<b>Lab</b>	<b>University Exam</b>	<b>Sessional</b>	<b>Total</b>
MCA1.1.1	Discrete Mathematical Structures	3	-	70	30	100
MCA 1.1.2	Computer Organization	3	-	70	30	100
MCA 1.1.3	Problem Solving & Programming using 'C'	3	-	70	30	100
MCA 1.1.4	Probability , Statistics & Queuing Theory	3	-	70	30	100
MCA 1.1.5	Management Accountancy	3	-	70	30	100
MCA 1.1.6	Computer Organization Lab	-	3	50	50	100
MCA 1.1.7	C Programming Lab	-	3	50	50	100

Credits: 3 for each Theory, 2 for each Lab., Total Credits: 19

**External Paper setting guidelines:**

1. First question contains small questions like bits (carries 2 or 3marks) to cover all topics of the syllabus
2. Questions 2-8 contain essay type from all topics of the syllabus. Kindly do not set one single essay question; please do compound a question.

**MCA 1.1.1 DISCRETE MATHEMATICAL STRUCTURES**

Model Paper

First Question is Compulsory

Answer any four from the remaining and All questions carry equal marks

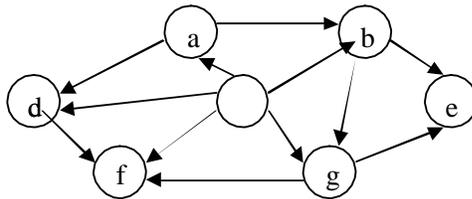
Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. Answer the following

- Write the elements of the set  $P(P(P(\phi)))$  where  $P(A)$  denotes the power set of the set  $A$  and  $\phi$  denotes the empty set.
- Give an example of a relation that is reflexive and transitive but not symmetric.
- How many ways can 12 people have their birthdays in different calendar months?
- Find the number of divisors of 400.
- Write the characteristic equation of  $S_k - 7S_{k-2} + 6S_{k-3} = 0$ .
- Write the adjacency matrix of the following digraph.



- Draw all possible binary trees with three nodes.
- Check whether  $((P \rightarrow Q) \rightarrow R) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$  is a tautology.
    - How many positive integers less than 1,000,000 have sum of their digits equal to 19?
  - Find the number of integer solutions to the equation  $x_1 + x_2 + x_3 + x_4 + x_5 = 20$  where  $x_1 \geq 3$ ,  $x_2 \geq 2$ ,  $x_3 \geq 4$ ,  $x_4 \geq 6$  and  $x_5 \geq 0$ .
    - A simple code is made by permuting the letters of the alphabet of 26 letters with every letter being replaced by a distinct letter. How many different codes can be made in this way?
  - Find the number of ways of placing 20 similar balls into 6 numbered boxes so that the first box contains any number of balls between 1 and 5 inclusive and the other 5 boxes must contain 2 or more balls each.
    - Solve  $a_n - 6a_{n-1} + 12a_{n-2} - 8a_{n-3} = 0$  by generating functions for  $n \geq 3$ .
  - Find the transitive closure of the digraph whose adjacency matrix is

$$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & & & \\ 0 & 0 & 1 & 0 \\ 0 & & & \\ 1 & 0 & 0 & 1 \end{pmatrix}$$

- b) Build a binary search tree for the words : banana, peach, apple, pear, coconut, mango, papaya, orange, strawberry, pineapple, guava, pomegranate and grape using alphabetical order.

6. a) Write Kruskal's algorithm for finding the minimum spanning tree of a graph  
 b) Find the minimum spanning tree of the graph given by the adjacency matrix

$$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & & & \\ 1 & 0 & 1 & 0 \\ 0 & & & \\ 0 & 1 & 0 & 1 \end{pmatrix}$$

7. a) Describe the steps involved in simplifying a logical expression that is in sum of products form using Quine-McCluskey method.  
 b) Use the Quine-McCluskey method to simplify the sum-of-products expansion:  
 $wxyz' + wx'yz + wx'yz' + w'xyz + w'x'yz + w'xy'z + w'x'y'z$
8. a) Construct a finite state machine that determines whether the input string has a 1 in the last position and a 0 in the third to the last position read so far.  
 b) Construct a Turing Machine that recognizes the set  $\{ 0^n 1^n \mid n \geq 1 \}$

MCA 1.1.2

**COMPUTER ORGANIZATION**

Model Paper

First Question is Compulsory

Answer any four from the remaining and All questions carry equal marks

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1.
  - (a) What is the difference between Combinational Logic and Sequential Logic?
  - (b) What is the type of control unit in 8085 Microprocessor?
  - (c) What is the data transfer rate of PCI bus?
  - (d) Distinguish between microinstruction and nanoinstruction
  - (e) What is IEEE 754?
  - (f) What is the difference between real memory and virtual memory?
  - (g) What do you understand by internal interrupt?
  
2.
  - (a) Verify whether the expression given below is valid using algebraic method only.  $ab' + bc' + ca' = a'b + b'c + c'a$
  - (b) Design a two bit comparator that compares two 2-bit values in whole, rather than one bit at a time. The circuit has inputs  $X_1X_0$  and  $Y_1Y_0$ , and outputs  $X > Y$ ,  $X = Y$ , and  $X < Y$
  
3.
  - (a) Show the hardware including logic gates for the control function that implements the RTL statement  $xy^1T_0 + T_1 + x^1yT_2 : A \leftarrow A + 1$
  - (b) Write 8085 assembly language program to calculate the Fibonacci value  $f(n)$ , where  $f(0) = f(1) = 1$  and  $f(n) = f(n-1) + f(n-2)$  for  $n > 1$ . Assume that  $n > 1$  and the result will be less than 256
  
4.
  - (a) Describe the mechanism of an instruction fetching, decoding and execution using flow chart?
  - (b) Describe the major hardware functional units of 8085 microprocessor with a neat complete functional block diagram.
  
5.
  - (a) Show how nine bit micro operation field in a micro instruction can be divided into sub fields? Explain with an example
  - (b) What are the functions performed by an I/O interface? Explain with an example
  
6.
  - (a) Compare and contrast isolated I/O and memory mapped I/O.
  - (b) Why does I/O interrupt make more efficient use of the CPU?
  
7.
  - (a) Explain the need of the memory hierarchy?
  - (b) What is the associate memory and what kind of operation it is more suitable?
  
8. Write short notes on
  - (i) Signed Notation in Computer Arithmetic
  - (ii) Instruction formats.
  - (iii) DMA
  - (iv) VHDL

**MCA 1.1.3      PROBLEM SOLVING AND PROGRAMMING USING C**

Model Paper

First Question is Compulsory

Answer any four from the remaining and All questions carry equal marks

All parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

- 1) Answer the following:
  - a) What is an algorithm?
  - b) Write any two data types in C with examples.
  - c) How are logical operators written in C?
  - d) What are bit wise operators in C?
  - e) Give an example to illustrate the concept of structures in C.
  - f) What is hash searching?
  - g) How do you declare an array of 10 pointers pointing to integers?
2. a) Write an algorithm for swapping two elements without using an extra temporary variable.  
b) Write a C program to convert a given decimal number to binary.
3. a) What are the control structures in C? Give an example each.  
b) Write a C program to sort a set of n elements using bubble sort.
4. a) Declare a 12-element array of pointers to functions. Each function will accept two pointers to double-precision quantities as arguments and will return a pointer to a double-precision quantity.  
b) Write a program to find the transpose of a given n x n matrix A. The matrix A should be declared using pointers. Your program should store the resultant in A only. No additional matrix be used.
- 5 a) Write a C Program to find the Kth smallest element of a given array.  
b) Explain how your program works for finding the 4<sup>th</sup> smallest element of the following data: 11, 2, 9, 4, 2, 7, 3, 3, 11, 8, 14, 6.
- 6.a)What are command line arguments? Explain.  
b) Write a program that reads a line of text from a data file character by character and displays the text on the screen.
- 7.a) Write a C program for hash searching using linear collision.  
b) Illustrate the Program for the following data:  
10, 12, 20, 23, 27, 30, 31, 39, 42, 44, 45, 49, 53, 57, 60.
- 8.a) Write a program for Towers of Hanoi problem using recursion.  
b) Write a program to count the number of vowels in a given string.

**MCA 1.1.4 PROBABILITY, STATISTICS & QUEUEING THEORY**

Model Paper

First Question is Compulsory

Answer any four from the remaining and All questions carry equal marks

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. a) State the axioms of probability.  
 b) Explain confident intervals in estimation.  
 c) Explain the method of least squares.  
 d) Explain Principle of least square.  
 e) Explain Type I and II errors.  
 f) Explain Correlation Coefficient  
 g) Write applications of Queuing theory
  
2. a) State and prove Baye's formula on conditional probability.  
 b) We are given three urns as follows:  
 Urn A contains 3 red and 5 white marbles  
 Urn B contains 2 red and 1 white marble  
 Urn C contains 2 red and 2 white marbles.  
 An urn is selected at random and a marble is drawn from the urn. If the Marble is red, what is the probability that it came from urn A?
  
3. a) Define mathematical expectation of a random variable. Show that the expectations of the sum of two random variables is equal to the sum of their expectations.  
 b) Suppose that a pair of dice are tossed and let the random variable X denote the sum of the points. Find the expectation of X.
  
4. a) Define the mean to failure of a component. For aq series systems show that  $0 \leq E(X) \leq \min [ E(X_c) ]$ .  
 b) Derive Markov inequality. Hence or otherwise state and prove Chebychev inequality.
  
5. a) Find the moment generating function about origin of the normal distribution.  
 b) Prove that a linear combination of normal variate is also a normal variate.
  
6. a) Derive normal equations to fit  $y = a + bx$  by the method of least squares.  
 b) Fit a least squares parabola having the form  $y = a + bx + cx^2$  to the following data:

X: 1.2   1.8   3.1   4.9   5.7   7.1   8.6   9.8

Y: 4.5   5.9   7.0   7.8   7.2   6.8   4.5   2.7

7. a) Show that the correlation coefficient lies between  $x$  and  $y$   $-1$  and  $+1$ .  
b) Calculate the correlation coefficient between  $x$  and  $y$  for the following data.

X: 65 66 67 67 68 69 70 72

Y: 67 68 65 68 72 72 69 71

8. Arrivals at a telephone booth are considered to be Poisson with an average time of 12 min. between one arrival and the next. The length of a phone call is assumed to be distributed exponentially with mean 4 min.
- Find the average number of persons waiting in the system.
  - What is the probability that a person arriving at the booth will have to wait in the queue?
  - What is the probability that it will take him more than 10 min. altogether to wait for the phone and complete his call?
  - Estimates the fraction of the day when the phone will be in use.
  - The telephone department will install a second booth, when convinced that an arrival has to wait on the average for at least 3 min. for phone. By how much the flow of arrivals should increase in order to justify a second booth?

## MCA 1.1.5 MANAGEMENT ACCOUNTANCY

Model Paper

First Question is Compulsory

Answer any four from the remaining and All questions carry equal marks

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. Answer any THREE of the following.
  - a. Master file.
  - b. Scope for computerization of accounts.
  - c. Compensating errors.
  - d. Solvency ratios.
  - e. Native of costing.
  - f. Role of Chartered Accountant
  - g. Marginal Costing with examples
2. What are the managerial uses of funds flow statement? State the limitations of ratio analysis.
3. Classify budgets with example. State the methods of preparing cash budget.
4. Discuss the practical application of marginal costing in decision making.
5. Describe the principles of accounting. State the features of subsidiary books.
6. A Practicing Chartered Accountant now spends Re. 0.90 per kilometer of taxi fares for his clients; work. He is considering two other alternatives, the purchase of a new small car or an old bigger car. The estimated cost figures are:

Items	New Small Old Bigger	
	Car	Car
	Rs.	Rs.
Purchase price.	35,000	20,000
Sale price, after 5 years	19,000	12,000
Repairs and servicing per annum	1,000	1,200
Taxes and insurance per annum	1,700	700
Petrol consumption, per litre	10 km.	7 km
Petrol price per litre	3.30	3.30

He estimates that he does 10,000 km. Annually, which of the three alternatives will be cheaper? If his practice expands and he has to do 19,000 km. Per annum.

What would be his decision? At how many km. Per annum, will the cost of two cars break-even and why? Ignore interest and income tax.

7. Make out a cash book with discount, cash and bank columns:
  - June 1 Cash in hand Rs. 2,800; cash at bank Rs. 8,70.
  - June 3 Received from Joseph Rs. 1,300 and allowed him a discount of Rs. 20.
  - June 7 Paid into bank Rs. 4,000
  - June 8 Received for cash sales Rs. 70 and cheque Rs. 190.
  - June 10 Paid George by cheque Rs.570 in settlement of his account for Rs. 600
  - June 11 Cash purchases by cheque Rs 700
  - June 15 Drew for office use Rs. 330
  - June 17 Advertisement expenses Rs. 30
  - June 20 Sam paid direct into our account in the bank Rs. 620
  - June 22 Withdrew cash for personal use Rs. 170
  - June 26 Paid rent by cheque Rs. 200
  - June 27 Received from Raja a cheque for Rs. 490 and allowed him a discount of Rs. 10.
  - June 29 Received commission by cheque Rs. 220.
  - June 30 Cash in excess of Rs. 400 was paid into bank.

8. An inexperienced clerk of B and Co., prepared the following Trial Balance as on 31.12.1989.

Credits	Rs.	Debits	Rs.
Capital	2,000	Loss in fire	70
Loan at 10%	6,000	Building	4,000
Creditors	846	Furniture	
Doubtful debts reserve	200	and fittings	300
Bills receivables	852	Plant and machinery	5,800
Returns to suppliers	300	Debtors	4,800
Carriage on sales	230	Bills payable	815
Sales	14,954	Bank shares	520
		Commission received	287
		Stock (1.1.1989)	2,818
		Cash in hand	88
		Manufacturing expenses	782
		Wages	730
		Salaries	394
		Postage and telegrams	54
		Rates	95
		Printing and stationary	86
		Insurance	17
		Purchases	2,986
		Interest on loan (paid up to October 31)	430
		Returns from customers	110
		Carriage on purchases	100
	<u>25,602</u>		<u>25,602</u>

Prepare the correct Trial Balance, Trading Account, Profit and Loss Account for the year ending December 31, 1989 and the Balance Sheet as on that date after taking the following adjustments into account:

- a. Stock on hand 31.12.89. Goods Rs. 1,600; Stationary Rs. 45.
- b. Make up the reserve for doubtful debts at 5% on debtors.
- c. Depreciate Plant at 7½ % and debts at 10%
- d. Outstanding expenses: Salaries Rs. 75 ; Interest on Loan.
- e. Dividend due on Bank Shares. Rs. 52.
- f. Insurance Co. agreed to meet the loss in fire fully.
- g. Commission received in advance Rs. 25.

**MCA**  
**2<sup>nd</sup> SEMESTER**

With effect from 2008-09 admitted batch

**MODEL QUESTION PAPERS**

**Chairman**  
**Board of Studies**

Dept of Computer Science and Systems Engineering  
College of Engineering  
Andhra University  
Visakhapatnam

**MASTER OF COMPUTER APPLICATIONS**  
**Course Structure and Scheme of Examination**

**1<sup>st</sup> Year – 2<sup>nd</sup> SEMESTER**

<b>With effect from 2008-09 admitted batch</b>						
<b>Code</b>	<b>Name of the Subject</b>	<b>Periods</b>		<b>Max Marks</b>		
		<b>Theory</b>	<b>Lab</b>	<b>University Exam</b>	<b>Sessional</b>	<b>Total</b>
MCA1.2.1	Systems Programming	3	-	70	30	100
MCA 1..2.2	Data Structures	3	-	70	30	100
MCA 1..2.3	Principles of Programming Languages	3	-	70	30	100
MCA 1..2.4	Object Oriented Programming	3	-	70	30	100
MCA 1..2.5	Information Systems & Organizational Behavior	3	-	70	30	100
MCA 1..2.6	OOPS Lab	-	3	50	50	100
MCA 1..2.7	Data Structures Lab	-	3	50	50	100

Credits: 3 for each Theory, 2 for each Lab., Total Credits: 19

**External Paper setting guidelines:**

1. First question contains small questions like bits (carries 2 or 3marks) to cover all topics of the syllabus
2. Questions 2-8 contain essay type from all topics of the syllabus. Kindly do not set one single essay question; please do compound a question.



MCA 1.2.2

**DATA STRUCTURES****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1. a) What is the difference in function between BALR and USING instructions?  
 b) Explain Allocation. c) Define Macro Instruction.  
 d) Differentiate in between pass and phase. e) Define Linkage Editor.  
 f) Define Compiler. g) Explain the importance of LESA.  
 g) Differentiate in between simple RELOCATABLE and complex RELOCATABLE address constants.  
 i) Differentiate in between open subroutine and closed subroutine.  
 j) Explain the importance of RLD cards.
2. a) Explain the role of Base Register.  
 b) Explain the role of Index Register.  
 c) Differentiate in between USING and DROP PSEUDO op codes.
3. a) Give the design of single pass assembler.  
 b) Can we write an ALP without using USING OP CODE? How? what are the limitations.
4. a) Give the design of single pass macro processor.  
 b) Explain the design of macro processor which can handle macro definitions within macros.
5. a) Give the design part of Assembler corresponding to LTORG pseudo op code.  
 b) Give the design of Assembler corresponding to Extended MNEUMONICS. c) Will the following divide 10 by 2? Justify.  
     L3,=f' 10'  
     D2,=f' 2'  
     ST3, 700
6. a) Give the design of absolute loader.  
 b) Explain about Direct Linking Loader.
7. a) Explain BSS loader.  
 b) At what point in time of each of the following loading schemes perform binding?  
     i. DLL,                              ii. BSS loader,                      iii. Dynamic binder.  
     iv. Dynamic linking loader,   v. Overlay,                          vi. Editor
8. a) Explain Lexical Analysis in detail  
 b) Differentiate between TDP & BUP

**MCA 1.2.3 PRINCIPLES OF PROGRAMMING LANGUAGES****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1. Explain the following terms.
  - a. Dangling – Else ambiguity.
  - b. Coercion.
  - c. Activation record.
  - d. Dangling pointers.
  - e. Constructors.
  - f. In-Line functions.
  - g. Recursive functions.
  - h. Quoting in Lisp.
  - i. Cut predicate in PROLOG.
  - j. Rendezvous in Ada.
2.
  - a. Discuss the evolution of programming languages.
  - b. The following is a set of BNF rules for real numbers where R stands for Real number, I stands for Integer, F for fraction, D for digit
 
$$\begin{aligned} \langle R \rangle &::= \langle I \rangle . \langle F \rangle \\ \langle I \rangle &::= \langle D \rangle | \langle I \rangle \langle D \rangle \\ \langle F \rangle &::= \langle D \rangle | \langle D \rangle \langle F \rangle \\ \langle D \rangle &::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 \end{aligned}$$

Using the above grammar give a left most derivation of the string 2.89 and draw tree snapshots corresponding to the above derivation.
3.
  - a. Discuss syntax directed control flow.
  - b. Draw flow diagram for the following program fragment.
 

```

loop
  S1;
  If E then exit end;
  S2
End
          
```
4.
  - a. With suitable examples explain type equivalence
  - b. Explain Static and dynamic scope roles.
5.
  - a. With a suitable example explain the concept of inheritance in Object Oriented programming.
  - b. Explain Virtual functions in C++.
6.
  - a. Explain the rules for expression evaluation in functional programming.
  - b. Explain control mechanism in PROLOG.
7.
  - a. Discuss concurrent tasks in Ada.
  - b. Explain how semaphores can be used to achieve mutual exclusion.
8. Explain the following
  - a. Early and late binding.
  - b. Information hiding.

MCA 1.2.4

**OBJECT ORIENTED PROGRAMMING**

**Model Paper**

**First Question is Compulsory**

**Answer any four from the remaining**

**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1. Discuss the following
  - a) Conversion rules and casts in C++
  - b) Static and Const member functions
  - c) Template Parameters
  - d) Copy Constructor
  
2.
  - a) Outline the underlying concepts of Object Oriented programming
  - b) Write a class description for complex numbers. Write methods for addition and subtraction.
  
3.
  - a) What are the function calling mechanisms supported by C++. Explain them with examples
  - b) Outline with a suitable C++ program, the concept of two classes having a common friend function.
  
4.
  - a) What are the types of Inheritances?
  - b) Discuss the concept of constructors under inheritance using relevant examples.
  
5.
  - a) What is dynamic binding? Outline this concept through a virtual destructor.
  - b) Explain with an example how to overload postfix(++ ) operator
  
6.
  - a) What are the different types of containers supported by C++ standard library.
  - b) Discuss how the file I/O is handled in C++
  
7.
  - a) Discuss the exception handling mechanism in C++
  - b) Using templates, write a generic version of bubble sort, complete with assertion. Use a random number generator to generate test data.
  
8. With a relevant example, explain the design of a project using UML.

**MCA 1.2.5 Information Systems And Organizational Behavior**  
**Model Paper**

**First Question is Compulsory**  
**Answer any four from the remaining**  
**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1.
  - a. Explain briefly the principles of communication.
  - b. Briefly explain the principal methods of conflict resolution.
  - c. Describe in brief the elements of management in action.
  - d. Define MIS. Indicate its significance.
  - e. Distinguish between physical structure and the conceptual structure of an information system.
2. What are the characteristics of a good manager?
3. Discuss the basic organizational relationships created by the process of delegation.
4. Discuss Management by objectives as a device of motivation.
5. Discuss the different leadership styles in management.
6. What are the characteristics that should be borne in mind while designing a MIS?
7.
  - a. What are the physical components of an Information system? Explain.
  - b. Explain the major processing functions in Information systems.
8. What do you manage the information resources to different application areas in an organization?

**MCA**  
**3rd SEMESTER**

With effect from 2008-09 admitted batch

**MODEL QUESTION PAPERS**

**Chairman**  
**Board of Studies**

Dept of Computer Science and Systems Engineering  
College of Engineering  
Andhra University  
Visakhapatnam

**MASTER OF COMPUTER APPLICATIONS**  
**Course Structure and Scheme of Examination**

**2<sup>nd</sup> Year – 1<sup>st</sup> SEMESTER**

<b>With effect from 2008-09 admitted batch</b>						
<b>Code</b>	<b>Name of the Subject</b>	<b>Periods</b>		<b>Max Marks</b>		
		<b>Theory</b>	<b>Lab</b>	<b>University Exam</b>	<b>Sessional</b>	<b>Total</b>
MCA 2.1.1	Theory of Computation	3	-	70	30	100
MCA 2.1.2	Computer Graphics	3	-	70	30	100
MCA 2.1.3	File Structures	3	-	70	30	100
MCA 2.2.4	Design and Analysis of Algorithms	3	-	70	30	100
MCA 2.1.5	Operating Systems	3	-	70	30	100
MCA 2.1.6	Operating Systems Lab	-	3	50	50	100
MCA 2.1.7	File Structures Lab	-	3	50	50	100

Credits: 3 for each Theory, 2 for each Lab., Total Credits: 19

**External Paper setting guidelines:**

1. First question contains small questions like bits (carries 2 or 3marks) to cover all topics of the syllabus
2. Questions 2-8 contain essay type from all topics of the syllabus. Kindly do not set one single essay question; please do compound a question.

MCA 2.1.1

## THEORY OF COMPUTATION

## Model Paper

## First Question is Compulsory

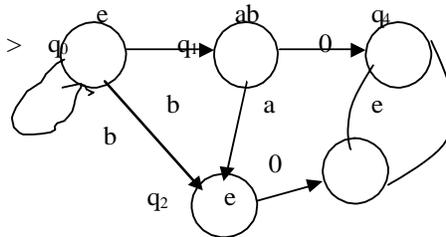
Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. a). Let  $\Sigma = \{a, b\}$ . Write regular expression for the set of all strings in  $\Sigma^*$  with no more than three a's.
  - b). State the mathematical definition of DFA.
  - c). Define Context Free grammar.
  - d). What is configuration of a Turing machine?
  - e). When do we say that a function is Turing – computable.
  - f). When do we say that a function is Primitive recursive?
  - g). State post correspondence problem.
  - h). Define the class NP.
  - i). Define the concept of validity in propositional calculus.
  - j). Construct truth tables for the following formula :  $(A \leftrightarrow (B \leftrightarrow A))$
2. a). Prove that, for every non deterministic finite automation there is an equivalent deterministic finite automation.
  - b). Construct DFA equivalent to non-deterministic automata given below :



3. a). Show that the class of Languages accepted by pushdown automata is exactly the class of context-free languages.
  - b). Construct context free Grammar that generate the language  $\{wcw^R \mid w \in \{a, b\}^+\}$
4. a). Describe the Turing Machine which shifts a string  $w$  containing no blanks to one cell to the left.
  - b). Construct a Turing Machine that accepts the Languages  $a^*ba^*b$ .
5. a). Describe the method of Godelization
  - b). Show that the function  $f(n) = n!$  is primitive recursive
6. a). What is halting problem? Explain
  - b). Show that any finite set is Turing-decidable
7. a). Let  $L$  be an  $NP$ -complete language. Then  $P=NP$  if and only if  $L \in P$ .
  - b). Show that Travelling salesman problem is  $NP$ -complete.
8. a). Show that the following formula of propositional calculus is a Tautology.  
 $((P \rightarrow Q) \rightarrow R) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$
  - b). Describe resolution in Predicate calculus.

MCA 2.1.2

**COMPUTER GRAPHICS****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1. Explain the following:
  - a) Frame Buffer
  - b) Homogeneous Coordinates
  - c) Graphics Work stations
  - d) GUI?
  - e) Antialiasing.
  - f) View port
  - g) Blending functions of B-Spline curves?
2. a) Describe the working of a CRT.  
b) What are the differences between the raster scan and random scan devices?
3. a) Describe the Bresenham's circle drawing algorithm.  
b) Explain how the Bresenham's line drawing algorithm works for the line joining the points  $(-1, 2)$  and  $(7, 5)$ .
4. a) Describe Cohen - Sutherland algorithm for line clipping.  
b) Explain how the Sutherland - Hodgaman algorithm for polygon clipping.
5. a) Describe the matrix forms of the two dimensional transformations of translation, rotation and scaling.  
b) Derive the transformation matrix for finding the reflection of a point with respect to the line  $y = mx + c$ .
6. a) Describe various graphic input devices explaining their logical functions  
b) Describe the methods for character generation.
7. a) Describe the 3D transformations for rotation, scaling and translation  
b) Find the combined matrix transformation of the following:  
3D rotation of an object by  $\alpha$  degrees around X- axis followed by a 3D rotation of  $\beta$  degrees around Y- axis, which in turn is translated with a units along X- axis, b units along Y-axis c units along Z-axis.
8. a) How are surfaces generated in computer graphics? Explain  
b) Derive the matrix transformation for standard perspective projection.

MCA 2.1.3

**FILE STRUCTURES****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1.
  - a) What is rational delay? What is the reason?
  - b) When could be disks becomes bottleneck?
  - c) What is multiple buffering? What is its use?
  - d) What are the limitations of key sort?
  - e) What are the limitations of Binary search?
2.
  - a) What are the operations required to maintain an indexed file?
  - b) How do you retrieve special subset of records from a data file using combination of secondary key?
3. What is Abstract data model? Why did the early file processing programs does not deal with abstract data model? What are the advantages of using abstract data models in application?
4. What do you mean by Data Compression? Explain about the data compression. What are various techniques of data compressions? What are its uses?
5. What is Hashing? Explain the various methods of Hashing Algorithms.
6. What is Collision? Explain the various collision "Resolution Technique".
7.
  - a) Explain why the number of comparisons is not adequate for measuring performance in sorting large files.
  - b) Construct a B<sup>+</sup> tree for the set of key values (21, 33, 41, 47, 49, 54, 63, 70) under the assumption that the number of search key values that fit in a one node is 5.

Show the steps involved in the following tasks:

  - i) Find record 49. ii)
  - Insert record 45. iii)
  - Delete record 41.
8.
  - a) Explain how extendible Hashing works. Show how it combines tries with conventional static hashing technique.
  - b) In extendible hashing procedure, the directory can occasionally point to empty bucket. Describe two situations that can produce empty bucket.

MCA 2.1.4

**DESIGN AND ANALYSIS OF ALGORITHMS****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1. Explain:
  - a. Asymptotic Notation.
  - b. Lower Bounds.
  - c. NP-hard Problems.
  - d. Minimal spanning Tree.
  - e. Convex Hull Problem.
  - f. Memory Functions.
  - g. Topological Sorting.
2. Describe divide and conquer strategy for multiplying two n-bit numbers. Derive its time complexity.
3.
  - a. Explain quick sort Algorithm.
  - b. Show how the quick sort algorithm sorts the following sets of keys. (1,1,1,1,1,1,1) and (5,5,8,3,4,3,2)
4.
  - a. Explain how you can use greedy technique for Huffman coding.
  - b. Explain the greedy technique with knapsack problem as an example.
5. Explain problem Reduction using linear programming as an example.
6. Explain Dynamic Programming Technique for construction of optimal binary search trees with the help of an example.
7. Outline Template of a backtracking algorithm. Explain a backtracking solution to the Hamiltonian circuit problem.
8. Explain branch and bound technique. Apply it to the following instance of Assignment problem.

	Job1	Job2	Job3	Job4
Person A	9	2	7	8
Person B	6	4	3	7
Person C	5	8	1	8
Person D	7	6	9	4

MCA 2.1.5

**OPERATING SYSTEMS****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1. Explain the following terms.
  - a. Multiprogramming.
  - b. System Call
  - c. Process Control Block
  - d. Thread.
  - e. Busy waiting
  - f. TSR programs
  - g. Race condition
  - h. Page fault
  - i. Inode
  - j. Block device
2.
  - a. Explain the role of operating system as a resource manager.
  - b. Explain the difference between hard and soft real time systems.
3.
  - a. Explain the difference between non-preemptive and preemptive scheduling.
  - b. For the following example explain how round Robin scheduling with a time quantum of 4 ms works and also compute average wait and turn around times.

Process	CPU Burst
P1	14
P2	3
P3	9

4.
  - a. Write and explain monitor solution for producer – consumer problem.
  - b. Write and explain Peterson’s software solution for Two-process synchronization.
5.
  - a. Explain deadlock detection and recovery mechanism.
  - b. Explain the difference between internal and external fragmentation.
6.
  - a. Discuss different page replacement policies and related issues.
  - b. Explain the concept of thrashing.
7.
  - a. Discuss design issues in contiguous and linked file allocation methods.
  - b. Explain Access control lists as a protection mechanism.
8. Explain the following.
  - a. Process management in Unix.
  - b. Device drivers.
  - c. Segmentation.
  - d. Inter process communication.

**MCA  
4th SEMESTER**

With effect from 2008-09 admitted batch

**MODEL QUESTION PAPERS**

**Chairman  
Board of Studies**

Dept of Computer Science and Systems Engineering  
College of Engineering  
Andhra University  
Visakhapatnam

**MASTER OF COMPUTER APPLICATIONS**  
**Course Structure and Scheme of Examination**

**2<sup>nd</sup> Year – 2<sup>nd</sup> SEMESTER**

<b>With effect from 2008-09 admitted batch</b>						
<b>Code</b>	<b>Name of the Subject</b>	<b>Periods</b>		<b>Max Marks</b>		
		<b>Theory</b>	<b>Lab</b>	<b>University Exam</b>	<b>Sessional</b>	<b>Total</b>
MCA2.2.1	Data Communications & Networks	3	-	70	30	100
MCA2.2.2	Data Base Management Systems	3	-	70	30	100
MCA 2.2.3	Operations Research	3	-	70	30	100
MCA 2.2.4	Artificial Intelligence	3	-	70	30	100
MCA 2.2.5	Elective-1	3	-	70	30	100
MCA 2.2.6	Visual Programming Lab	-	3	50	50	100
MCA 2.2.7	DBMS Lab	-	3	50	50	100

- Elective-1
1. Distributed Systems
  2. Image Processing

Credits: 3 for each Theory, 2 for each Lab., Total Credits: 19

**External Paper setting guidelines:**

1. First question contains small questions like bits (carries 2 or 3marks) to cover all topics of the syllabus
2. Questions 2-8 contain essay type from all topics of the syllabus. Kindly do not set one single essay question; please do compound a question.

## MCA 2.2.1      DATACOMMUNICATIONS AND NETWORKS

Model Paper

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. Write brief note for the following

- |                                |                      |
|--------------------------------|----------------------|
| a) List typical LAN topologies | b) De facto standard |
| c) Null Modem                  | d) burst error       |
| e) RFC                         | f) DNS               |
| g) Virtual circuit             | h) data gram         |
| i) POP3                        | j) Leased line       |

2. a) Distinguish between a local area networks and a wide area network

b) When a party makes a local telephone call to another party, is this a point-to-point or multi point connection: Explain your answer.

c) What is the difference between the communication of data and the communication of information?

3. a) What is meant by a layered protocol? Why are protocols layered?

b) Distinguish between frequency-division multiplexing and time-division multiplexing

c) Distinguish between a carrier signal, a modulating signal and a modulated signal with appropriate diagrams

4.a) What is a cyclic redundancy check?

b) Classify the errors that a CRC method will always detect and will not detect

c) What are the major differences between the go-back-n and select repeat protocols?

5. a) Distinguish between interior and exterior protocols

b) List typical control messages defined by ICMP

c) Why did IPv6 eliminate the checksum in the packet header?

6. a) List TCP primitives related to connection management

b) Why are TCP and IP at different layers in the protocol hierarchy?

7. a) Describe the client/server mode of computing

b) What is SMTP? How does it useful to send e-mails?

c) How does anonymous FTP differ from FTP.

8. a) How is the routing information protocol similar to the Bellman-Ford algorithm?

b) How does next-hop routing decrease the number of table entries in a router?

## MCA 2.2.2 DATABASE MANAGEMENT SYSTEMS

Model Paper

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. Write a brief note of the following
 

a. Database schema	b. Database State
c. Null Value	d. Generalization
e. Logical design	f. DBA
g. ACID	h. Referential Integrity
i. State Armstrong axioms	j. Purpose of normal forms
  
2. a) With an appropriate example differentiate between logical data independence and physical data independence.  
 b) When is the concept of a weak entity used in data modeling?  
 c) Define the terms owner entity type, weak entity type, identifying relationship type and partial key.
  
3. a) What is subclass? When is subclass needed in data modeling?  
 b) What is difference between a specialization hierarchy and a specialization lattice?  
 c) Discuss the similarities and differences between an ontology and a database schema.
  
4. a) Draw an E-R diagram for an airline reservation system consisting of flights, aircrafts, airports, fares, reservations, tickets, pilots, crew and passengers. Clearly highlight the entities, the relationship, the primary keys and the mapping constraints  
 b) Write down the database schema, indicating the primary keys, the foreign keys and functional dependencies. Is there any redundancy in the definition? If so, give a normalized decomposition.  
 c) Explain clearly why the lossless-join property is a necessary condition for decomposition while dependency preservation is only a desirable condition.
  
5. Consider the following relations:
  - SHOP(Shop\_No, Shop\_name, Address, owner)
  - ITEM(I-No, I-Name)
  - SUPPLIED(I-No, C\_No, Shop\_No, Date, Price)
  - REQUIRES(C\_No, I-No)
 SUPPLIED database gives data about items supplied by a shop to a customer and REQUIRES gives data about items required by a customer  
 Write down queries in relational algebra for getting
  - a) names of customers who have been supplied items of maximum total value.
  - b) Names of customers who require items which have not been supplied ( along with item names

- c) Names of customers who are supplied all the items from only one shop.
- d) List of shop owners who supplied some item to the address “Krishna Nivas, MG Road”.

6. a) List all functional dependencies(FDs) satisfied by the following relation r.

A	B	C	D
a <sub>1</sub>	b <sub>1</sub>	c <sub>1</sub>	d <sub>1</sub>
a <sub>1</sub>	b <sub>2</sub>	c <sub>1</sub>	d <sub>2</sub>
a <sub>2</sub>	b <sub>2</sub>	c <sub>2</sub>	d <sub>2</sub>
a <sub>2</sub>	b <sub>3</sub>	c <sub>2</sub>	d <sub>3</sub>
a <sub>2</sub>	b <sub>3</sub>	c <sub>2</sub>	d <sub>4</sub>

- b) Why are certain FDs called trivial FDs?
- c) Let the relation scheme R(ABCDE) be decomposed into (AD), (AB), (BE), (CDE) and (AE). Determine whether the above join is lossless if the following set of FDs hold A? C, B? C, C? D, DE? C, CE? A

- 7. a) Explain how concurrency can lead to inconsistency.
- b) What is a deadlock?
- c) Can it occur in a serializable schedule? If so, give an example. How can it be detected and resolved?
- d) Explain the concept of the two phase locking and show that it guarantees serializability?

8. a) For each of the situations listed below, decide which of the following recovery technique(s) is most appropriate. Justify your answer

- 1) Backward recovery (UNDO)
- 2) Forward recovery(REDO)
- 3) Forward recovery using backup copy (REDO using backup copy)
- 4) Compensating transactions (introduced to correct errors)

The situations are:

- i) A disk containing the database is damaged so that it cannot be read
- ii) A lightning storm causes a power failure
- iii) An incorrect amount is entered and posted for a student tuition payment. The error is not discovered for several weeks.
- iv) A phone disconnection occurs while a user is entering a transaction.

b) Describe the recovery techniques that employs the immediate update scheme

MCA 2.2.3

**OPERATIONS RESEARCH**

Model Paper

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. Write short notes on the following:
- Graphical Method for solving a Linear Programming Problem.
  - Explain the Duality in linear programming.
  - Zero sum Game.
  - Economic order Quantity (EOQ).
  - Min-Max Method.

2. a) Explain the characteristics of LP model.  
b) Solve the following LP problem by using Simplex method:

$$\text{Minimize : } Z = 2x_1 + 4x_2 + x_3$$

Subject to

$$\begin{aligned} 4x_1 + 8x_2 + 2x_3 &= 40 \\ x_1 + 2x_2 + x_3 &= 24 \\ x_1, x_2, x_3 &= 0 \end{aligned}$$

3. a) Explain the reasons for analysing a primal linear programming problem in terms of dual form.  
b) Given the following linear programming problem:

$$\text{Minimize } z = 4x_1 + 3x_2$$

Subject to :

$$\begin{aligned} 2x_1 + x_2 &= 10 \\ -3x_1 + 2x_2 &= 6 \\ x_1 + x_2 &= 6 \\ x_1, x_2 &= 0 \end{aligned}$$

Solve using the dual simplex method.

4. a) Explain the Transportation and Transshipment problems.  
b) Given the following Transportation problem:

To From	A	B	C	D	Supply
1	5	12	7	10	30
2	4	6	7	6	30
3	2	8	5	3	60
Demand	40	20	30	70	

Find the initial solution by VAM method and optimum solution by MODI method.

5. a) Explain the Travelling Salesman problem.  
b) A dispatcher presently has six taxicabs at different locations and five customers who have call for service. The mileage from each taxi's present location to each customer

is

Customer	1	2	3	4	5
Cab					
A	7	2	4	10	7
B	5	1	5	6	6
C	8	7	6	5	5
D	2	5	2	4	5
E	3	3	5	8	4
F	6	2	4	3	4

Determine the optional assignment that will minimize the total mileage.

6. a) Explain the Critical Path method.  
 b) A project being planned involved the following activities:

---

	Activity	Predecessor	Duration
A	-		14
B	A		21
C	A		30
D	B		14
E	C,D		30
F	E		10

---

Construct the network.

Determine expected project completion time.

Determine free slack and total slack.

7. a) Explain the Graphical Method for solving a Game.  
 b) Find the Optimal solution for the following game using Graphical method;

		Player B				
		1	2	3	4	5
Player A		4	2	5	-6	6
		7	-9	7	4	8

8. a) Explain Integer Programming problem.  
 b) Explain the Branch and Bound Technique for solving and Integer Programming Problem

MCA 2.2.4

## ARTIFICIAL INTELLIGENCE

Model Paper

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. Explain the following terms.
  - a. Physical symbol system hypothesis
  - b. Turing test.
  - c. Heuristic.
  - d. Computable functions and predicates.
  - e. Tautology.
  - f. Most General Unifier (MGU)
  - g. Herbrand Universe
  - h. Closed World Assumption(CWA)
  - i. Confidence factors
  - j. Horn clause
2. a. Explain the characteristics of an AI technique.
  - b. Explain the role of cognitive science in modeling human behavior.
3. a. Explain the role of state space approach in solving AI problem.
  - b. With suitable example explain the characteristics of monotonic and partially commutative production systems.
4. a. Prove each of the following statements:
  - i. Breadth first search is a special case of uniform cost search.
  - ii. Breadth first, depth first and uniform cost search are special cases of best-first search.
  - iii. Uniform cost search is a special case of A\* search.
  - b. Explain the role of difference tables in Means – Ends analysis.
5. a. With suitable examples, explain the steps needed to convert a WFF in predicate logic to its equivalent clause form.
  - b. Explain the operation of unification algorithm.
6. a. Discuss the use of Frames for default reasoning.
  - b. With suitable examples explain inferential and inheritable knowledge.
7. Discuss different models for nonmonotonic reasoning.
8. Write short notes on.
  - a. Baye's rule
  - b. Scripts.
  - c. Forward and backward chaining.
  - d. Dependency directed back tracing.

MCA 2.2.5

## Distributed Systems

## Elective-I

## Model Paper

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1. Explain the following terms.
  - a. Intranet
  - b. Thin client
  - c. UDP
  - d. Idempotent operation
  - e. RMI
  - f. Stateless server
  - g. URL
  - h. Clock skew
  - i. Locks
  - j. Atomicity property
2.
  - a. Define a distributed system and give example for the same.
  - b. Discuss performance and quality of service aspects of a distributed system.
3.
  - a. Explain how IP addressing is done.
  - b. Briefly explain group communication.
4. Discuss the design and implementation issues in Remote Method Invocation(RMI)
5.
  - a. Discuss the mounting issues of remote file systems on NFS client.
  - b. Briefly discuss about Andrew file system.
6. Discuss the design and implementation issues of Domain Name System.
  7.
    - a. Explain how Lamport's logical clocks are synchronized.
    - b. Explain the Bully Algorithm for election of coordinator.
8.
  - a. Explain how distributed deadlocks can be detected.
  - b. Explain how primary-backup model of replication is fault tolerant.

MCA 2.2.5

## IMAGE PROCESSING

Elective-I

Model Paper

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

1.
  - a) Define connectivity.
  - b) Define sampling.
  - b) Define quantization.
  - c) Define “noise” of an image
  - d) Define Walsh transform.
  - e) Explain compression due to quantization.
  - f) How do you represent an image in frequency domain?
  - g) Define gray value.
  - h) Define mask.
  - i) Define edge.
2. Give an Algorithm for FFT.
3.
  - a) How do you Acquire an image? Explain in detail.
  - b) Define and explain image sliding and image stretching.
4.
  - a) Define and explain low pass filters in brief.
  - b) Define and edge. Explain various edge enhancement filters.
5.
  - a) Define prewitt filter.
  - b) Explain in detail “Homomorphie filter”.
6.
  - a) Explain compression at the time of Image Transmission.
  - b) Explain about standardization in image compression.
7.
  - a) Explain split and merge technique for segmentation.
    - a. Define and explain thresholding.
    - b. Explain segmentation by PIXEL based methods.
8.
  - a) Define Erosion and Dilation.
  - b) Explain how the morphological operations may be extended to gray scale images.
  - c) Explain “Skeletanization” in detail.

**MCA**  
**5th SEMESTER**

With effect from 2008-09 admitted batch

**MODEL QUESTION PAPERS**

**Chairman**  
**Board of Studies**

Dept of Computer Science and Systems Engineering  
College of Engineering  
Andhra University  
Visakhapatnam

**MASTER OF COMPUTER APPLICATIONS**  
**Course Structure and Scheme of Examination**

**3<sup>rd</sup> Year – 1<sup>st</sup> SEMESTER**

With effect from 2008-09 admitted batch						
Code	Name of the Subject	Periods		Max Marks		
		Theory	Lab	University Exam	Sessional	Total
MCA3.1.1	Information Systems control and Audit	3	-	70	30	100
MCA 3.1.2	Network Security	3	-	70	30	100
MCA 3.1.3	Object Oriented Software Engineering	3	-	70	30	100
MCA 3.1.4	Elective-II	3	-	70	30	100
MCA 3.1.5	Elective -III	3	-	70	30	100
MCA 3.1.6	OOSE Lab	-	3	50	50	100
MCA 3.1.7	Data Communications & Networking lab	-	3	50	50	100

Elective II:     1. Embedded systems  
                   2. Neural Networks & Fuzzy Systems  
                   3. Bioinformatics

Elective III:    1. Data Ware Housing and Data Mining  
                   2. Computer Vision & Pattern Analysis  
                   3. Knowledge Management

Credits: 3 for each Theory, 2 for each Lab., Total Credits: 19

**External Paper setting guidelines:**

1. First question contains small questions like bits (carries 2 or 3marks) to cover all topics of the syllabus
2. Questions 2-8 contain essay type from all topics of the syllabus. Kindly do not set one single essay question; please do compound a question.

**MCA 3.1.1                    INFORMATION SYSTEMS CONTROL AND AUDIT**  
**Model Paper**

**First Question is Compulsory**  
**Answer any four from the remaining**  
**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1. Answer the following:
  - a) Incorrect Data in a Computer System is likely to have more serious consequences for which System?
  - b) What does an efficient data processing system accomplish?
  - c) Why Information Systems controls are needed?
  - d) Which is the most likely to be a characteristic of the information systems plan prepared for a backbone organization?
  - e) Which is the most likely sequence of phases in the systems development process?
  - f) What are the keys a public-key cryptosystem uses?
  - g) How should a screen be organized for direct entry of input data?
  - h) What is a passive attack on a communication network?
  - i) How does Real memory errors are primarily detected?
  - j) What is the purpose of concurrency controls in a distributed database environment?
  - k) What control problem that arises with spooling software?
  - l) What are the functional capabilities of generalized audit software?
  - m) What is the global evaluation judgment on maintenance of asset safeguarding and data integrity?
  - n) What are the steps most likely will be undertaken first when evaluating the effectiveness of an information system?
  - o) What is the sequence of steps most likely will be used in an efficiency evaluation study?
2. What characteristics of computer systems often lead to high costs being incurred because of computer-system errors?
3. Briefly describe the five components of internal control that should be established in an organization.
4. Briefly explain the functions of the boundary subsystem. Give two components that perform basic activities in the boundary subsystem.
5. Briefly explain the nature of public –key cryptography.
6. Why is encryption an important means of protecting the integrity of data passing over public communication lines? Is encryption also useful as a means of protecting data passing over private communication lines?
7. Why should application programs that update monetary data items in the database maintain a suspense account?
8. What purposes might auditors seek to achieve in using generalized audit software to examine the quality of data maintained on an application system files?

MCA 3.1.2

**NETWORK SECURITY**

**Model Paper**

**First Question is Compulsory**

**Answer any four from the remaining**

**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1.
  - a) What is a digital signature?
  - b) What is denial service attack?
  - c) What is ECB mode?
  - d) What is the procedure for key generation using RSA?
  - e) What is the purpose and the use of a KDC?
  - f) What is non-repudiation?
  - g) What is session key?
  
2.
  - a) Describe the Diffie - Hellman key exchange algorithm and explain it with an example.
  - b) Alice and Bob want to establish a secret key using the Diffie – Hellman key exchange protocol using  $n = 11$ ,  $g = 5$ ,  $x = 2$  and  $y = 3$ . Find the values A and B and the secret key.
  
3. Describe the data encryption algorithm.
  
4.
  - a) What are the key requirements of message digests?
  - b) Describe the secure hash algorithm.
  
5. Discuss the message formats of Kerberos V4 in detail.
  
6.
  - a) What is password based encryption? What are the problems associated with it?
  - b) What is AH? Explain.
  
7. Discuss SSL in detail?
  
8. Describe Pretty Good Privacy.

**MCA 3.1.3 OBJECT ORIENTED SOFTWARE ENGINEERING****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1.
  - a) For a school and its teacher association , indicate whether it should be an ordinary association, a standard aggregation or a composition
  - b) Explain about an error, fault and failure
  - c) What is project management?
  - d) Write two disadvantages of the water fall model
  - e) Write two advantages of PERT chart
  
2. what are the five of the most important attributes of software quality? Explain them
3. Describe as many sources of information as you can think of, that should be considered in order to perform a domain analysis for the following  
The house hold alarm system
4. create three classes linked by associations to represent a student taking courses in a school. Specify appropriate multiplicity as well as labels for the association. If there is more than one reasonable alternative, explain the advantages and disadvantages of each
5. For a library system, draw a use case diagrams that shows which actor perform which use cases and write SRS document.
6. Draw sequence diagram and a corresponding collaboration diagram for student registration system.
7. What is wrong with the following designs from the perspective of cohesion and what could be done to improve them?  
 There are two subsystems in a university registration system that do the following: Subsystem A displays lists of courses to a student, accepts requests from the student to register in courses, ensures that the student has no schedule conflicts and is eligible to register in the courses, stores the data in the database and periodically backs up the database. System B allows faculty members to input student grades and allow administrators to assign courses to faculty members, add new courses, and change the student registration. It also prints the bills that are sent to students
  
8. Describe a good set of equivalence class tests for the following situation.  
A personal information form that asks for surname, name, date of birth, street city/town, country, PIN, home/office/cell phone number

MCA 3.1.4

**EMBEDDED SYSTEMS****ELCTIVE –II****Model Paper****First Question is Compulsory****Answer any four from the remaining****Answer all parts of any Question at one place.****Time: 3 Hrs.****Max. Marks: 70**

1. a) Explain Atomic Operations, give any one atomic instruction for any processor known to you?
  - b) Distinguish between Microprocessors and Microcontrollers
  - c) Explain any two schemes for inter task communication.
  - d) What is watchdog timer in a single board computer? Explain.
  - e) What are the two rules that an interrupt routine must adhere to in an RTOS environment.
2. a) Suggest a suitable architecture for road traffic lights control at a four-road intersection Give hardware and software requirements.
  - b) What is data sharing problem in multi tasking environment? Explain with an example
3. a) Explain (i) Round Robin architecture, (ii) Preemptive scheduling?
  - b) What is reentrancy? Give the necessary conditions to make a function reentrant.
4. a) Bring out the subtle differences between real time operating systems and typical (non real time) operating system?
  - b) Explain the architecture of function queue scheduling, write a C program for implementing the same. Assume suitable data wherever necessary
5. a) What are the constituents of the Embedded software that are required to make the target CPU (single board computer) to run, name them and explain each of them briefly?
  - b) Explain the following in brief (i) ROM Emulator (ii) In-Circuit –Emulator (iii) Flash memory.
6. What is priority inversion? How this can be solved? Take up a problem of elevator for four floors, identify the number of tasks required, their priorities and their functions in the process of designing an application software in Real Time.
7. Compare three methods of inter task communication with a suitable example pseudo code using  $\mu$ C/OS RTOS functions. Assume suitable data
8. Write short notes on the following:
  - a) Interrupt Latency
  - b) Applications of Embedded Systems
  - c) Hard Real-Time and Soft Real-Time Systems
  - d) Built-Ins on the Microprocessor

**MCA 3.1.4 NEURAL NETWORKS & FUZZY SYSTEMS**  
**ELCTIVE –II**

**Model Paper**

**First Question is Compulsory**

**Answer any four from the remaining**

**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1. write briefly
  - a. Stochastic Equilibrium
  - b. Hop field Circuit
  - c. Max – Mini Fuzzy composition
  - d. Subset hood
  - e. Bi-directional stability
  
2.
  - a. Describe Neural and Fuzzy systems as model free function estimators .
  - b. Discuss the Taxonomy of nearest Network models
3.
  - a. Discuss commonly used signal functions to model the activation of neural in neural networks
  - b. Find the optimal layer associative memory (OLAM) matrix M for the association given below
 
$$A1 = (1 \ 2 \ 3) \quad B1 = (4 \ 3 \ 2)$$

$$A2 = (2 \ 3 \ 4) \quad B2 = (3 \ 5 \ 2)$$

$$A3 = (3 \ 4 \ 6) \quad B3 = (2 \ 2 \ 1)$$
 Determining whether  $A_i = M - B_i$
  
4. Discuss in detail the two additive bivalent neural Network models and compare them.
5.
  - a. What is competitive learning? How does it differ from signal Hebbrian learning.
  - b. What are Fuzzy Cognitive Maps ? How can they be used to combined opinion of multiple experts ?
6.
  - a. Discuss the essential differences between supervised and unsupervised learning in Neural Nets.
  - b. Discuss various learning algorithms and write their limitations.
7.
  - a. State the fuzzy entropy Theorem and explain it suitable example.
  - b Write the entropy – subsethood theorem and its implications
  
8.
  - a. What is Fuzzy centroid defuzzification scheme? Explain how is it used in FAM system architecture.
  - b. Use Correlation – Minimum encoding to construct the FAM matrix M from the fit- Vector pair (A,B) if  $A=(0.6, 1,0.2,0.9)$  and  $B=(0.8 \ 0.3 \ 1.0)$  . Is (A,B) a bi-directional fined points? Pass  $A''=(0.2 \ 0.9 \ 0.3 \ 0.2)$  through M and  $B''=(0.9 \ .5 \ 1.0)$  through  $M^T$  . Do the recalled fuzzy sets differ from B and A?

**MCA 3.1.4**

**BIOINFORMATICS**

**ELCTIVE –II**

**Model Paper**

**First Question is Compulsory**

**Answer any four from the remaining**

**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1. Explain the following:
  - a) Folding Problem
  - b) Motifs
  - c) UniGene
  - d) Positional Cloning
  - e) Identity and Similarity
  - f) Consensus
  - g) Hidden Markov Models
  - h) Local Alignment Vs Global Alignment
  - i) Phylogenetic Tree
  - j) Folding Problem
2.
  - a) What is bioinformatics? Explain the importance of bioinformatics?
  - b) What are the application areas of different analysis methods?
3.
  - a) Explain the structure of SWISS-PROT entries.
  - b) Why create secondary databases?
4.
  - a) Explain GenBank.
  - b) What is the importance of specialized genomic resources?
5. What is GenBank? Explain the structure of GenBank entries
6.
  - a) Explain Central Dogma of Molecular biology with neat diagram.
  - b) Describe features of DNA sequence analysis
7.
  - a) Write about BLAST (Basic Local Alignment Search Tool)
  - b) Explain the Needleman and Wunsch algorithm for global alignment
8.
  - a) Define Multiple sequence alignment? What is the goal of Multiple sequence alignment?
  - b) Explain simultaneous methods and progressive methods for multiple alignments?

MCA 3.1.5

**DATA WARE HOUSING AND DATA MINING  
ELCTIVE –III**

**Model Paper**

**First Question is Compulsory**

**Answer any four from the remaining**

**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1. Briefly discuss.
  - a. Correlation analysis for handling redundancy.
  - b. Discretization
  - c. Advantages of ROLAP and MOLAP
  - d. Ice-berg query.
  - e. Constraint –based rule mining
  - f. Scalability of an algorithm
  - g. Cross table reporting
  - h. Slicing operations
  - i. Reasons for data partitioning
  - j. Components of five-number summary
  
2.
  - a) What is data mining? Briefly describe the components of a data mining system.
  - b) What kinds of patterns can be identified in a data mining system?
  
3.
  - a) Write the differences between operational database and data warehouse.
  - b) Briefly describe 3-tier Data warehouse architecture
  
4.
  - a) Write different approaches to data transformation.
  - b) Propose an algorithm in pseudo-code for automatic generation of a concept hierarchy for categorical data based on the number of distinct values of attributes in the given schema.
  
5.
  - a. Discuss the essential features of a typical data mining query language like DMQL.
  - b. Consider association Rule below, which was mined from the student database at Big- University:  
 Major(X,"science") ——— status(X,"undergrad").  
  
 Suppose that the number of students at the university (that is, the number of task-relevant data tuples) is 3000, that 56% of undergraduates at the university major in science, that 64% of the students are registered in programs leading to undergraduate degrees, and that 70% of the students are majoring in science.

- a. Compute the confidence and support of above rule.
  - b. Consider Rule below:  
Major(X,"biology") — status(X,"undergrad"). [17%,80%]  
Suppose that 30% of science students are majoring in bioogy. Would you consider Rule 2 to be novel with respect to Rule 1? Explain.
6.
  - a. Discuss why attribute relevance analysis is needed and how it can be performed.
  - b. Outline a data cube-based incremental algorithm for mining analytical class comparisons.
7. Write the A priori algorithm for discovering frequent item sets for mining single-dimensional Boolean Association Rule and discuss various approaches to improve its efficiency.
8.
  - a. Discuss the back propagation algorithm for neural network-based classification of data.
  - b. What are the different categories of clustering methods?

**MCA 3.1.5                    COMPUTER VISION AND PATTERN ANALYSIS**  
**ELCTIVE –III**

**Model Paper**

**First Question is Compulsory**

**Answer any four from the remaining**

**Answer all parts of any Question at one place.**

**Time: 3 Hrs.**

**Max. Marks: 70**

1. (a) Define Distance and Connectivity.  
(b) Define HIT-or-MISS Transformation.  
  
(c) Define Chain Code. Give it's Application.  
(d) Define Euler's Number.  
(e) Define C lustering. Briefly Explain it's Importance
2. (a) Define an Edge; Explain Various Edge Enhancement Filters.  
(b) Define Image Segmentation. Give a method of image segmentation.
3. (a) Define Skeletanization. Explain it's Application in Pattern Analysis.  
(b) Define Thinning & Thickening.
4. (a) Define Region Identification. Give an Algorithm for Region Identification.  
(b) Define and Explain Fourier Transforms of Boundaries.
5. (a) Define Convex hull. Give it's Application in Pattern Analysis.  
(b) Define and Explain Moments in Detail.
6. (a) Explain Classification Learning.  
(b) Explain the Application of Graph Theory in Object Recognition.
7. (a) Define Hierarchical Clustering. Give one Algorithm for above purpose.  
(b) Define Partitional Clustering. Give K-Means Algorithm for the above purpose.
8. (a) Give McCulloch - Pitts Model of ANN.  
(b) Give McCulloch - Pitts Neuron Model for **AND** Function.  
(c) Briefly Explain Application of Fuzzy Logic in Pattern Analysis.

MCA 3.1.5

KNOWLEDGE MANAGEMENT

ELCTIVE –III

Model Paper

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

Time: 3 Hrs.

Max. Marks: 70

- 1 Explain the following:
  - a) Knowledge Management
  - b) Information Vs Knowledge
  - c) Knowledge Repository
  - d) Smart networks
  - e) RDI methodology
  - f) Knowledge Segment
  - g) Communication Process
  - h) Users Vs Knowledge workers
  - i) Data Visualization
  - j) Knowledge Testing
- 2
  - a) What are the various components of the KM system?
  - b) Explain integrative and interactive knowledge applications.
- 3
  - a) Discuss Knowledge maps to link knowledge to strategy
  - b) Write about strategic imperatives for a successful KM system.
- 4
  - a) Compare knowledge management platforms with other enterprise systems
  - b) Briefly write about technology components of the KM architecture
- 5
  - a) Explain measuring knowledge growth with example.
  - b) Explain the procedure to conduct the Knowledge Audit
- 6
  - a) Explain the procedure involved in 'Designing the KM Team'
  - b) Describe each layer of KM system architecture.
- 7
  - a) Explain leadership and reward structures
  - b) Discuss legacy development methods and results driven incremental methodologies
- 8
  - a) Discuss real-options analysis to prioritize knowledge management investments.
  - b) Write about measuring inputs for real-options models for knowledge valuation.