

**Model Question Papers:**

**I sem MCA**

**P.E.S COLLEGE OF ENGINEERING,MANDYA-571401**  
(An Autonomous Institution Under VTU Belgaum)  
**Department of Master of Computer Applications**

**Mathematics (P08MCA101A)**

**Credits: 05(4:1:0)**

**Max.Marks:100**

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**NOTE:- Answer any FIVE full questions.**

1. a) If  $\sin\theta = \frac{3}{4}$  ( $\theta$  is acute angle), find the values of i)  $\cos\theta$  ii)  $\tan\theta$   
b) With usual notations, prove that  $\cos(A+B) = \cos A \cos B - \sin A \sin B$   
c) Prove that  $(1 + \cos\theta + \sin\theta)^n + (1 + \cos\theta - i \sin\theta)^n = 2^{n+1} \cos^n \frac{\theta}{2} \cos\left(\frac{n\theta}{2}\right)$

2. a)  $\cos\alpha + \cos\beta + \cos\gamma = 0 = \sin\alpha + \sin\beta + \sin\gamma$  Prove that  
i)  $\cos 3\alpha + \cos 3\beta + \cos 3\gamma = 3\cos(\alpha + \beta + \gamma)$   
ii)  $\sin 3\alpha + \sin 3\beta + \sin 3\gamma = 3\sin(\alpha + \beta + \gamma)$   
b) Express  $\cos^8 x$  in terms of cosine series  
c) Find the cube root of  $1 + i$  and represent them in the Argand diagram.

3. a) Define the following with example i) Square matrix ii) Symmetric matrix  
iii) Orthogonal matrix

b) If  $A = \begin{pmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{pmatrix}$   $B = \begin{pmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{pmatrix}$  and  $C = \begin{pmatrix} 4 & 1 & 2 \\ 0 & 3 & 2 \\ 0 & -2 & 3 \end{pmatrix}$

Verify that  $A(B+C) = AB + AC$ .

c). Find the rank of the matrix  $\begin{pmatrix} 0 & 1 & -3 & -1 \\ 0 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{pmatrix}$

**Contd...2**

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- 4.a) Test the consistency and hence solve:  $2x + 5y + 7z = 52$ ,  $2x + y - z = 0$ ,  $x + y + z = 9$ .

b) Find eigen values and eigen vectors of  $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$

c) Using Cayley – Hamilton theorem, find the inverse of the matrix  $\begin{pmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{pmatrix}$

5. a). Find the  $n^{\text{th}}$  derivative of i).  $e^{-x} \cos^2 x$  ii).  $\frac{x}{(x-1)(2x+3)}$

b). If  $y = a \cos(\log x) + b \sin(\log x)$ , prove that  $x^2 y_{n+2} + (2n+1)xy_{n+1} + (n^2+1)y_n = 0$

c). Differentiate  $\log(\sin x) + e^{\sin^{-1} x}$  w.r.t  $x$ .

6. a) Show that the pairs of curves  $r = a(1 + \cos \theta)$  &  $r = b(1 - \cos \theta)$  intersect Orthogonally

b) Find the pedal equations the curve  $r^2 \sin 2\theta = a^2$

c) Evaluate  $\lim_{x \rightarrow 0} \left( \frac{a^x + b^x + c^x + d^x}{4} \right)^{1/x}$

7. a) Evaluate i)  $\int \frac{1}{(2x+3)^3} dx$  ii)  $\int \frac{1}{1+e^x} dx$

b) Evaluate  $\int \frac{1}{5+3\cos x} dx$

c) Evaluate  $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx$

8. a) Solve:  $\frac{dy}{dx} = \cos(x+y+1) = -$

b). Solve:  $r \sin \theta - \cos \theta \left( \frac{dr}{d\theta} \right) = r^2$

c). Solve:  $(2xy + y - \tan y)dx + (x^2 - x \tan^2 y + \sec^2 y)dy = 0$

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**P.E.S COLLEGE OF ENGINEERING,MANDYA-571401**  
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**Department of Master of Computer Applications**

**Accounting and Financial Management (P08MCA101B)**

**Credit: 5**

**Max Marks:100**

**Note : Answer any FIVE full questions**

- 1 a. What do you mean by Marginal costing? Discuss its usefulness and limitation. (05 Marks)  
b. Using information given below, prepare income statement under absorption costing and marginal costing for the month of June and July.

i) Data per unit

Selling price	Rs. 50
Material cost	Rs.18
Labour cost	Rs.4

Variable overheads

Rs.3 ii) Monthly cost.

Fixed production cost Rs. 99,000:Fixed administration cost Rs.40, 000; Variable selling cost 10% of sales revenue; Normal production capacity 11,000 units p.m.; sales in units June 10,000 July 12,000.Production in units June - 12000, July - 10,000

(15 Marks)

- 2 a. What is profit volume ratio? How do you improve it? (05 Marks)

b. Swathi Ltd., a multiproduct company furnishes you the following data relating to the year 2004.

1 half of the year 2 half of the year

Total sales	Rs. 4,50,000	5,00,000
Total cost	Rs.4, 00,000	4,30,000

Calculate for the year:

i)profit volume ratio

ii)Break even sales

iii) Sales required to make a profit of Rs. 1,00,000,

iv) Profit when sales are Rs. 7,00,000

v) Percentage of margin of safety.

(15 Marks)

- 3 a. "Cost Accounting has come to an essential tool of management" comment. (05 Marks)  
 b. From the following particulars prepare cost sheet for the year ended 31-12-01

	Rs.
Stock of finished goods [1-1-01]	6000
Stock of raw materials [1-1-0]	40,000
Work in progress [1-1-01]	15,000
Purchase of raw materials	4,75,000
Carriage Inward	12,500
Factory rent and taxes	7,250
Other production expenses	43,000
Stock of finished goods [31-12-01]	15,000
Wages	1,75,000
Works manager salary	45,000
Power expenses	9,500
Selling expenses	4,250
General expenses	32,500
Sales for the year	8,60,000
Stock of raw materials [31-12-01]	50,000
Work in progress [31-12-01]	10,000

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Discrete Mathematical Structures (P08MCA102)**

**Credit :5**

**Time :3 hrs**

**Max.Marks:100**

Note: Answer any FIVE full questions

1. a. Verify whether the following statements are tautologies or not
  - i)  $(p \rightarrow) (p \vee q)$
  - ii)  $(p \rightarrow q) \rightarrow (\neg q)$
  - iii)  $((p \wedge Q) \rightarrow Q)$  (06 Marks)
- b. Prove that for any three propositions P, Q, R  
 $(\neg p \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (p \wedge R) \Leftrightarrow R$  (06 Marks)
- c. Obtain the principal disjunctive normal form of  $(p \wedge Q) \vee (p \wedge R) \vee (Q \wedge R)$  (04 Marks)
- d. Express symbolically and negate "all integers are rational numbers." (04 Marks)
  
2. a. Let A, B, C be any three sets. Then
  - i) Show that  $(A - B) - C = A - (B \cup C)$
  - ii) Show that  $(A - B) - C = (A - C) - (B - C)$  (06 Marks)
- b. State principle of mathematical induction.  
 $P \ T \ 1 + 5 + 9 + \dots + (4n-3) = n(2n-1)$  for all positive integers. (07 Marks)
- c. A five person committee having members  $M_1, M_2, M_3, M_4$  and  $M_5$  is to select a President, Vice-President and secretary.
  - i) How many selections exclude  $M_1$ ?
  - ii) How many selections include  $M_2$  and  $M_3$ ?
  - iii) How many selections are there in which  $M_5$  is President? (07 Marks)
  
3. a. Let R be a binary relation from A to B. Define converse of R. If R is reflexive, is  $R^{-1}$  necessarily reflexive? If R is symmetric, is  $R^{-1}$  necessarily symmetric? If R is transitive, is  $R^{-1}$  necessarily transitive? (07 Marks)
- b. Define a compatible relation. Let  $Z^+$  be the set of all positive integers and R be a relation on  $Z^+$  defined by  $(a, b) \in R$  if and only if a - b is divisible-by S. Prove that R is compatible relation on  $Z^+$  and also obtain corresponding cover of  $Z^+$ . (07 Marks)
- c. Define transitive closure. Write the Warshall's algorithm for finding the transitive closure. (06 Marks)
  
4. a. Define partitions of a set. Let R be a symmetric and transitive relation on a set A. Show that if for every a  $\in$  A, there exists b  $\in$  A, such that  $(a, b) \in R$ , then R is an

- equivalence relation. (06 Marks)
- b. Let  $(A,R)$  be a poset with  $B$  subset of  $A$ . Define (08 Marks)
- Lower bound of  $B$
  - Upper bound of  $B$
  - Greatest lower bound of  $B$
  - Least upper bound of  $B$
- c. Define a partially ordered set draw the hasse diagram of the relation  $R$  defined as exactly divides on  $A = \{ 2,3,6,12,24,36,72 \}$  (06 Marks)
- 5 a. Let  $f: X \rightarrow Y$  be a function and  $A \subseteq X$ . Define restriction of  $f$  to  $A$  with one example. If  $|X| > |Y|$  then prove that at least two elements of  $X$  has the same image in  $Y$  (06 Marks)
- c. Define a characteristic function of a set. Employing characteristic functions, prove that, for any three sets  $A, B, C$ .  
 $An (B \cup C) = (An B) \cup (An C)$  (07 Marks)
- 6 a. Define a simple path and simple circuit of a graph. In a graph with  $n$  vertices, if there is a path from vertex  $V_1$  to vertex  $V_2$ , then prove that there is a path of no more than  $n - 1$  edges from vertex  $V_1$  to vertex  $V_2$ . (07 Marks)
- b. Define an eulerian path. Prove that a graph possesses an eulerian path if it is connected and has either zero or two vertices of odd degree. (07 Marks)
- c. Define a spanning tree. Write the algorithm to find minimum spanning tree. (06 Marks)
- 7 a. Define multi graph, simple graph, Hamiltonian graph with one example each. (06 Marks)
- b. Show that a tree with  $n$  vertices has  $n - 1$  edges. (07 Marks)
- c. Define homomorphism of semigroups and mono ids. Let  $G$  be a group with respect  $*$ . Prove that left and right cancellation law is true for all elements in  $G$ . (07 Marks)
- 8 a. Prove that any two right cosets are either identical or disjoint. (06 Marks)
- b. If  $H$  and  $K$  are normal subgroups of a group  $G$ . Show that  $H \cap K$  is normal subgroup of  $G$ . Is  $H \cup K$  is normal subgroups of  $G$ ? Explain your answer. (06 Marks)
- c. State and prove Lagranges theorem (08 Marks)

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**PES COLLEGE OF ENGINEERING, MANDYA – 571 401**  
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**Department of Master of Computer Applications**

**Fundamentals of Computer Organization (P08MCA103)**

**Credit :5**

**Time: 3 hrs.**

**Max. Marks: 100**

**Note: Answer any FIVE full questions.**

1. a. Perform the following conversions.  
i)  $(AB6)_{16} = ( )_{10}$       ii)  $(310)_8 = ( )_{10}$       iii)  $(1001)_2 = ( )_{10}$       **(06 Marks)**  
b. Convert the following Binary number to Decimal number.  
i)  $(10.011010101)_2 = ( )_{10}$       ii)  $(11.011)_2 = ( )_{10}$ .      **(06 Marks)**  
c. i) Simplify and Implement it with only OR and NOT gates.  
 $F' = XY + X'Y' + Y'Z'$   
ii) Simplify and Implement it with only NAND Gates.  
 $F = AC' + ACE + ACE' + A'CD' + A'D'E'$ .      **(08 Marks)**
2. a. State and Prove De - Morgan;s Theorem.      **(06 Marks)**  
b. Determine the minimal SOP and minimal POS for the Boolean function.  
 $f(W, X, Y, Z) = \sum (0,3,4,7,8) + \sum d(10, 11, 12,14,15)$ .      **(04 Marks)**  
c. What is Full adder? With the truth table of full adder obtain logical expression for sum and carry terms and implement the same using two Half adder?      **(10 Marks)**
3. a. With neat Block diagram, explain various functional units of a computer.      **(10 Marks)**  
b. What is a bus? Explain single bus structure in architecture.      **(10 Marks)**
4. a. Explain the following : i) Big- Endian format    ii) Little – Endian format      **(04 Marks)**  
b. What is an addressing mode? Explain different addressing modes.      **(10 Marks)**  
c. Write an assembly language program to find sum of “N” numbers.      **(06 Marks)**
5. a. What are interrupts? Explain two approaches to handling multiple devices.      **(06 Marks)**  
b. What is bus arbitration? Explain two approaches to handle bus arbitration.      **(08 Marks)**  
c. Explain synchronous bus structure with timing diagram.      **(06 Marks)**
6. a. Explain working of a static RAM cell.      **(05 Marks)**  
b. What is the use of cache memories? Explain any one cache mapping function.      **(06 Marks)**  
c. Explain the Internal Organization of a  $2M \times 8$  dynamic memory chip.      **(10 Marks)**
7. a. Explain Booth's algorithm to multiply two signed integers. Illustrate with an example.      **(10 Marks)**  
b. With a neat diagram, explain floating point addition / subtraction unit.      **(10 Marks)**
8. Write short notes on:  
a. RISC and CISC  
b. Assembler Directives  
c. IEEE standards for floating point numbers  
d. Zero, One, Two, Three address instructions.      **(20 Marks)**

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**Problem Solving using 'C' (P08MCA104)**

**Credit :5**  
**Time :3 hrs**  
**Max.Marks:100**

Note : **Answer any FIVE full questions**

1. a. What is an algorithm? Give and explain the characteristics of an algorithm.  
(06 Marks)  
b. Give a precise algorithm to find the GCD (Greatest Common Divisor) of two numbers.  
Hand simulate the algorithm for the numbers 27 and 18. (06 Marks )  
c. What are the simple data types supported by C programming language? Give and explain  
the syntax of declaring the variables of these types, using examples (08 Marks)
2. a. What are bitwise operators? Explain the bitwise operators supported by C language  
Using examples. (06 Marks)  
b. Write a C program to find the roots of the equation  $ax^2 + bx + c = 0$ , your program should  
read the values of a, b and c from the keyboard. (08 Marks)  
c. Give the precedence of arithmetic operators in C language. Give the valid 'C' expressions  
for the following arithmetic expressions, also indicate the steps of computation  
for  $x = 5, y = 10$ . i)  $x^3 + 3x^2 + 4y - 10$  ii)  $x^2 y^2 + x^3 y + 4xy + 20$ . (06 Marks)
3. a. Briefly describe the syntax of printf and scanf functions using examples. (04 marks)  
b. Write a 'C' program to input a number from 0-9 and display the number in word  
using  
if / if-else statements (Eg: 4 --> Four). (08 Marks)  
c. Write a 'C' program to find the least amongst three numbers using ternary  
operators only. (08 Marks)
4. a. Explain the looping structures supported by C programming language. Differentiate  
the looping structures using flowcharts. (06 Marks)  
b. Describe the continue, break and exit statements using examples. (06 Marks)  
c. Write C program to find the sum of even numbers and sum of odd numbers  
separately from amongst the natural numbers from 1 to n. The program should read the  
value of n from the keyboard. (08 Marks)
5. a. What is an array? Explain the syntax of declaring the two dimensional array.



- (04 Marks)
- b. Write a 'C' program to read a  $m \times n$  two dimensional array and exchange the elements of the first and last row. (08 Marks)
- c. Write a C program to sort N numbers using a bubble sort technique. (08 Marks)
6. a. What is a character array? With examples explain how to input strings from keyboard.
- b. Write a C program to input a string and print its reverse without using library functions. (08 Marks)
- c. What is a user-defined function? Write a C program using functions to evaluate the expression  $3x^2 + \sin x$ . The value of x is to be passed to the function. (Library function can be used to compute  $\sin x$ ). (07 Marks)
7. a. What is a Structure? Give the syntax for defining a C structure. Also explain how the individual members of the structure are accessed. (06 Marks)
- b. What is a pointer? With the help of a diagram explain how to access a variable through its pointer. (06 Marks)
- c. Write a C program to create a copy of a text file. (08 Marks)
8. Briefly explain the following:
- |                              |                            |
|------------------------------|----------------------------|
| a. Dynamic memory allocation | b. Preprocessor directives |
| c. Pointers and arrays       | d. Unions.                 |
- (20 Marks)

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**PES COLLEGE OF ENGINEERING, MANDYA – 571 401**  
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**Department of Master of Computer Applications**

**Professional Communications and Ethics (P08MCA105)**

**Credit :5**

**Time: 3 hrs.**

**Max. Marks: 100**

**Note: Answer any FIVE full questions.**

- 1 a. Explain the process of communication. (10 Marks)  
b. What are the various levels of human communication? Explain inter personal communication. (10 Marks)
- 2 a. What are the communication barriers that crop up in message formation and delivery ? List and explain the causes for intra personal barriers. (10 Marks)  
b. Explain the impact of technology for communication. (10 Marks)
- 3 a. How listening is an important skill? Explain the traits of a good listener. (10 Marks)  
b. What is body language? Explain the non-verbal communication Kinesics (10 Marks)
- 4 a. Discuss the importance of group communication. (10 Marks)  
b. Explain how you will prepare and conduct meeting. (10 Marks)
- 5 a. What is a Research Paper? Explain how research papers are prepared. (10 Marks)  
b. Why fostering good business ethics is important? (10 Marks)
- 6 a. Explain the professional code of ethics and its benefits. (10 Marks)  
b. Discuss the different aspects of right of privacy. (10 Marks)
- 7 a. What is data encryption? Explain how public key encryption work. (10 Marks)  
b. What is whistle blowing? Outline the steps a whistle blower should consider while dealing such situation. (10 Marks)
- 8 Write short notes on:  
a. Grapevine  
b. Proxemics  
c. Spyware  
d. Safety-critical system. (20 Marks)



**II sem MCA:**

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**Business Data Processing With COBOL (P08MCA201)**

**Credits: 06(4:1:1)**

**Max. Marks:100**

**Time :3 hrs**

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**Answer any five of the following:**

1. a. Write the COBOL coding sheet and explain. Explain the significance of each area in COBOL. 05 Marks
- b. What are literals? Explain various types of literals that are supported by COBOL. 05 Marks
- c. Why level numbers are used in COBOL explain? When the special level numbers are used in COBOL. 05 Marks
- d. What are user defined data names? List the rules for defining them. 05 Marks
2. a. Explain the sections that comes under environment division and data division. 04 Marks
- b. What is a picture clause? Discuss all the basic picture code characters. 04 Marks
- c. Explain any two editing and two floating insertion characters with example. 04 Marks
- d. Discuss how variables can be initialized in working-storage section and procedure division with suitable examples. 08 Marks
3. a. Mention and explain two sequence control verbs with example. 04 Marks
- b. Write a simple program to read the records from a file and write onto another file. 08 Marks
- c. With examples discuss different types of divide and multiply verb. 08 Marks
4. a. Why usage clause is used in COBOL? Explain synchronized clause. 06 Marks
- b. Compare rounded option and on size error option. 04 Marks
- c. Explain the following with the examples.  
        (i) Add corresponding      (ii) Alter statement      (iii) Sign clause  
        (iv) Next sentence      (v) Justified clause. 10 Marks
5. a. With example explain condition-name condition and class condition. 06 Marks
- b. Explain how looping is performed in COBOL with any two syntax. 06 Marks
- c. Explain occurs depending clause and indexing. 08 Marks
6. a. In which dimension search verb is used. Write a COBOL program using search verb to search a given name in a table. 08 Marks
- b. Read the file and count the number of customers having balance > Rs 50,000/- 12 Marks
7. a. Write a interactive program using relative file approach to update a record and display the record. 10 Marks
- b. Discuss the structures and uses of various clauses to be defined in file-control paragraph for an index sequential file and relative file. 10 Marks
8. Write a short notes on :

- a. Merge verb.
- b. Subroutine in COBOL.
- c. Screen section.
- d. Redefine clause.

20 Marks

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**Introduction to Unix (P08MCA202)**

**Credits: 05(3:1:1)**

**Max. Marks:100**

**Time :3 hrs**

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1. a. Explain the command, with options to record a session. (03 Marks)  
b. Explain 3 file categories. (06 Marks)  
c. Explain UNIX file system with tree structure diagram. (05 Marks)  
d. Explain Absolute path name and relative pathname with example. (06 Marks)
2. a. Explain three modes of vi editor. (07 Marks)  
b. Explain ls -l with example. (07 Marks)  
c. Explain i) cmp ii) comm. iii) diff. (06 Marks)
3. a. What are file permissions? How permissions of a regular file may be manipulated? Discuss. (08 Marks)  
b. Explain chown, chgrp, and umask commands. (06 Marks)  
c. What are positional parameters? How are they useful in shell script? Discuss. (06 Marks)
4. a. What is a shell program? How shell programs are executed? Write a note on read statement. (08 Marks)  
b. Explain cut, sort and tr commands with example. (06 Marks)  
c. Write a shell script to find smallest of three numbers that are read from keyboard. (06 Marks)
5. a. Explain Mechanism of process creation in detail. (10 Marks)  
b. Explain the following commands i) ps ii) nice iii) no hup iv) kill with examples (10 Marks)
6. a. Explain the grep, egrep, fgrep with examples. (08 Marks)  
b. Explain Hard link and Symbolic link with example. (06 Marks)  
c. Write a shell script to find a file with largest size in a given directory and print it. ( Program should recursively search files within subdirectories also) (06 Marks)
7. a. Who is a super user? What are his duties, responsibilities and privileges? Discuss. (10 Marks)  
b. Write a shell script using expr command to read in a string and display a suitable message if it does not have at least 10 characters. (06 Marks)  
c. Write a note on df and tar commands. (04 Marks)
8. a. Discuss the structure of an awk script. Explain any 3 awk built in variables with an example for each. (08 Marks)  
b. Write a shell script that compute gross salary of an employee, according to the rule given below. The Basic salary is input interactively through the keyboard.  
If basic salary is < 15000 then HRA = 10 % of the basic and DA = 90% of the basic.  
If basic salary is >= 15000 then HRA = 500 and DA = 98% of the basic. (08 Marks)  
c. Write a note on shell function. (04 Marks)

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**Data Structures Using C (P08MCA203)**

**Credits: 06(4:1:1)**

**Max. Marks:100**

**Time :3 hrs**

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1. (a). Discuss the different data types supported by 'C'. (08)  
(b). How arrays are organized in memory? Explain how the elements are addressed in one dimensional and two dimensional arrays with examples. (08)  
(c). Discuss the significant difference between structure and Union in 'C' with example. (04)
2. (a). Write algorithm for performing PUSH and POP operations with respect to a STACK (06)  
(b). Convert the following infix expression into prefix and postfix expression ((A-(B+C))\*D)/(E+F) (08)  
(c). Write a recursive algorithm to find the factorial of a given number. (06)
3. (a). Explain the working principle of a general QUEUE. Discuss the advantages and disadvantages of different types of queues. (10)  
(b). Write an algorithm to perform insertion and deletion operation with respect to a queue using arrays. (10)
4. (a). write an algorithm to create a circular queue using linked list. (08)  
(b). Write an algorithm to create a list where each node will contain student details such as USN, name and percentage. Delete a node based on the given USN (12)
5. (a). Write a algorithm to create a binary tree (08)  
(b). Construct a BST for given elements and perform In order, Preorder, and post order traversals.  
100 50 160 40 15 120 4 180 (12)
6. (a). Write an algorithm for D.F.S (06)  
(b). Write an algorithm for performing quick sort for N numbers (08).  
(c). Construct an ascending heap for the following list of numbers.  
25 57 48 37 12 92 86 33 (06)
7. (a). Define index sequential search. Create a table and search for a record in the table using same. (12)  
(b). What is hashing? How collision are resolved in hashing. (08)
8. Write a short notes on : (5x4=20)  
i). ADT ii). Dynamic memory allocation  
iii). Parameter passing mechanism iv). Advantages of linked lists over arrays.

## Department of Master of Computer Applications

### Management Information System (P08MCA204)

Credits: 04(3:1:0)

Max. Marks:100

Time :3 hrs

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#### Note: Answer any Five full questions

1. a) Define a system and explain the various types of systems? (08 Marks)  
b) Explain waterfall system development model. (04 Marks)  
c) Define information. Explain the attributes of information. (08 Marks)
2. a) What are the characteristics of information? Explain with a neat diagram human as an information process. (07 Marks)  
b) Elaborate on Negandi Estfen model for analysis of management. (08 Marks)  
c) Explain with example goals, objectives and targets. How are they relevant to MIS. (05 Marks)
3. a) Explain the different types of strategies with suitable examples. (08 Marks)  
b) Explain the prototype approach and life cycle approach and also compare those approaches. (12 Marks)
4. a) Illustrate the key dimensions of change management. (06 Marks)  
b) What are the four most important factors you would use in evaluating computer hardware and software? Explain why. (08 Marks)  
c) What is Business Process Re-engineering (BPR)? What is role of IT in BPR. (06 Marks)
5. a) Explain briefly TQM of information system. (08 Marks)  
b) Explain data processing system. (04 Marks)  
c) What are the methods for deciding decision alternatives? Explain in detail any two methods. (08 Marks)
6. a) List the problems arise while making rational decision? Explain. (08 Marks)  
b) What is ERP? Discuss its benefits, challenges and causes of failures. (12 Marks)
7. a) With a neat diagram, explain the client-server architecture model. (10 Marks)  
b) Elaborate on the variety of hardware and software that are used to make the Internet functional and effective. (10 Marks)
8. Write a short note on :
  - a) Deterministic v/s probabilistic
  - b) The law of requisite variety
  - c) Model of E-business
  - d) CRM(20 Marks)

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**

**(An Autonomous Institution Under VTU Belgaum)**  
**Department of Master of Computer Applications**

**Operation Research (P08MCA205)**

**Credits: 04(3:1:0)**

**Max. Marks:100**

**Time :3 hrs**

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**Note: Answer any FIVE full questions.**

1. a. Define Operation Research. List six main phases of operation research and briefly explain a linear programming model. (10 Marks)
  
- b. A glass company has three plants. Aluminum frames are hardware are made in plant 1, wood frames are made in plant 2, and plant 3 produces the glass and assembles the products. The top management has decided to revamp the company's product line. Unprofitable products are being discontinued, releasing production capacity to launch two new product having large scale potentials.  
 Product 1: An 8 - foot glass door with aluminum framing.  
 Product 2: A4 x 6 foot double - hung wood framed window. The following data for the glass company is obtained" Find a LP model for the problem. (10 Marks)

Plant	Production Time per batch, hours		Production Time available per week, hours
	1	2	
1	1	0	4
2	0	2	12
3	3	2	18
Profit per batch	RS.30-	RS.50-	,

2. a. Old hens can be bought at Rs.20 each and young ones at Rs.50 each. The old hen lay 3 eggs per week and the young one lay 5 eggs per week, each egg being worth Rs.3. A hen costs RS.10 per week to feed. I have only Rs.800 to spend on the hens. How many of each kind should I buy to give a profit of more than Rs.60 per week? Assume that I cannot house more than 60 hens. Solve it graphically. (10 Marks)
  - b. Explain the following
    - a) A standard form of the LPP.
    - b) Feasible solution.
    - c) Optimal solution.
    - d) Slack and surplus variables.
    - e) Basic solution of a LPP.(10 Marks)
  
3. a. Solve the following LPP by simplex method.  

$$\text{Max } Z = 3x_1 + 2x_2$$
 Subjected to  $x_1 + x_2 \leq 4$   
 $x_1 - x_2 \leq 2$   
 $x_1, x_2 \geq 0$  (10 Marks)



- b. Use Big – M method to solve  
 Minimize  $Z = 2x_1 + x_2$   
 Subject to  $3x_1 + x_2 = 3$   
 $4x_1 + 3x_2 \geq 6$   
 $x_1 + 2x_2 \leq 3$ , Where  $x_1, x_2 \geq 0$  (10 Marks)

4. a. Use Two – Phase method to  
 Minimize  $Z = 7.5x_1 - 3x_2$   
 Subjected to  $3x_1 - x_2 - x_3 \geq 3$   
 $x_1 - x_2 + x_3 \geq 2$ , Where  $x_1, x_2, x_3 \geq 0$  (10 Marks)

- b. Use dual simplex method to solve  
 Max  $Z = -3x_1 - 2x_2$   
 Subjected to  $x_1 + x_2 \geq 1$   
 $x_1 + x_2 \leq 7$   
 $x_1 + 2x_2 \geq 10$   
 $x_2 \leq 3$ , Where  $x_1, x_2 \geq 0$  (10 Marks)

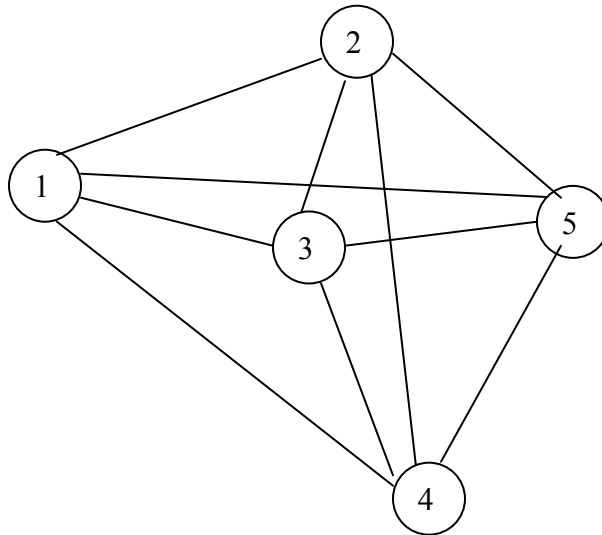
5. a. State weak duality property and strong duality property and Duality theorem. (06 Marks)

b. Briefly explain the role of Duality theory in sensitive analysis . (07 Marks)

c. Write the dual of the LPP

$$\begin{aligned} \text{Minimize } Z &= 2x_1 + 3x_2 + 4x_3, \\ \text{Subject to } 2x_1 + 3x_2 + 5x_3 &\geq 2, \\ 3x_1 + x_2 + 7x_3 &= 3, \\ x_1 + 4x_2 + 6x_3 &\leq 5, \\ x_1, x_2 &\geq 0 \text{ and } x_3 \text{ is unrestricted.} \end{aligned} \quad (07 \text{ Marks})$$

6. a. Solve the traveling salesman problem shown below where city 1 is his home city. (10 Marks)



- b. Briefly explain three prominent types of metaheuristics. (10 Marks)

7. a. Solve the following transportation problem. (10 Marks)

Source	Destination				Availability
	A	B	C	D	
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Requirement	6	10	12	15	43

b. Solve the following assignment problem. (10 Marks)

	I	II	III	IV	V
1	11	17	8	16	20
2	9	7	12	6	15
3	13	16	15	12	16
4	21	24	17	28	26
5	14	10	12	11	13

8. a. Reduce the following game by dominance and find the game value. (10 Marks)

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

b. Solve the game given below by graphic method. (10 Marks)

		B			
		y <sub>1</sub>	y <sub>2</sub>	y <sub>3</sub>	y <sub>4</sub>
A	x <sub>1</sub>	19	6	7	5
	x <sub>2</sub>	7	3	14	6
	x <sub>3</sub>	12	8	18	4
	x <sub>4</sub>	8	7	13	-1

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
(An Autonomous Institution Under VTU Belgaum)  
**Department of Master of Computer Applications**

**System Programming (P08MCA301)**

**Credits : 05(3:1:1)**

**Max. Marks : 100**

**Time : 3 hrs**

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**Note: Answer any *FIVE* full questions.**

1. a. Define System Software. Give examples for System Software Write the difference between system software and application software. (06 Marks)  
b. Explain the data formats, instruction formats and addressing modes of SIC/XE Machine architecture. (10 Marks)  
c. List the differences between CISC and RISC machines (04 Marks)
2. a. Discuss the need for a two pass assembler and explain its functions. (08 Marks)  
b. What are assembler directives? Explain the following assembler directives  
i) EQU ii) START iii) LOCCTR  
c. What is Program relocation? How will you solve the relocation problem?(06 Marks)
3. a. Differentiate between a Literal and immediate operand with an example. (04 Marks)  
b. Explain MASM assembler in detail. (10 Marks)  
c. How Forward references are handled in multipass assembler? (06 Marks)
4. a. Mention the basics functions of a loader. Explain the concept of Absolute loader (10 Marks)  
b. With reference to Loader design options Explain the concept of Linking loader and Linkage Editor with a neat diagram (10 Marks)
5. a. Explain the structure of a text editor in detail. (10 Marks)  
b. Explain different Data structures we used in a Macro processors (10 Marks)
6. a. What do you mean by a Macro. Explain macro definition and expansion with proper example. (10 Marks)  
b. Explain with reference to Macro processor (10 Marks)  
i) The concept of Concatenation of Macro  
ii) Parameters and Generation of Unique Labels
7. a. Explain the structure of LEX program with an example. (08 Marks)  
b. Write a LEX program to count the number of characters, words and lines in a given file. (06 Marks)  
c. Explain following terms with respect to LEX with an example (06 Marks)  
i) yylex() ii) yywrap() iii) yyin()

8. Write a Short note on: (20 Marks)
- a. Automatic Library search
  - b. Dynamic Linking
  - c. MS Dos Linker
  - d. Symbol Defining Statements

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
(An Autonomous Institution Under VTU Belgaum)  
**Department of Master of Computer Applications**  
**Computer Networks (P08MCA302)**

**Credits : 05(4:1:0)**

**Max. Marks : 100**

**Time : 3 hrs**

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*Note: Answer any FIVE full questions.*

- 1 a. What is Multiplexing? Explain the working of STDM and FDM with their limitations. 5  
b. Explain the functionalities of OSI model and Internet Architecture. 10  
c. Consider a point – to – point link 20km in length. At what bandwidth would propagation delay (at a speed of  $2 \times 10^8$  m/sec) equal transmit delay for 100-byte packet? What about 512 – byte packets? 5
- 2 a. What is encoding? Explain the different encoding schemes with waveforms. 10  
b. Suppose we want to transmit the message 11001001 and protect it from errors using the CRC polynomial  $x^2 + 1$ .  
i) Use polynomial long division to determine the message that should be transmitted. 10  
ii) Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receivers CRC calculation? How does the receiver know that an error has occurred?
- 3 a. Explain ARQ stop and wait algorithm with time lines showing various scenarios. 10  
b. Explain the functionality of Ethernet (802.3). Give its frame format and merits and demerits. 10
- 4 a. Discuss the spanning tree algorithm for a particular LAN. 7  
b. Discuss IPV4 packet header with neat diagram. 6  
c. Explain the functional block diagram of a Router with its implementation. 7
- 5 a. Describe the Routing for Mobile Hosts with the help of a neat diagram. 10  
b. Explain inter domain Routing (BGP). Give an example of a network running BGP. 10
- 6 a. Explain the format for UDP header and UDP message queue. 6  
b. Describe the process for connection establishment and connection termination using Three – way Handshake protocol. 8  
c. Explain briefly effective resource allocation scheme. 6
- 7 a. What is DNA? Explain the DNS message format. 7  
b. Explain how SMTP plays a role in transferring Internet e – mail. 7  
c. Discuss the issues that affects the QoS of VoIP. 6
- 8 Write short notes on.  
a) SONET  
b) WiMAX (802.16) 20  
c) Internetwork.  
d) FTP.

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**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Object Oriented programming with C++ (P08MCA303)**

**Credits : 05(3:1:1)**

**Max. Marks : 100**

**Time : 3 hrs**

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*Note : Answer any FIVE full questions*

- 1 a. Explain the concept of object oriented programming. Bring out the salient structured programming & object oriented programming. (10 marks)
- b. Define Qualifiers. Explain its types with an example (06 marks)
- c. Explain how new & delete operators manage memory allocation dynamically (04 marks)
- 2 a. What are the advantages of using functions? Explain function prototyping and parameter passing mechanism. (10 marks)
- b. What is a generic function? Write a C++ program to create a template function for bubble sort and demonstrate the sorting of integers and floats. (10 marks)
- 3 a. Define class and object. With an example explain the concept of data encapsulation and accessing of member functions. (06 marks)
- b. What is friend function? Explain with a C++ program to demonstrate the usage of friend function. (10 marks)
- c. Explain static data members and static member functions. (04 marks)
- 4 a. Explain the concept of constructors and destructors with example. (07 marks)
- b. Write a note on scope resolution operator (03 marks)
- c. Explain operator overloading using friend functions for ++ and --. (10 marks)
- 5 a. What is inheritance? Explain how to pass parameters to base class constructors (10 marks)
- b. Explain the concept of inheriting multiple base classes. (04 marks)
- c. Explain the virtual base class concept with C++ program (06 marks)
- 6 a. Distinguish between virtual and pure virtual functions. (08 marks)
- b. Discuss how the virtual functions are hierarchical? (07 marks)
- c. What is early and late binding? (05 marks)
- 7 a. Create a class STRING & implement the following. Display the results by overloading the operator << after every operation.  
    STRING S 1 = "VTU"  
    STRING S 1 = " BELGAUM"  
    STRING S3 = S 1 + S2; Use copy constructor. (10 marks)
- b. What is a class template? Discuss class template with multiple arguments (10 marks)
- 8 Write short notes on the following:
  - a. this pointer
  - b. file input and output
  - c. Access specifiers
  - d. I/O streams in C++ (20 marks)

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**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Database Management System (P08MCA304)**

**Credits : 05(3:1:1)**

**Max. Marks : 100**

**Time : 3 hrs**

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**Note : Answer any FIVE full questions.**

- 1 a. With a neat diagram explain the architecture of Data Base Management Systems. (10 marks)
- b. Explain the three-schema architecture. (06 marks)
- c. What are the main responsibilities of DBA? (04 marks)
- 2 a. With a neat diagram, explain the main phases of the database design process. (08 marks)
- b. Write an ER diagram for a banking system by assuming atleast four entities. (08 marks)
- c. Define the following terms  
i) Weak Entity    ii) Descriptive attribute (04 marks)
- 3 a. Discuss the following with examples.  
i) Select    ii) Project    iii) division    iv) Cartesian product  
v) referential integrity constraints (10 marks)
- b. Consider the following relational schema and answer the following queries using relational algebra  
EMP (Name, SSN, Bdate, Address, Sex, Salary, SSSN, DNO)  
Department (Dname, DNO, MSSN, Msdate)  
Dept-Ioc (DNO, DLOC),  
Project (Pname, Pno, PLOC, DNO)  
Works - ON (ESSN, PNO, HOURS)  
Dependent (ESSN, Dname, Sex, Bdate, relationship)  
i) Retrieve the names of all Employees in dNO = 5 who work more than 10hrs/week on product 'X' project.  
ii) For each department retrieve the department name, and the average salary of all the Employees working in that department.  
iii) List the names of all department managers who have no dependents.  
iv) Retrieve the average salary of all female Employees. (10 marks)
- 4 a. Explain join operations in SQL (06 marks)
- b. Explain with example i) Create - both view and table ii) Alter  
iii) Delete iv) Update v) Insert (10 marks)
- c. Discuss views in SQL (04 marks)
- 5 a. Consider the following relations  
S(SNo, Sname, status, city)  
P(PNo, Pname, colour, weight, city)  
SP(SNo, PNO, Qty). Write the following queries in SQL.  
i) Get PNO for parts, which have more than two shipments.  
ii) Get SNO for suppliers who supply at least one part supplied by S2.  
iii) Retrieve the details of shipments whose quantity is known.  
iv) Retrieve all the parts cities and supplier cities.  
v) Create a view to select part name, color and Quantity supplied by the supplier 100. (10 marks)
- b. How are outer join operations different from the join operations? Explain the left outer join, right outer join and full outer join with examples. (10 marks)
- 6 a. Define:

- i) Functional dependency.
- ii) Multivalued Dependency. (05 marks)
- 7 b. Discuss Insertion, Deletion and Updation anomalies by taking suitable examples. (09 marks)
- c. Explain 3NF with an example. (06 marks)
- 7 a. Explain ACID properties of a transaction. (10 marks)
- b. Explain strict 2PL. (10 marks)
- 8 Write short notes on:
  - i) Data Models.
  - ii) Concurrency Control.
  - iii) Serializability.
  - iv) Check Pointing. (20 marks)

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**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
**(An Autonomous Institution Under VTU Belgaum)**  
**Department of Master of Computer Applications**

**Operating Systems (P08MCA305)**

**Credits : 05(4:1:0)**

**Max. Marks : 100**

**Time : 3 hrs**

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Note : Answer any FIVE full questions.

- 1 a. Explain in detail
  - i) Multi processor system
  - ii) Dual mode operations(10 marks)
- b. Explain the service provided by the operating system. (06 marks)
- c. Explain the layered architecture of the operating system. (04 marks)
- 2 a. What is process control block? Describe the contents of process control block. (06 marks)
- b. Differentiate among the short term, medium term and long term scheduling. (06 marks)
- c. Consider the following set of processes with the length of CPU burst given in milli secs.

Process	Burst time	Priority
P <sub>1</sub>	8	4
P <sub>2</sub>	2	1
P <sub>3</sub>	2	3
P <sub>4</sub>	3	3
P <sub>5</sub>	5	2

All processes arrived at time0 in the given order. Draw Gantt charts using FCFS, SJF, a non preemptive priority (a smallest number implies higher priority) and RR (quantum = 1) scheduling. Also find the average waiting time for each process for each scheduling algorithm. (08 marks)

- 3 a. Explain the resources allocation graph technique to detect dead lock in a system. (06 marks)
- b. What is safe state in a system (04 marks)
- c. Using the following snap shot of a system, answer the questions using Banker's algorithm

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P <sub>0</sub>	0	0	1	2	0	0	1	2	1	5	2	0
P <sub>1</sub>	1	0	0	0	1	7	5	0				
P <sub>2</sub>	1	3	5	4	2	3	5	6				
P <sub>3</sub>	0	6	3	2	0	6	5	2				
P <sub>4</sub>	0	0	1	4	0	6	5	6				

What is the content of need matrix? If a request from P<sub>2</sub> arrive for ( 1,0,0,2 ) can the request be granted immediately? (10 marks)

- 4 a. Define critical section problem and explain the necessary characteristics of a correct solution. (06 marks)
- b. What is fragmentation? Explain their types with examples. (06 marks)
- c. Explain paging hardware with translation look aside buffer. (08 marks)
- 5 a. What is a Page fault? What actions does operating system take when a page fault

- occurs? (08 marks)
- b. What are the causes of thrashing? (04 marks)
  - c. Explain 2-level directory system. (08 marks)
- 6 a. Explain the file allocation methods with their merits and demerits. (12 marks)
- b. Explain any four disk scheduling algorithm. (08 marks)
- 7 a. What is Access matrix? Discuss the implementation of Access matrix. (10 marks)
- b. Explain the concept of user authentication. (04 marks)
  - c. Explain inter process communication in Linux system. (06 marks)
- 8 Write short notes on any FOUR:
- a. System calls
  - b. Belady's Anomaly
  - c. Multi level feed back Queue.
  - d. Page replacement.
  - e. Recovery from deadlock. (20 marks)

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IV sem MCA

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
(An Autonomous Institution Under VTU Belgaum)  
**Department of Master of Computer Applications**

**Software Engineering (P08MCA401)**

**Credits : 05(4:1:0)**

**Max. Marks : 100**

**Time : 3 hrs**

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**Note : Answer any five full questions**

- |        |  |          |
|--------|--|----------|
| 1) a.) | What is software Engineering ? How is it different from system engineering. Explain system engineering process with a neat diagram                   | 10 marks |
| b.)    | What are the professional and ethical responsibilities of software engineers ? Explain system procurement process.                                   | 10 marks |
| 2) a.) | What are the different types of critical systems? Explain dimensions of dependability and security assurance.  | 10 marks |
| b.)    | In detail explain waterfall model. Mention its merits and demerits   | 10 marks |
| 3) a.) | What is DFD ? Write the symbols used in DFD's .Draw the context level diagram of an ATM system.  | 10 marks |
| b.)    | Explain the structure of requirement document.   | 10 marks |
| 4) a.) | List different stages of object oriented design. Explain any 2 stages. Explain modular decomposition styles.   | 10 marks |
| b.)    | In detail explain the principles of user interface design.   | 10 marks |
| 5) a.) | What is Agile methods. Explain the principles and problems with agile methods  | 10 marks |
| b.)    | Explain in detail software maintenance, its types, cost and cost factors.  | 10 marks |
| 6) a.) | What are the stages of Static Analysis. Explain in detail clean-room process with figure.  | 10 marks |
| b.)    | Explain in detail Stress testing, interface testing and structural testing.  | 10 marks |
| 7) a.) | What are the factors that leads to manage people. State different types of human needs hierarchy and also explain factors influencing group working. | 10 marks |
| b.)    | What are the different typed of estimation techniques. Explain COCOMO model for cost estimation.   | 10 marks |
| 8)     | Write short notes on :   | 5*4=20   |
| a)     | key challenges faced by software engineers.  |          |
| b)     | Types of requirements  |          |
| c)     | Risk management process  |          |
| d)     | Debugging and testing process  |          |

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Web Programming (P08MCA402)**

**Credits : 05(3:1:1)**

**Max. Marks : 100**

**Time : 3 hrs**

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**Note : Answer any five full questions**

1. a. What is a Web server? Explain its operation and characteristics. (06 Marks)
- b. Explain the phases of HTTP protocol. (06 Marks)
- c. Explain various types of lists that can be used in an HTML document, with an example. (08 Marks)
2. a. Write an HTML program to create a registration form with the following details.  
    ACCNo, AccType, Name, Password, Address, Gender, Date of Birth and also submit and reset button. (10 Marks)
- b. Explain various selector forms used in CSS with example. (10 Marks)
3. a. Explain Box model (Table property) with respect to CSS. (06 Marks)
- b. Briefly explain the uses of Java script. (04 Marks)
- c. Explain any five array methods used in Java script. (10 Marks)
4. a. Explain document object model structure for a simple document. (04 Marks)
- b. Explain the various events that can be handled in Java script. (10 Marks)
- c. Explain event propagation and event handler registration with respect to DOM2 event model. (06 Marks)
5. a. Explain different types of positioning elements with illustrations. (10 Marks)
- b. What is DTD? Explain how to declare elements, attributes, and entities in DTD. (10 Marks)
6. a. Explain XML schemas. (10 Marks)
- b. Mention different categories of variables in perl. Explain with an examples each. (10 Marks)
7. a. Write a perl program which creates a hash table containing country names keys and their capitals as values and perform the following:  
    i) Print all pair of values (country name and capital)  
    ii) Accept country name and print the capital of it. (10 Marks)
- b. What is CGI? How data can be passed in CGI using GET and POST methods, with example. (10 Marks)
8. Write short notes on:
  - a. Web browsers
  - b. Font properties with respect to CSS
  - c. XHTML document structure
  - d. Cookies. (20 Marks)

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Design and Analysis of Algorithms (P08MCA403)**

**Credits : 05(3:1:1)**

**Max. Marks : 100**

**Time : 3 hrs**

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- 1 a. What is an algorithm? Explain the various stages of algorithm design and analysis process using a flow chart. (10 Marks)
- b. Define the following:
- i) Special types of list.
  - ii) Paths and cycles.
  - iii) Sets and Dictionaries. (06 Marks)
- c. Convert the following rooted tree into a binary tree using the first child-next sibling representation. (04 Marks)

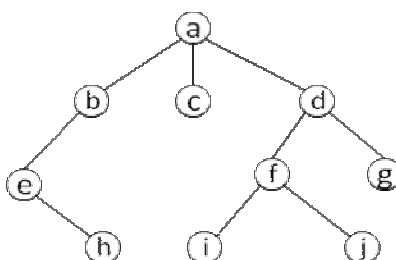
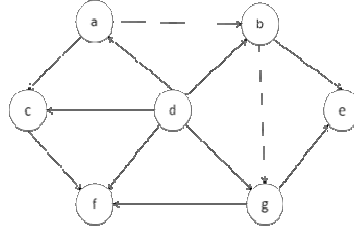


Fig.1(c)

- 2 a. List the steps involved in analyzing efficiency of non recursive algorithm. Write an algorithm to multiply two  $n \times n$  matrices and analyze. (12 Marks)
- b. Prove that: If  $t_1(n) \in O(g_1(n))$  and  $t_2(n) \in O(g_2(n))$   
then  $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$  (06 Marks)
- c. Solve the following recurrence relation:
- i)  $x(n) = x(n/2) + n$  for  $n > 1$ ,  $x(1) = 1$  ( solve for  $n = 2^k$  ) (02 Marks)
- 3 a. What is Brute force method? (02 Marks)
- b. Write the brute force string matching algorithm and analyse it for the time complexities. (08 Marks)
- c. Write a quick sort algorithm and apply it to sort the list E, X, A, M, P, L, E. (10 Marks)
- 4 a. Describe Strassen's matrix multiplication and evaluate the asymptotic efficiency. (10 Marks)
- b. Explain decrease-and-conquer algorithm design technique. what are its variations? (05 Marks)

- c. Apply the DFS-based algorithm to solve the topological sorting problem for the digraph shown in Fig.Q4(b).



(05 Marks)

- 5 a. Write the bottom-up heap construction algorithm. Using the above algorithm heapify the following list of numbers  
2, 7, 3, 6, 4, 8, 9 (08 Marks)

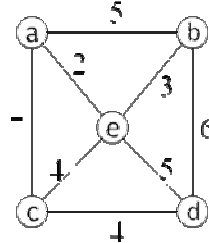
- b. Solve the following Knapsack problem using dynamic programming. (12 Marks)

Item	1	2	3	4
Weight	2	1	3	2
Value (Rs)	12	10	20	15

Capacity w=5

- 6 a. What is input enhancement? Apply this approach to design a linear sorting and trace the algorithm for the list of numbers-  
13, 11, 12, 13, 12, 12 (10 Marks)

- b. Explain Prim's algorithm and apply it for the following graph to find the minimum spanning tree. (10 Marks)



- 7 a. What is back tracking? Apply back tracking to solve the following instance of the subset sum of the given problem:  $S = \{1, 3, 4, 5\}$  and  $d=12$ . (10 Marks)

- b. Explain Branch-and-Bound technique and solve the assignment problem for the following instance. (10 Marks)

Cost Matrix

	Job I	Job II	Job III	Job IV
Person A	9	2	7	8
Person B	6	4	3	7
Person C	5	8	1	9
Person D	7	6	9	4

**8** Write short notes on:

- a. Johnson – Trotter algorithm for generating permutations
- b. 2-3 trees
- c. Huffman trees
- d. NP and NP-Complete problems

(20 Marks)

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**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
(An Autonomous Institution Under VTU Belgaum)  
**Department of Master of Computer Applications**

**Information Storage And Management (P08MCA414)**

**Credits : 05(4:1:0)**

**Max. Marks : 100**

**Time : 3 hrs**

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**Note: Answer any FIVE full questions**

- |  |           |
|--|-----------|
| <b>1. a)</b> Describe the key requirements of Data Center Elements.                                      | <b>5</b>  |
| <b>b)</b> Explain the activities of process of developing an ILM strategy and give the benefits of ILM.  | <b>5</b>  |
| <b>c)</b> With neat diagram explain Zoned Bit recording and Logical Block Addressing.                    | <b>7</b>  |
| <b>d)</b> What are Seek Time, Rotational Latency and Block Level Access.                                 | <b>3</b>  |
| <b>2. a)</b> Explain Nested RAID, RAID – 4 and RAID – 5 with neat diagram.                               | <b>12</b> |
| <b>b)</b> With a neat diagram explain the Read operation and Write operation with cache.                 | <b>8</b>  |
| <b>3. a)</b> Explain the Architecture of SCSI – 3 also explain SCSI – 3 client – server model.           | <b>10</b> |
| <b>b)</b> Explain with neat diagram different types of Zoning.   | <b>10</b> |
| <b>4. a)</b> Explain the different factors that affects NAS performance at different levels.             | <b>10</b> |
| <b>b)</b> With neat diagram explain the Topologies for iSCSi connectivity.                               | <b>10</b> |
| <b>5. a)</b> Explain the Features and Benefits of CAS.   | <b>7</b>  |
| <b>b)</b> Define the different types of Archives based on the means of access.                           | <b>3</b>  |
| <b>c)</b> Explain the different forms of virtualization.   | <b>10</b> |
| <b>6. a)</b> With neat diagram explain single point of failure and Fault tolerance in failure analysis.  | <b>10</b> |
| <b>b)</b> With neat diagram explain server based backups and serverless backups in NAS environment.      | <b>10</b> |
| <b>7. a)</b> Explain with neat diagram pointer based virtual replication.                                | <b>10</b> |
| <b>b)</b> Explain with neat diagram Storage Array based Synchronous and Asynchronous remote replication. | <b>10</b> |
| <b>8. a)</b> Write short notes on  |           |
| i) Controlling user Access to Data   |           |
| ii) Protecting the Storage Infrastructure  |           |
| iii) Data encryption   |           |
| iv) Controlling administrative access  | <b>10</b> |
| <b>b)</b> Explain the different Storage Management Activities.   | <b>10</b> |

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**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Topics in Enterprise Architecture - 1 (P08MCA421)**

**Credits : 05(4:1:0)**

**Max. Marks : 100**

**Time : 3 hrs**

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**Note : Answer any FIVE full questions**

- 1) a. Explain the special features of Java (08 Marks)  
b. What is type casting? Illustrate with an example. What is meant by automatic type promotion? (08 Marks)  
c. Explain the operations of the following operators with examples:  
i) >>> ii) && (04 Marks)
- 2) a. Explain the following with examples :  
i) final class ii) abstract class (06 Marks)  
b. Write a Java program to read data from keyboard up to N names and sort them in alphabetical order. (10 Marks)  
c. Describe the following constructs with examples :  
i) labeled break ii) labeled continue (04 Marks)
- 3) a. What is exception? How does Java handle exceptions? List some of the most common types of exceptions that might occur in Java. (10 Marks)  
b. What are interfaces? What are their benefits? Explain how it is implemented in java with suitable examples (10 Marks)
- 4) a. Explain Inner class and it's access protection with suitable examples (06 Marks)  
b. What are applets? How it is different from application program? Explain how parameters are passed to applet program (09 Marks)  
c. What is synchronization? When do we use it? (05 Marks)
- 5) a. How inter thread communication is done in Java? (04 Marks)  
b. Develop a program to create multithreads with different priorities (08 Marks)  
c. Explain any four event listener models (08 Marks)
- 6) a. Write the JDBC procedure for the following:  
i) Getting connection to different database  
ii) To create and execute SQL statements  
iii) Transaction processing statements (06 Marks)  
b. Write a short note on components and containers in swings (07 Marks)  
c. Write short note on RMI (07 Marks)
- 7) a. Why it is necessary to deploy servlet into webservers? What are the types of servlets? (07 Marks)  
b. Discuss JSP tags (06 Marks)  
c. Briefly explain EJB interfaces (06 Marks)
- 8) Write short notes on the following : (20 Marks)  
a. Applet life cycle  
b. Dynamic method dispatch  
c. Cookies  
d. JVM

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**System Simulation and Modeling (P08MCA501)**

**Credits : 05(4:1:0)**

**Max. Marks : 100**

**Time : 3 hrs**

*Note: Answer any FIVE full questions.*

- 1 a) Define Simulation. Briefly explain the advantages and disadvantages of simulation. 10
- b) Briefly explain the various steps involved in simulation process. Draw necessary flow diagram. 10
- 2 a) A small shop has one check out counter. Customers arrive at this counter at random from 1 to 10 minutes apart. Each possible value of inter arrival time has the same probability of occurrence equal to 0.10. The service time vary from 1 to 6 minutes with probability shown below: 10
- |              |      |      |      |      |      |      |
|--------------|------|------|------|------|------|------|
| Service time | 1    | 2    | 3    | 4    | 5    | 6    |
| Probability  | 0.05 | 0.10 | 0.20 | 0.30 | 0.25 | 0.10 |
- Develop simulation table for 10 customers. Find i) Average waiting time ii) Average time customer spends in the system. Use the following random digits for arrivals and service respectively as
- 91, 72, 15, 94, 30, 92, 75, 23, 30 (Arrivals)  
84, 10, 74, 53, 17, 79, 91, 67, 89, 38.
- b) What are the major concepts in discrete event simulation? 10
- 3 a) Explain the different world views used in simulation with examples. 10
- b) Explain Discrete and continuous random variables. Give example for each. 10
- 4 a) Explain the characteristics of queuing system. 10
- b) Why random numbers are required? What are the important characteristics of random numbers routines? Explain briefly. 10
- 5 a) Generate five random numbers and hence test for uniformity by KS test. Given  $X_0=117$ ,  $a=43$  and  $m=1000$ ,  $\alpha=0.05$ . 10
- b) From the following sequence, test for auto correlation at 5% level of significance of 3<sup>rd</sup>, 8<sup>th</sup>, 13<sup>th</sup> so on 10
- |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|
| 0.69 | 0.87 | 0.23 | 0.28 | 0.98 | 0.31 | 0.65 | 0.28 | 0.83 |
| 0.93 | 0.99 | 0.15 | 0.33 | 0.35 | 0.91 | 0.41 | 0.60 | 0.27 |
| 0.57 | 0.88 | 0.86 | 0.49 | 0.05 | 0.43 | 0.95 | 0.58 | 0.19 |
| 0.36 | 0.12 | 0.01 |      |      |      |      |      |      |
- 6 a) Explain the inverse transform technique for the exponential and uniform distributions. 10
- b) Explain in detail the four important steps of development of input model. 10
- 7 a) Explain the output analysis for Terminating simulations. 10
- b) Differentiate between verification and validation of simulation models. Suggest the techniques which help in verification. 10
- 8 Write short note on: 20
- a) Quantile – Quantile plot                      b) Principles of model building
- c) Stochastic nature of output data          d) Simulation tools

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Object Oriented Modeling and Design Patterns (P08MCA502)**

**Credits : 05(3:1:1)**

**Max. Marks : 100**

**Time : 3 hrs**

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**Note : Answer any FIVE full questions.**

- 1 a) What is a model? What purpose does it serve? (08 Marks)
- b) What are links and association? Write UML notation for links and association and explain with an example. Explain qualified associations with example. (12 Marks)
- 2 a) What is aggregation and composition? How is aggregation different from composition? Give their respective UML notations with example (10 Marks)
- b) What is an event? Explain different types of events with example (10 Marks)
- 3 a) Draw use-case diagram for vending machine. What are the guidelines needed to be followed while drawing use-case diagrams? (10 Marks)
- b) How can you represent branching and concurrency in activity diagram? (10 Marks)
- 4 a) Explain the stages of software development (10 Marks)
- b) Write and explain the steps performed in constructing a domain state model. (10 Marks)
- 5 a) Explain the steps followed in constructing application class model with the diagram (10 Marks)
- b) Explain architecture of the ATM system with diagram (10 Marks)
- 6 a) Explain the different tasks involved in design optimization with appropriate UML diagram (09 Marks)
- b) What is Reverse Engineering? Compare Reverse Engineering Vs Forward Engineering (11 Marks)
- 7 a) List and explain the three categories of pattern in detail (12 Marks)
- b) What is view handler design pattern? Explain the class diagram of view handler that shows the structure of view handler pattern (08 Marks)
- 8 a) What are forward-receiver design patterns? Write and explain the steps to implement a forward-receive design (10 Marks)
- b) What are Idioms? How they are helpful in selecting optimized solution for a given problem? (08 Marks)

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Software Testing (P08MCA503)**

**Credits : 03(2:1:0)**

**Max. Marks : 50**

**Time : 1½ hr**

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**Note : Answer any FIVE full questions**

- |       |  |          |
|-------|--|----------|
| 1.    | Explain human error, fault, failure with the neat diagram and list out the software quality attributes             | 10 marks |
| 2.    | In detail explain test metrics   | 10 marks |
| 3.    | List different classifiers that serve to classify testing techniques. With example explain in detail C1 classifier | 10 marks |
| 4.    | How faults are targeted in equivalence partitioning. Explain in detail equivalence classes for variables           | 10 marks |
| 5. a) | Explain in detail systematic procedure for equivalence partitioning  | 5 marks  |
| b)    | Briefly explain Boundary value analysis  | 5 marks  |
| 6.    | With an example explain step by step approach for decision table from cause effect graph                           | 10 marks |
| 7.    | Explain statement testing, branch testing, condition testing, path testing with formulas                           | 10 marks |
| 8.    | In detail explain test oracles with the figure   | 10 marks |

**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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 Department of Master of Computer Applications

**Topics in Enterprise Architecture - II (P08MCA531)**

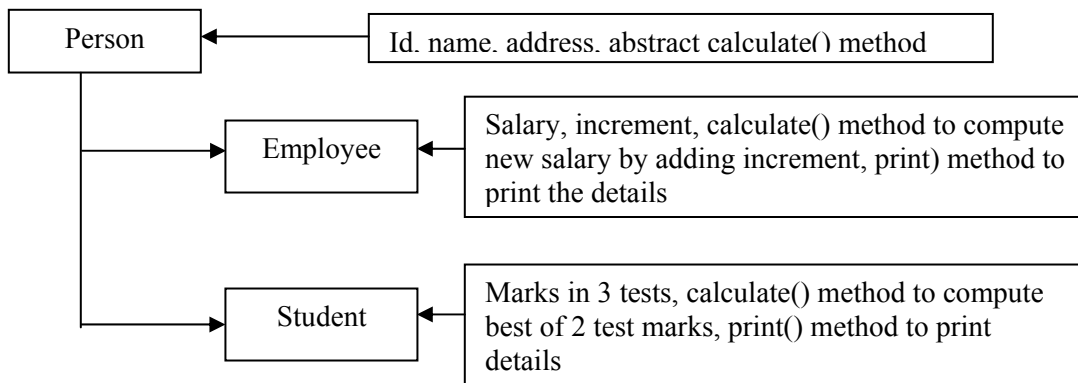
**Credits : 05(4:1:0)**

**Max. Marks : 100**

**Time : 3 hrs**

**Note : Answer any FIVE full questions.**

- 1 a. Explain the basic building blocks of .NET platform along with the role of the base class libraries. 10 marks  
 b. Explain the structure of .NET assembly. 05 marks  
 c. What are namespace? List and explain the purpose of any three namespaces. 05 marks
- 2 a. What do you mean by C# preprocessor directives? With an example, explain how to specify code regions? 06 marks  
 b. Differentiate between single file and multifile assemblies. 04 marks  
 c. Explain the various output options available with C# compiler. 10 marks
- 3 a. Differentiate between value types and reference types. What is method parameter modifier? Explain with code snippets at least two such modifiers. 10 marks  
 b. Using methods System.String class, design a C# method which replaces all occurrences of the word "computer" with COMPUTER. 06 marks  
 c. What is boxing and unboxing? Explain with an example for each. 04 marks
- 4 a. What is encapsulation? What are the two ways of enforcing encapsulation? Give examples for both the methods. 10 marks  
 b. Consider the following hierarchy of classes. 10 marks



Write a C# program to create the above classes. Create two instances of each. Call calculate() and print the new details.

- 5 a. What do you understand by exception in C#? Illustrate the use of System.Exception base class in throwing generic exceptions. 10 marks

- b. How does .NET framework manage garbage collection? Explain using IDisposable interface. 10 marks
- 6** a. Explain three methods to obtain interfaces. 08 marks  
b. Distinguish between shallow and deep copy, as applied to cloning. How would you implement cloning for a custom class using ICloneable interface? 12 marks
- 7** a. Explain single cast and multicast delegates on C# with examples. 10 marks  
b. What do you understand by event-based programming in C#? Give an example. 10 marks
- 8** a. Write the steps involved in building a shared assembly under .NET environment. 10 marks  
b. Write short notes on following: 10 marks  
    i) Cross language inheritance  
    ii) Array manipulation in C#



**P.E.S COLLEGE OF ENGINEERING, MANDYA-571401**  
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**Department of Master of Computer Applications**

**Data Mining (P08MCA543)**

**Credits: 05(4:1:0)**

**Max. Marks : 100**

**Time: 3 hrs**

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**Note: Answer any *FIVE* full questions.**

- 1 a. What is data mining? Explain the knowledge discovery process in data mining. (05 Marks)
- b. Explain the different types of attributes. (05 Marks)
- c. What are the challenges that motivated the development of data mining. (10 Marks)
- 2 a. What is data preprocessing? What are the steps involved in it? Explain any two steps in detail. (10 Marks)
- b. Discuss the dissimilarities between data objects. (05 Marks)
- c. What are the issues related to proximity measures? (05 Marks)
- 3 a. Explain how classification is done using decision tree induction. (10 Marks)
- b. Explain sequential covering algorithm for rule extraction. (05 Marks)
- c. Explain any five characteristics of decision tree induction. (05 Marks)
- 4 a. Write and explain the Apriori algorithm for finding frequent itemsets. (10 Marks)
- b. Explain the alternative methods for generating frequent itemsets. (10 Marks)
- 5 a. Explain FP-growth algorithm to find frequent itemsets. (10 Marks)
- b. Briefly describe the compact representation of frequent itemsets. (05 Marks)
- c. Write a note on Ripper algorithm. (05 Marks)
- 6 a. Explain K-means clustering method. (10 Marks)
- b. Differentiate between agglomerative and devise hierarchical clustering. (03 Marks)
- c. Explain K-nearest neighbor classifiers. (07 Marks)
- 7 a. Explain the different approaches to text mining. (10 Marks)
- b. Write short notes on:
  - i) Mining multimedia data on the web
  - ii) We b usage mining (10 Marks)
- 8 a. Give an account of the role of data mining in bio-medical and DNA analysis. (10 Marks)
- b. How do you choose a good data mining system? (10 Marks)

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