IV CS, IS (S)

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10MAT41

Fourth Semester B.E. Degree Examination, June/July 2015
Engineering Mathematics - IV

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. Obtain y(0.2) using Picards method upto second iteration for the initial value problem $\frac{dy}{dx} = x^2 - 2y \quad y(0) = 1.$ **(06 Marks)**

b. Solve by Eulers modified method to obtain y(1.2) given $y' = \frac{y+x}{y-x}$ $y(1) = 2.$ **(07 Marks)**

c. Using Adam Bash forth method obtain y at x = 0.8 given **(07 Marks)**
$\frac{dy}{dx} = x - y^2$, $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.0795$ and $y(0.6) = 0.1762.$

2 a. Solve by 4th order Runge Kutta method simultaneous equations given by
$\frac{dx}{dt} = y - t$, $\frac{dy}{dt} = x + t$ with $x = 1 = y$ at $t = 0$, obtain y(0.1) and x(0.1). **(06 Marks)**

b. Solve $\frac{d^2y}{dx^2} - x\left(\frac{dy}{dx}\right)^2 + y^2 = 0$, $y(0) = 1$, $y'(0) = 0$. Evaluate y(0.2) correct to four decimal places, using Runge Kutta method of fourth order. **(07 Marks)**

c. Solve for x = 0.4 using Milnes predictor corrector formula for the differential equation y" + xy' + y = 0 with y(0) = 1 , y(0.1) = 0.995 , y(0.2) = 0.9802 and y(0.3) = 0.956. Also z(0) = 0 , z(0.1) = -0.0995 , z(0.2) = -0.196 , z(0.3) = -0.2863. **(07 Marks)**

3 a. Verify whether f(z) = sin2z is analytic, hence obtain the derivative. **(06 Marks)**

b. Determine the analytic function f(z) whose imaginary part is $\frac{y}{x^2 + y^2}$. **(07 Marks)**

c. Define a harmonic function. Prove that real and imaginary parts of an analytic function are harmonic. **(07 Marks)**

4 a. Under the mapping $w = e^z$, find the image of i) $1 \le x \le 2$ ii) $\pi/3 < y < \frac{\pi}{2}$. **(06 Marks)**

b. Find the bilinear transformation which maps the points 1, i, -1 from z plane to 2, i, -2 into w plane. Also find the fixed points. **(07 Marks)**

c. State and prove Cauchy's integral formula. **(07 Marks)**

PART - B

5 a. Prove $J_n(x) = \frac{x}{2n}[J_{n-1}(x) + J_{n+1}(x)]$. **(06 Marks)**

b. Prove $(n+1) P_n(x) = (2n+1) x P_n(x) - n P_{n-1}(x)$. **(07 Marks)**

c. Explain the following in terms of Legendres polynomials.
$x^4 + 3x^3 - x^2 + 5x - 2$ **(07 Marks)**

6 a. A class has 10 boys and 6 girls. Three students are selected at random one after another. Find the probability that i) first and third are boys , second a girl ii) first and second are of same sex and third is of opposite sex. **(06 Marks)**

b. If P(A) = 0.4 , P(B/A) = 0.9 , P($\overline{B}$ / $\overline{A}$) = 0.6. Find P(A/B) , P(A/ $\overline{B}$). **(07 Marks)**

c. In a bolt factory machines A, B and C manufacture 20%, 35% and 45% of the total of their outputs 5%, 4% and 2% are defective. A bolt is drawn at random found to be defective. What is the probability that it is from machine B? **(07 Marks)**

7 a. A random variable x has the following distribution :

x :	-2	-1	0	1	2	3	4
P(x) :	0.1	0.1	k	0.1	2k	k	k

Find k, mean and S.D of the distribution. **(06 Marks)**

b. The probability that a bomb dropped hits the target is 0.2. Find the probability that out of 6 bombs dropped i) exactly 2 will hit the target ii) atleast 3 will hit the target. **(07 Marks)**

c. Find the mean and variance of the exponential distribution. **(07 Marks)**

8 a. A die is tossed 960 times and 5 appear 184 times. Is the die biased? **(06 Marks)**

b. Nine items have values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from assumed of mean of 47.5. ($\gamma = 8$, $t_{0.05} = 2.31$). **(07 Marks)**

c. A set of 5 similar coins tossed 320 times gives following table.

No. of heads :	0	1	2	3	4	5
Freq.	6	27	72	112	71	32

Test the hypothesis that data follows binomial distribution (Given $\gamma = 5$, $\chi^2_{0.05} = 11.07$) **(07 Marks)**

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10CS42

Fourth Semester B.E. Degree Examination, June/July 2015
Graph Theory and Combinatorics

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. For the following graph determine,
i) A walk from b to d that is not a trail
ii) A b–d trail that is not a path
iii) A path from b to d
iv) A closed walk from b to b that is not a circuit
v) A circuit from b to b that is not a cycle
vi) A cycle from b to b. **(06 Marks)**

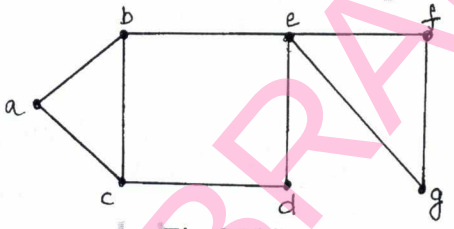

Fig.Q1(a)

b. Define subgraph, spanning subgraph, induced subgraph and complete graph with example. **(07 Marks)**

c. Prove that the undirected graph G = (V, E) has an Euler circuit if and only if G is connected and every vertex in G has even degree. **(07 Marks)**

2 a. Define planar graph and prove that the following Petersen graph is nonplanar using Kuratowski's theorem. **(06 Marks)**

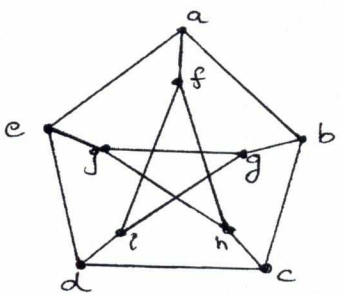

Fig.Q2(a)

b. Prove that in a complete graph with n–vertices, where n is an odd number ≥ 3, there are (n –1)/2 edge – disjoint Hamiltonian cycles. **(07 Marks)**

c. Find the chromatic polynomial for the following graph. **(07 Marks)**

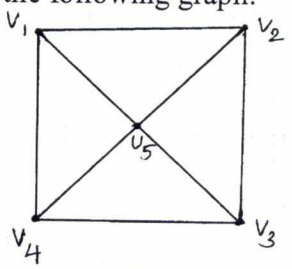

Fig.2Q(c)

3 a. Prove that in every tree $T = (V, E)$ $|V| = |E| + 1$. **(06 Marks)**

b. i) If $T_1 = (V_1, E_1)$ and $T_2 = (V_2, E_2)$ be two trees where $|E_1| = 17$ and $|V_2| = 2|V_1|$, then find $|V_1|$, $|V_2|$ and $|E_2|$

ii) Let $F_2 = (V_2, E_2)$ is a forest with $|V_2| = 62$ and $|E_2| = 51$, how many trees determine F_2

iii) Let $F_1 = (V_1, E_1)$ be a forest of 7 trees where $|E_1| = 40$ what is $|V_1|$? **(07 Marks)**

c. Construct an optimal prefix code for the symbols a, o, q, u, y, z that occur with frequencies 20, 28, 4, 17, 12, 7 respectively. **(07 Marks)**

4 a. Using the Kruskal's algorithm, find a minimal spanning tree of the following weighted graphs. **(06 Marks)**

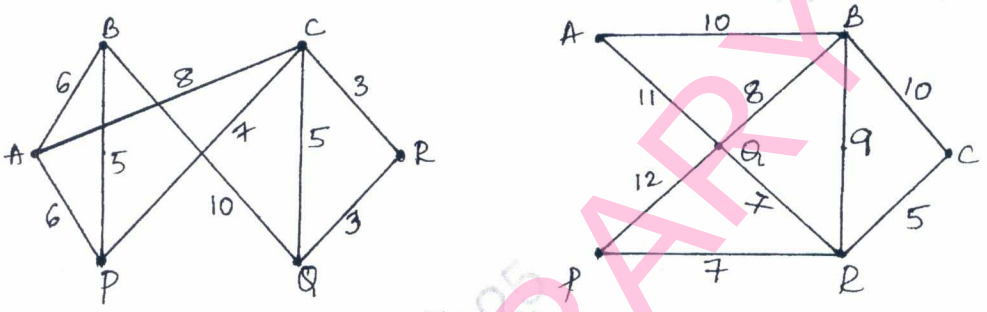

Fig.Q4(a)

b. Using the Dijkstra's algorithm obtain the shortest path from vertex 1 to each of the other vertices in the following graph. **(07 Marks)**

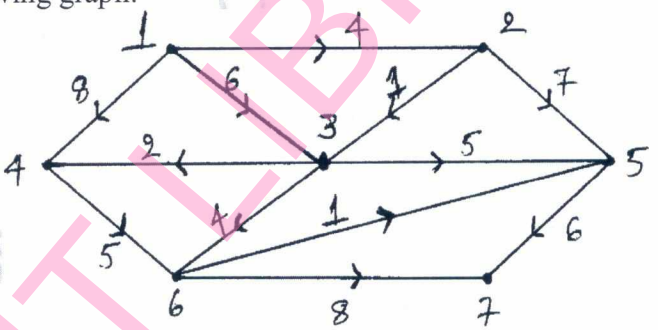

Fig.Q4(b)

c. Prove that in a bipartite graph $G(V_1, V_2, E)$ if there is a positive integer M such that the degree of every vertex in $V_1 \geq M \geq$ the degree of every vertex in V_2, then there exists a complete matching from V_1 to V_2. **(07 Marks)**

PART – B

5 a. i) How many arrangements all there for all letters in the word SOCIOLOGICAL?

ii) In how many of these arrangements, A and G are adjacent?

iii) In how many of these arrangements, all the vowels are adjacent? **(06 Marks)**

b. Determine the co-efficient of :

i) x^9y^3 in the expansion of $(2x - 3y)^{12}$

ii) $x \cdot y \cdot z^2$ in the expansion of $(2x - y - z)^4$

iii) $x^2 \cdot y^2 \cdot z^3$ in the expansion of $(3x - 2y - 4z)^7$. **(07 Marks)**

c. Determine the number of integer solutions for : $x_1 + x_2 + x_3 + x_4 + x_5 < 40$, Where :

i) $x_i \geq 0$, $1 \leq i \leq 5$

ii) $x_i \geq -3$, $1 \leq i \leq 5$. **(07 Marks)**

6 a. Find the number of integers between 1 to 10,000 inclusive, which are divisible by none of 5, 6 or 8. **(06 Marks)**

b. Determine in how many ways can the letters in the word ARRANGEMENT be arranged so that there are exactly two pairs of consecutive identical letters. **(07 Marks)**

c. i) Find the rook polynomial for the shaded chessboard

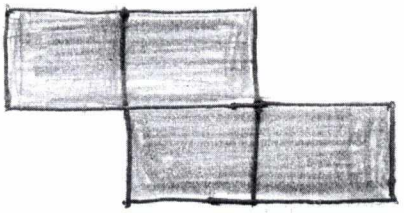

Fig. Q6(c)(i)

ii) Let A = {1, 2, 3, 4} and B ={u v, w, x, y, z}. How many one to one functions f : A → B satisfy none of the following conditions :

C_1 : f(1) = u or v ; C_2 : f(2) = w ; C_3 : f(3) = w or x ; C_4 : f(4) = x, y or z. **(07 Marks)**

7 a. Find the coefficient of x^{15} in $\frac{(1+x)^4}{(1-x)^4}$. **(06 Marks)**

b. A ship carries 48 flags, 12 each of the colors red, white, blue and black. Twelve of these flags are placed on a vertical pole inorder to communicate a signal to other ships. Determine, how many of these signals have atleast three white flags or no white flags at all. **(07 Marks)**

c. Find the formula to express : $0^2 + 1^2 + 2^2 + - - - - - - + n^2$ as a function of n using summation on operator. **(07 Marks)**

8 a. Solve the recurrence relation $F_{n+2} = F_{n+1} + F_n$ where $n \geq 0$ and $F_0 = 0$ and $F_1 = 1$. **(06 Marks)**

b. i) A bank pays 6% interest compounded quarterly. If Laura invests $ 100 then how many months must she wait for her money to double?

ii) The number of bacteria in a culture is 1000 and this number increases 250% every 2 hours. Use a recurrence relation to determine the number of bacteria present after one day. **(07 Marks)**

c. Solve the recurrence relation : $a_{n+2} - 5a_{n+1} + 6a_n = 2$, $n \geq 0$, $a_0 = 3$, $a_1 = 7$ using method of generating functions. **(07 Marks)**

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10CS43

Fourth Semester B.E. Degree Examination, June/July 2015
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Discuss the various stages of algorithm design and analysis process using a flow chart. **(10 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. Consider the following algorithm :

```
Algorithm Mystery (n)
//input : A non negative integer n
S ← 0
for i ← 1 to n do
    S ← S + i * i
return S
```

i) What does this algorithm compute?
ii) What is its basic operation?
iii) How many times is the basic operation executed?
iv) What is the efficiency class of this algorithm? **(04 Marks)**

2 a. Write merge sort algorithm and discuss its efficiency. Sort the list E, X, A, M, P, L, E in alphabetical order using the merge sort. **(10 Marks)**

b. Design an algorithm for binary search, give an example. Show that the worst case efficiency of binary search is $\theta(\log n)$. **(10 Marks)**

3 a. Solve the following instance of knapsack problem using greedy algorithm. Knapsack weight M = 20. **(04 Marks)**

Item	1	2	3
Weight	18	15	10
Profit	25	24	15

b. Using the prim's algorithm, determine the minimum cost spanning tree for the graph of Fig. Q3(b). **(08 Marks)**

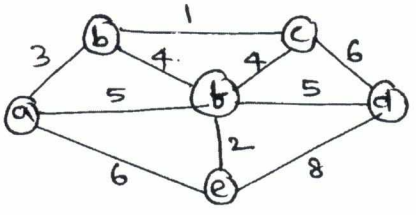

Fig.Q3(b)

c. Design the Dijkstra's algorithm and apply the same to find the single source shortest paths problem for the graph taking vertex 'a' as source in Fig. Q3(c). **(08 Marks)**

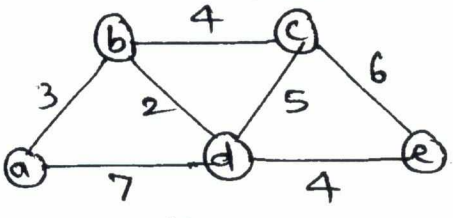

Fig.Q3(c)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

4 a. Define transitive closure of a graph. Write Warshall algorithm to compute transitive closure of a directed graph. Apply the same on the graph defined by the following adjacency matrix.

$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}.$$

(10 Marks)

b. Using Floyd's algorithm, find all pair shortest path for the graph of Fig. Q4(b). **(06 Marks)**

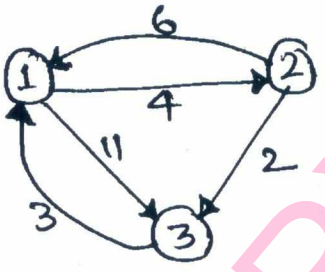

Fig.Q4(b)

c. Write a note on travelling sales person problem. **(04 Marks)**

PART – B

5 a. Write insertion sort algorithm. Apply it to arrange the following numbers in increasing order 89, 45, 68, 90, 29, 34, 17. **(08 Marks)**

b. Design a BFS algorithm to check the connectivity of a given graph. **(08 Marks)**

c. What is time–space trade off of an algorithm? **(04 Marks)**

6 a. Write short notes on :

i) Tight lower bound

ii) Trivial lower bound

iii) Information–theoretic lower bounds. **(12 Marks)**

b. Define decision tree? Draw the decision tree to sort the elements using insertion sort. **(08 Marks)**

7 a. Write the pseudo code for backtracking algorithm. Apply backtracking to solve the instance of the sum of subset problem : S = {3, 5, 6, 7} and d = 15. **(10 Marks)**

b. With the help of a state space tree, solve the travelling salesman problem of Fig. Q7(b), using branch–and–bound algorithm. **(10 Marks)**

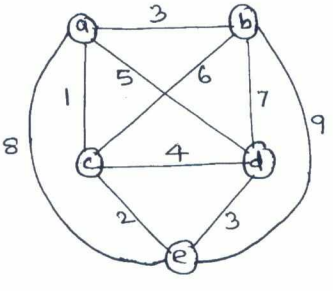

Fig.Q7(b)

8 a. What is prefix computing problem? Write the algorithms for prefix computation which uses: i) n processors ii) n/log n processors. **(10 Marks)**

b. Let the input to the prefix computation problem be 5, 12, 8, 6, 3, 9, 11, 12, 1, 5, 6, 7, 10, 4, 3, 5, and Let $\oplus$ stand for addition. Solve the problem using work optimal algorithm. **(10 Marks)**

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10CS44

Fourth Semester B.E. Degree Examination, June/July 2015
UNIX and Shell Programming

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the architecture of UNIX operating system with a neat diagram. **(08 Marks)**

b. Illustrate with a diagram, the typical UNIX file system and explain different types of files supported in UNIX. **(08 Marks)**

c. Explain internal and external commands with example. **(04 Marks)**

2 a. Which command is used for listing file attributes? Briefly describe the significance of each field of the output. **(08 Marks)**

b. A file's current permissions are rw – r – x r – –. Specify the chmod expression required to change them for the following :

i) r w x r w x r w x

ii) r – – r – – – – –

iii) – – – – – – – – –

Using both the relative and absolute methods of assigning permissions. **(06 Marks)**

c. What are the different modes of vi editor? Explain with a diagram. **(06 Marks)**

3 a. Explain the three standard files with respect to UNIX operating system. **(06 Marks)**

b. Explain the mechanism of process creation using system calls in UNIX. **(06 Marks)**

c. Explain the following environment variables with examples :

i) SHELL

ii) LOGNAME

iii) PATH

iv) PS2. **(08 Marks)**

4 a. Distinguish between hard links and soft links with suitable examples. **(06 Marks)**

b. Explain the following filters with options :

i) pr

ii) sort. **(08 Marks)**

c. Use find command to locate from your home directory :

i) All files with the extension ·html

ii) All flies having inode number 9076

iii) All directories having permissions 666

iv) All files not accessed for more than a year

v) All but the C program files

vi) All files named a·out and all "C" source files and remove them interactively. **(06 Marks)**

PART – B

5 a. Explain grep command with all options. **(08 Marks)**

b. Briefly explain the different ways of addressing used in sed with example. **(06 Marks)**

c. Explain BRE (Basic Regular Expression) character subset used for constructing regular expressions. **(04 Marks)**

d. Write the commands for the following :

i) Use sed to delete all blank lines from a file named sample

ii) Use sed to replace all occurrences of the word "UNIX" with "LINUX" in a file named sample. **(02 Marks)**

6 a. What is shell programming? Write a menu – driven shell script to perform the following :

i) List of users who are logged in

ii) List of files in the current directory

iii) Today's date

iv) Quit to UNIX. **(08 Marks)**

b. Explain with an example "while" and "for" loop in shell programming. **(06 Marks)**

c. Briefly explain set and shift commands in UNIX to manipulate positional parameters with example. **(06 Marks)**

7 a. What is AWK? Explain any three built – in functions in AWK. **(07 Marks)**

b. Explain associative arrays in AWK. **(06 Marks)**

c. Explain built – in variables in AWK. **(07 Marks)**

8 a. Explain the string handling functions supported by PERL and also write a PERL script to convert a given decimal number to binary equivalent. **(12 Marks)**

b. Explain the following in PERL with example :

i) split

ii) join. **(08 Marks)**

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10CS45

Fourth Semester B.E. Degree Examination, June/July 2015
Microprocessors

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. Draw and discuss the Register Organization of 8086 through core 2 microprocessors. **(10 Marks)**

b. Explain the real mode memory addressing of 8086 processor. **(10 Marks)**

2 a. Define paging. Discuss the memory paging with diagram. **(08 Marks)**

b. Explain Data related addressing modes of 8086, with an example. **(08 Marks)**

c. Define physical address. Discuss how physical address is generated in 8086 processor. **(04 Marks)**

3 a. Explain the following instruction with an example : i) XLAT ii) LEA iii) CMP iv) MUL v) TEST. **(10 Marks)**

b. What are assembler directives? Explain the following assembler directives with an example i) PUBLIC ii) ORG iii) DW iv) ASSUME. **(07 Marks)**

c. What is meant by segment override prefix? Explain with examples. **(03 Marks)**

4 a. Discuss shift and rotate instructions, with an example. **(08 Marks)**

b. Explain FAR procedure and near procedure with an example. **(06 Marks)**

c. Write an assembly level program to reverse a given string and check for palindrome **(06 Marks)**

PART - B

5 a. What are the differences between a PROCEDURE and a MACRO? **(04 Marks)**

b. Write an 8086 ALP using DOS interrupt to read a two hexadecimal number and display the same on monitor. **(08 Marks)**

c. Define Modular programming. Explain various phases in program development and execution in the context of modular programming. **(08 Marks)**

6 a. Explain the functions of the following 8086 signals : **(06 Marks)**
i) ALE ii) MN / $\overline{MX}$ iii) NMI iv) QS0, QS1 v) RESET vi) DT/$\overline{R}$.

b. Indicate the signals which are different when 8086 in minimum mode and in maximum mode. **(04 Marks)**

c. Describe the working of 8086 in minimum mode configuration. **(10 Marks)**

7 a. Discuss in brief commonly used memories. **(08 Marks)**

b. With neat diagram, explain the Linear decoding techniques. **(08 Marks)**

c. Compare and contrast the memories mapped I/O to I/O mapped I/O. **(04 Marks)**

8 a. Draw and discuss the Interrupt structure of 8086. **(06 Marks)**

b. With functional block diagram, explain working principle of 8255 PPI. **(08 Marks)**

c. Discuss the DMA controller operating in a microprocessor system. **(06 Marks)**

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10CS46

Fourth Semester B.E. Degree Examination, June/July 2015
Computer Organization

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. With a neat diagram, explain the different processor registers. **(08 Marks)**

b. List and explain the technological features and devices improvement made during different generations of computers. **(08 Marks)**

c. What are the factors that affect the Performance? Explain any four. **(04 Marks)**

2 a. What is an addressing mode? Explain any four addressing modes, with an example for each. **(08 Marks)**

b. Explain shift and rotate operations with example. **(08 Marks)**

c. Explain Big – endian and Little – endian method of byte addressing with an example. **(04 Marks)**

3 a. Define Exceptions. Explain two kinds of exceptions. **(04 Marks)**

b. Define bus arbitration. Explain in detail any one approach of bus arbitration. **(08 Marks)**

c. Draw and explain the general 8 bit parallel processing. **(08 Marks)**

4 a. Explain the following with respect to USB : i) USB Architecture ii) USB Addressing iii) USB Protocols. **(09 Marks)**

b. Briefly discuss the main phases involved in the operation of SCSI bus. **(06 Marks)**

c. Explain distributed Bus arbitrations. **(05 Marks)**

PART - B

5 a. Define : i) Memory Latency ii) Memory bandwidth iii) Hit – rate iv) Miss - Penalty. **(04 Marks)**

b. Explain the different cache mapping functions. **(10 Marks)**

c. Explain any one feature of memory design that leads to improved performance of computer. **(06 Marks)**

6 a. With a neat diagram, explain the virtual memory organization. **(08 Marks)**

b. Design a logic circuit to perform addition / subtraction of two 'n' bit numbers X and Y. **(04 Marks)**

c. Explain Booth Algorithm. Apply Booth Algorithm to multiply the signed numbers +13 and -6. **(08 Marks)**

7 a. Explain the different arithmetic operations on floating point numbers. **(06 Marks)**

b. Perform division of number 8 by 3 (8 ÷ 3) using the restoring division algorithm. **(06 Marks)**

c. Explain the process of fetching a word from memory along with a timing diagram. **(08 Marks)**

8 a. Briefly explain the structure of General Purpose Multiprocessor. **(08 Marks)**

b. List different types of Networks. Explain any four. **(08 Marks)**

c. Give a brief description on performance consideration with an example. **(04 Marks)**

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MATDIP401

Fourth Semester B.E. Degree Examination, June/July 2015
Advanced Mathematics - II

Time: 3 hrs. Max. Marks:100

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

1 a. Find the angle between 2 diagonals of a cube. **(06 Marks)**

b. If A(0 9 6), B(1 2 3) , C(7 - 25) are vertices of a triangle. Find the coordinates of the foot of the perpendicular drawn from A to BC. **(07 Marks)**

c. Find the equation of the plane in the Intercept form $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$. **(07 Marks)**

2 a. Find the equation of the plane passing through the three points (2, 3, 4) , (-3, 5, 1) (4, -1, 2). **(06 Marks)**

b. Find the equation of the plane through the points (1, 2, -1) and perpendicular to the planes $x + y - 2z = 5$ and $3x - y + 4z = 12$. **(07 Marks)**

c. Find the equation of the plane through the points (-1, 2, 0) and containing the plane $2x + 3y + 5z - 1 = 0$ and $3x + y - z + 2 = 0$. **(07 Marks)**

3 a. Find the unit vector parallel to the sum of the vector $\vec{A} = 2i + 4j - 5k$ and $\vec{B} = i + 2j + 3k$. **(06 Marks)**

b. Determine λ such that $\vec{A} = i + j + k$, $\vec{B} = 2i - 4k$. $\vec{C} = i + \lambda j + 3k$ are coplanar. **(07 Marks)**

c. Prove that $(\vec{a}\times\vec{b})\times\vec{c} = (\vec{a}.\vec{c})\vec{b} - (\vec{b}.\vec{c})\vec{a}$. **(07 Marks)**

4 a. Prove that $\frac{d}{dt}[\vec{F}.\vec{G}] = \vec{F}.\frac{d\vec{G}}{dt}+\frac{d\vec{F}}{dt}.\vec{G}$. **(06 Marks)**

b. Find the velocity and acceleration for the curve $\vec{r} = (1-t^3)\,i + (1+t^2)j + (2t - 5)k$ at $t = 1$ and also find their magnitude. **(07 Marks)**

c. If $\frac{d\vec{a}}{dt} = \vec{w}\times\vec{a}$ and $\frac{d\vec{b}}{dt} = \vec{w}\times\vec{b}$ then show that $\frac{d}{dt}[\vec{a}\times\vec{b}] = \vec{w}\times(\vec{a}\times\vec{b})$. **(07 Marks)**

5 a. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at (1, -2, -1) along $2i - j - 2k$. **(06 Marks)**

b. If $\vec{F} = (x + y + 1)\,i + j - (x + y)k$. Find $\vec{F}.\text{curl}\,\vec{F}$. **(07 Marks)**

c. Show that $\nabla.(\nabla\times\vec{A}) = 0$. **(07 Marks)**

6 a. Find L f(t) given that $f(t) = \begin{cases} t\,; & 0 < t < 4 \\ 5\,; & t > 4 \end{cases}$ **(05 Marks)**

b. Find i) $L[e^{3t}\sin 5t\,\sin 3t]$ ii) $L[t^5\cosh 3t]$ iii) $L[t^3 e^{-3t}]$. **(15 Marks)**

7 a. Find $L\left[\frac{1-e^t}{t}\right]$. **(05 Marks)**

b. Find i) $L^{-1}\left[\frac{4s+5}{(s-1)^2(s+2)}\right]$ ii) $L^{-1}\left[\frac{4s+15}{16s^2-25}\right]$ iii) $L^{-1}\left[\frac{s}{s^2-6s+9}\right]$. **(15 Marks)**

8 a. Using Laplace transform solve :

$$\frac{dzy}{dt^2} + 4\frac{dy}{dt} + 3y = e^t \quad ; \quad y(0) = 0 \quad y'(0) = 1.$$ **(10 Marks)**

b. Solve using Laplace transformation method

$y'' + 2y' - 3y = \sin t, \quad y(0) = y'(0) = 0.$ **(10 Marks)**

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