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06MAT41

Fourth Semester B.E. Degree Examination, Dec.08 / Jan.09
Engineering Mathematics - IV

Time: 3 hrs. Max. Marks:100

Note : *Answer FIVE full questions choosing atleast two from each part.*

Part A

1 a. Find by Taylor's series method the value of y at $x = 0.1$ and $x = 0.2$ to five places of decimals from $\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$ consider upto 4^{th} degree terms. **(06 Marks)**

b. Apply Runge-Kutta method to find an approximate value of y for $x = 0.2$ in steps of 0.1 of $\frac{dy}{dx} = x + y^2$, given that y = 1, when x = 0. **(07 Marks)**

c. Given $\frac{dy}{dx} = x^2(1+y)$ and y(1)=1, y(1.1)=1.233, y(1.2)=1.548, y(1.3)=1.979, evaluate y(1.4) by Adam's-Bashforth method. **(07 Marks)**

2 a. Derive Cauchy – Riemann equations in polar-form. **(06 Marks)**

b. Determine the analytic function, $f(z) = u + iv$, if

$$u - v = \frac{\cos x + \sin x - e^{-y}}{2(\cos x - \cosh y)}.$$ **(07 Marks)**

c. Discuss the transformation $w = e^z$. **(07 Marks)**

3 a. State and prove Cauchy's integral formula. **(06 Marks)**

b. Find the Taylor's expansion of $f(z) = \frac{2z^3 + 1}{z^2 + z}$ about the point $z = i$. **(07 Marks)**

c. Evaluate $\int_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$, where C is the circle $|z| = 3$. **(07 Marks)**

4 a. Solve in series the equation $x\frac{d^2y}{dx^2} + \frac{dy}{dx} + xy = 0$. **(06 Marks)**

b. Reduce the differential equation $x\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + k^2xy = 0$ to Bessel's equation. **(07 Marks)**

c. Derive the Rodrigue's formula, $P_n(x) = \frac{1}{n!2^n}\frac{d^n}{dx^n}(x^2 - 1)^n$. **(07 Marks)**

Part B

5 a. Fit a second degree polynomial to the following data: **(06 Marks)**

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

b. The two regression equations of the variables x and y are
$x = 19.13 - 0.87y$ and $y = 11.64 - 0.50x$
Find i) mean of x's ii) mean of y's and iii) the correlation coefficient of x and y. **(07 Marks)**

c. State and prove Baye's theorem. **(07 Marks)**

6 a. The probability density function of a variate x is

x	0	1	2	3	4	5	6
P(x)	k	3k	5k	7k	9k	11k	13k

i) Find k.
ii) Find $P(x<4)$, and $P(3<x\leq 6)$. **(06 Marks)**

b. Derive mean and variance for the Poisson distribution. **(07 Marks)**

c. In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S.D. if 60 hours. Estimate the number of bulbs likely to burn for
i) More than 2150 hours
ii) Less than 1950 hours and
iii) More than 1920 hours, but less than 2160 hours. **(07 Marks)**

7 a. In a city A, 20% of a random sample of 900 school boys has a certain slight physical defect. In another city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant? **(06 Marks)**

b. A machinist is making engine parts with axle diameter of 0.7 inch. A random sample of 10 parts shows mean diameter 0.742 inch with a S.D. of 0.04 inch. On the basis of this sample, would you say that the axle is inferior? **(07 Marks)**

c. A set of five similar coins is tossed 320 times and the result is:

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

Test the hypothesis that the data follow a binomial distribution. **(07 Marks)**

8 a. The joint distribution of two random variables x and y is given by the following table:

x \ y	2	3	4
1	0.06	0.15	0.09
2	0.14	0.35	0.21

Determine the marginal distribution of x and y. Also verify that x and y are stochastically independent. **(06 Marks)**

b. Find the fixed probability vector of the regular stochastic matrix,

$$\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ \frac{1}{2} & \frac{1}{2} & 0 \end{bmatrix}.$$ **(07 Marks)**

c. Explain i) Transient state ii) Recurrent state iii) absorbing state of Markov chain. **(07 Marks)**

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Fourth Semester B.E. Degree Examination, Dec.08 / Jan.09
Advanced Mathematics II

Time: 3 hrs. Max. Marks:100

Note : *Answer any FIVE full questions.*

1 a. Show that the lines whose direction cosines are given by the equations $l+m+n=0$, $al^2+bm^2+cn^2=0$ are perpendicular if a+b+c = 0. **(06 Marks)**

b. Show that the angle between any two diagonals of a cube is $\cos^{-1}\left(\frac{1}{3}\right)$. **(07 Marks)**

c. If P, Q, A, B are (1, 2, 3), (-2, 1, 3), (4, 4, 2), (2, 1, -4), find the projection of PQ on AB. **(07 Marks)**

2 a. Find the equation of the plane in the intercept form. **(06 Marks)**

b. Find the equation of the plane which passes through (3, -3, 1) and is perpendicular to the planes $7x+y+2z=6$ and $3x+5y-6z=8$. **(07 Marks)**

c. Show that the lines $\frac{x-5}{4}=\frac{y-7}{4}=\frac{z+3}{-5}$, $\frac{x-8}{7}=\frac{y-4}{1}=\frac{z-5}{3}$ are coplanar. Find their common point. **(07 Marks)**

3 a. Show that the four points whose position vectors are $3i-2j+4k$, $6i+3j+k$, $5i+7j+3k$ and $2i+2j+6k$ are coplanar. **(06 Marks)**

b. A particle moves along the curve $x=t^3+1$, $y=t^2$, $z=2t+5$ where t is the time. Find the components of its velocity and acceleration at t = 1 in the direction $2i+3j+6k$. **(07 Marks)**

c. If $\vec{A}=4i+3j+k$, $\vec{B}=2i-j+2k$ find a unit vector N perpendicular to vectors A and B. Such that A, B, N form a right-handed system. **(07 Marks)**

4 a. Find the angle between the tangents to the curve $\vec{r}=t^2i+2tj-t^3k$ at the point $t=\pm1$. **(06 Marks)**

b. Let $\vec{a}=i+j-k$, $\vec{b}=i-j+k$, $\vec{c}=i-j-k$. Find the vector $\vec{a}\times\left(\vec{b}\times\vec{c}\right)$. **(07 Marks)**

c. Find a unit vector normal to the surface $x^2+3y^2+2z^2=6$ at (2, 0, 1). **(07 Marks)**

5 a. Find the directional derivative of $f(x,y,z)=xy^2+yz^3$ at the point (2, -1, 1) in the direction of i+2j+2k. **(06 Marks)**

b. Find i) $\operatorname{div}\left(3x^2i+5xy^2j+xyz^3k\right)$ at (1, 2, 3).

ii) $\operatorname{curl}\left[xyzi+3x^2yj+\left(xz^2-y^2z\right)k\right]$ **(07 Marks)**

c. Find the values of the constants a, b, c for which the vector $v=(x+y+az)i+(bx+3y-z)j+(3x+cy+z)k$ is irrotational. **(07 Marks)**

6 a. Find the Laplace transform of

$$f(t)=\begin{cases} e^t; 0<t<1 \\ 0; \ t>1 \end{cases}.$$ **(05 Marks)**

b. Find $L\left\{e^{-3t}(2\cos 5t-3\sin 5t)\right\}$. **(05 Marks)**

c. Evaluate $L\left\{t\sin^2 t\right\}$. **(05 Marks)**

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

7 Find the inverse Laplace transform for the following:

a. $\frac{s^2-3s+4}{s^3}$. **(05 Marks)**

b. $\frac{s+2}{s^2-4s+13}$. **(05 Marks)**

c. $\frac{s^2+s-2}{s(s+3)(s-2)}$. **(05 Marks)**

d. $\log\left(\frac{s+a}{s+b}\right)$. **(05 Marks)**

8 a. Use Laplace transform method to solve,

$\frac{d^2x}{dt^2}-2\frac{dx}{dt}+x=e^t$ with $x=2$, $\frac{dx}{dt}=-1$ at $t=0$. **(10 Marks)**

b. Solve the following simultaneous equations using Laplace transform method,

$\frac{dx}{dt}-y=e^t$; $\frac{dy}{dt}+x=\sin t$; given $x(0)=1$, $y(0)=0$. **(10 Marks)**

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Fourth Semester B.E. Degree Examination, Dec.08 / Jan.09

Engineering Mathematics - IV

Time: 3 hrs. Max. Marks:100

Note : *Answer FIVE full questions choosing atleast two from each part.*

Part A

1 a. Find by Taylor's series method the value of y at $x=0.1$ and $x=0.2$ to five places of decimals from $\frac{dy}{dx}=x^2y-1$, $y(0)=1$ consider upto 4^{th} degree terms. **(06 Marks)**

b. Apply Runge-Kutta method to find an approximate value of y for $x=0.2$ in steps of 0.1 of $\frac{dy}{dx}=x+y^2$, given that y = 1, when x = 0. **(07 Marks)**

c. Given $\frac{dy}{dx}=x^2(1+y)$ and y(1)=1, y(1.1)=1.233, y(1.2)=1.548, y(1.3)=1.979, evaluate y(1.4) by Adam's-Bashforth method. **(07 Marks)**

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c. Discuss the transformation $w=e^z$. **(07 Marks)**

3 a. State and prove Cauchy's integral formula. **(06 Marks)**

b. Find the Taylor's expansion of $f(z)=\frac{2z^3+1}{z^2+z}$ about the point $z=i$. **(07 Marks)**

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Part B

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x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
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b. Find the fixed probability vector of the regular stochastic matrix,

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USN | | | | | | | | | | MATDIP401

Fourth Semester B.E. Degree Examination, Dec.08 / Jan.09

Advanced Mathematics II

Time: 3 hrs. Max. Marks:100

Note : *Answer any FIVE full questions.*

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b. Show that the angle between any two diagonals of a cube is $\cos^{-1}\left(\frac{1}{3}\right)$. **(07 Marks)**

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2 a. Find the equation of the plane in the intercept form. **(06 Marks)**

b. Find the equation of the plane which passes through (3, -3, 1) and is perpendicular to the planes $7x+y+2z=6$ and $3x+5y-6z=8$. **(07 Marks)**

c. Show that the lines $\frac{x-5}{4}=\frac{y-7}{4}=\frac{z+3}{-5}$, $\frac{x-8}{7}=\frac{y-4}{1}=\frac{z-5}{3}$ are coplanar. Find their common point. **(07 Marks)**

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4 a. Find the angle between the tangents to the curve $\vec{r}=t^2i+2tj-t^3k$ at the point $t=\pm1$. **(06 Marks)**

b. Let $\vec{a}=i+j-k$, . $\vec{b}=i-j+k$, $\vec{c}=i-j-k$. Find the vector $\vec{a}\times\left(\vec{b}\times\vec{c}\right)$. **(07 Marks)**

c. Find a unit vector normal to the surface $x^2+3y^2+2z^2=6$ at (2, 0, 1). **(07 Marks)**

5 a. Find the directional derivative of $f(x,y,z)=xy^2+yz^3$ at the point (2, -1, 1) in the direction of i+2j+2k. **(06 Marks)**

b. Find i) $\operatorname{div}\left(3x^2i+5xy^2j+xyz^3k\right)$ at (1, 2, 3).

ii) $\operatorname{curl}\left[xyzi+3x^2yj+\left(xz^2-y^2z\right)k\right]$ **(07 Marks)**

c. Find the values of the constants a, b, c for which the vector $v=(x+y+az)i+(bx+3y-z)j+(3x+cy+z)k$ is irrotational. **(07 Marks)**

6 a. Find the Laplace transform of

$$f(t)=\begin{cases} e^t; 0<t<1 \\ 0;\ t>1 \end{cases}.$$ **(05 Marks)**

b. Find $L\left\{e^{-3t}(2\cos 5t-3\sin 5t)\right\}$. **(05 Marks)**

c. Evaluate $L\left\{t\sin^2 t\right\}$. **(05 Marks)**

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

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06CS42

Fourth Semester B.E. Degree Examination, Dec.08 / Jan.09

Graph Theory and Combinotrics

Time: 3 hrs. Max. Marks:100

Note : ***Answer FIVE full questions, selecting at least two questions from each part.***

Part A

1 a. Give an example of a connected graph G where removing any edge of G results in a disconnected graph. **(03 Marks)**

b. Define homomorphism of a graph. Show that following graphs are isomorphic. **(05 Marks)**

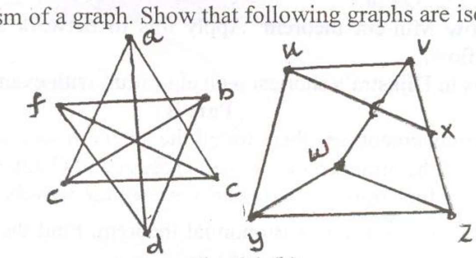

Fig. Q1 (b)

c. Determine $|v|$ for the following graphs or multigraphs G.

i) G has nine edges and all vertices have degree 3.

ii) G has ten edges with two vertices of degree 4 and all other of degree 3. **(04 Marks)**

d. Define, with one example for each: i) Regular graph ii) Complement of a graph iii) Euler trail and Euler circuit. iv) Complete graph. **(08 Marks)**

2 a. Let G = (V, E) be a loop-free connected planar graph with $|v| = v$ and $|E| = e > 2$ and r regions. Then show that $3r \leq 2e$ and $e \leq 3v - 6$. Using the above relation, show how k_5 and $k_{3,3}$ are nonplanar. **(06 Marks)**

b. Find the dual graph for the following planar graph shown in figure Q2 (b). Write down any four observations of the graph given below and its dual. **(04 Marks)**

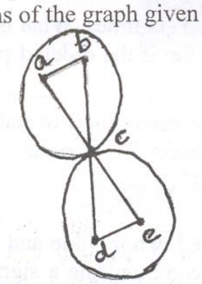

Fig. Q2 (b)

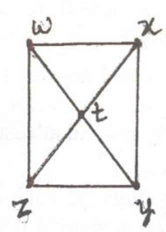

Fig. Q2 (d)

c. Show that Peterson graph has no Hamilton cycle but it has a Hamilton path. **(04 Marks)**

d. Define chromatic number of a graph. Find the chromatic polynomial for the graph shown below and also find the chromatic number for the same. **(06 Marks)**

3 a. Define a Tree. Prove that if $G = (V,E)$ is an undirected graph then G is connected if and only if G has a spanning tree. **(06 Marks)**

b. Define : i) Binary Rooted tree ii) Prefix code iii) Balanced tree. Give one example for each. **(06 Marks)**

c. Construct an optimal prefix code for the symbols a, 0, q, u, y, z that occur with frequencies 20, 28, 4, 17, 12, 7 respectively. **(08 Marks)**

4 a. State Kruskal's algorithm and using this algorithm find a minimal spanning tree for the weighted graph shown below. **(06 Marks)**

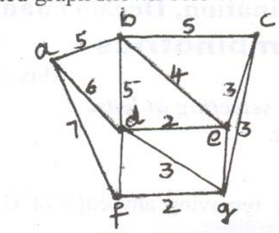

Fig. Q4 (a)

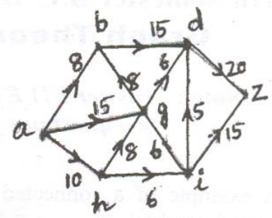

Fig. Q4 (b)

b. Explain Max-flow Min-cut theorem. Apply this to network shown in figure Q4 (b) to obtain the Max-flow. **(08 Marks)**

c. Explain the steps in Dijkstra's shortest path algorithm with example. **(06 Marks)**

Part B

5 a. i) How many arrangements are there for all the letters in sociological.
ii) In how many of the arrangements in part i) are A and G adjacent.
iii) In how many of the arrangement in part i) are all the vowels adjacent. **(06 Marks)**

b. State and explain the meaning of Bionomial theorem. Find the coefficient of $a^2b^3c^2d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$ and find the sum of all the coefficients in the expansion of $(x+y)^{10}$. **(08 Marks)**

c. Consider the moves: R : $(x, y) \rightarrow (x+1, y)$, U : $(x, y) \rightarrow (x, y+1)$.
In how many ways can one go
i) from (0, 0) to (6, 6) and not rise above the line y = x
ii) from (2, 1) to (7, 6) and not rise above the line y = x –
iii) from (3, 8) to (10, 15) and not rise above the line y = x + 5 **(06 Marks)**

6 a. Determine the number of +ve integers n where $1 \le n \le 100$ and n is not divisible by 2,3 or 5. **(06 Marks)**

b. Find the number of permutations of a, b……x, y, z in which none of the patterns spin, game, path or net occurs. **(06 Marks)**

c. How many de-arrangements are there for 1, 2, 3, 4, 5? **(04 Marks)**

d. A pair of dice, one is red, the other green is rolled six times. What is the probability that all six values come up on both red die and green die, if the ordered pairs (1, 2) (2, 1) (2, 5) (3, 4) (4, 1) (4, 5) and (6, 6) did not occur. **(04 Marks)**

7 a. If there is an unlimited number (or atleast 24 of each other) of red, green, white or black jelly beans, in how many ways can Douglas select 24 of these, so that he has an even number of white beans and atleast six black ones? **(06 Marks)**

b. Find all partitions of x^7. **(07 Marks)**

c. 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 in order to communicate a signal to other ships. How many of these signals use an even number of blue flags and odd number of black flags. **(07 Marks)**

8 a. Solve the recurrence relation,
$2a_{n+3} = a_{n+2} + 2a_{n+1} - a_n$; $n \ge 0$; $a_0 = 0$, $a_1 = 1$, $a_2 = 2$. **(08 Marks)**

b. Solve the recurrence relation,
$a_{n+2} - 4a_{n+1} + 3a_n = -200$; $n \ge 0$; $a_0 = 3000$, $a_1 = 3300$. **(06 Marks)**

c. Solve the recurrence relation by the method of generating function,
$a_{n+2} - 5a_{n+1} + 6a_n = 2$; $n \ge 0$; $a_0 = 3$, $a_1 = 7$. **(06 Marks)**

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06CS43

Fourth Semester B.E. Degree Examination, Dec 08 / Jan 09

Analysis and Design of Algorithms

Time: 3 hrs. Max. Marks:100

Note : ***Answer any FIVE full questions, selecting atleast TWO questions from Part A and Part B.***

PART - A

1 a. Discuss the various stages of algorithm design and analysis process using flow chart. **(10 Marks)**

b. Explain important fundamental problem types of different category. **(10 Marks)**

2 a. Explain in brief the basic asymptotic efficiency classes. **(06 Marks)**

b. Explain the method of comparing the order of the growth of two functions using limits. Compare order of growth of following functions i) $\log_2 n$ and $\sqrt{n}$ ii) $(\log_2 n)^2$ and $\log_2 n^2$. **(09 Marks)**

c. Discuss the general plan for analyzing efficiency of non recursive algorithms. **(05 Marks)**

3 a. What is brute – force method? Explain sequential search algorithm with an example. Analyse its efficiency. **(10 Marks)**

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

4 a. What is divide – and – conquer technique? Apply this method to find multiplication of integers 2101 and 1130. **(08 Marks)**

b. Explain the differences between DFS and BFS. Solve topological sorting problem using DFS algorithm with an example. **(12 Marks)**

PART - B

5 a. Explain bottom – up heap sort algorithm with an example. Analyse its efficiency. **(10 Marks)**

b. Write Horspool's algorithm. Apply Horspool algorithm to search for the pattern BAOBAB in the text BESS_ KNEW_ABOUT_BAOBABA. **(10 Marks)**

6 a. Write Warshall's algorithm. Apply Warshall's algorithm to find the transitive closure of the following Fig. 6(a). **(10 Marks)**

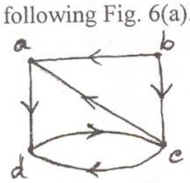

Fig. 6(a)

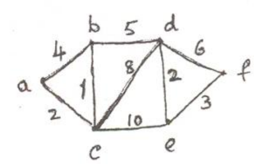

Fig. 7(a)

b. Solve the following knapsack problem with given capacity W = 5 using dynamic programming. **(10 Marks)**

Item	Weight	Value
1	2	\$12
2	1	\$10
3	3	\$20
4	2	\$15

7 a. Write Dijkstra's algorithm and apply the same to find single source shortest paths problem for the following graph taking vertex 'a' as source in fig. 7(a). **(10 Marks)**

b. What are decision trees? Explain the concept of decision trees for sorting algorithms with an example. **(10 Marks)**

8 a. Briefly explain the concepts of P, NP and NP complete problems. **(10 Marks)**

b. Explain back – tracking algorithm. Apply the same to solve the following instance of the subset – sum problem : S = {3, 5, 6, 7} and d = 15. **(10 Marks)**

USN | | | | | | | | | | 06CS44

Fourth Semester B.E. Degree Examination, Dec 08 / Jan 09
Object Oriented Programming With C++

Time: 3 hrs. Max. Marks:100

Note : ***Answer FIVE full questions, selecting atleast TWO questions from each Part A and Part B.***

PART - A

1 a. Discuss the issues of procedure oriented programming systems with respect to data security. If object oriented programming solves it, then how? **(08 Marks)**
b. What are the features of reference variable? **(04 Marks)**
c. Why C++ introduced reference variable? Explain with example. **(08 Marks)**

2 a. Compare "struct" and "class" keyword of C++. **(02 Marks)**
b. Explain the need of friend function in C++. **(06 Marks)**
c. Explain the term Namespace and Namespace pollution. **(04 Marks)**
d. Explain with an example to illustrate the different features of keyword "Namespace" and "using". **(08 Marks)**

3 a. Explain the features of keyword "new" and "delete". **(02 Marks)**
b. Write a C++ program using "set-new-handlers" function to generate out of memory condition and also make sure that out of memory condition is resolved. **(10 Marks)**
c. What is the benefit of copy constructor? Explain with example to illustrate the necessity of defining our own copy constructor though default copy constructor exists. **(08 Marks)**

4 a. What is diamond shaped inheritance? Write a C++ program for the same. **(06 Marks)**
b. Explain different order of invocation of constructors and destructors in inheritance with simple example. **(14 Marks)**

PART - B

5 a. What is need for virtual function? Write a C++ program to override member function of base class in the derived class. **(08 Marks)**
b. Differentiate between virtual destructor and virtual constructor. **(04 Marks)**
c. List different library classes that handle streams in C++. **(04 Marks)**
d. Explain "Write ( )" function of C++ to output the character type value to a disk file and to the display (Monitor) device. **(04 Marks)**

6 a. Explain error handling and manipulators in C++. **(10 Marks)**
b. What are the circumstances in which operator overloading becomes mandatory? **(06 Marks)**
c. Name any four rules for operator overloading. **(04 Marks)**

7 a. Write a C++ program to demonstrate the "new" and "delete" operator in overloading. **(10 Marks)**
b. Demonstrate the over loading of assignment operator in C++ program. **(10 Marks)**

8 a. Write a template for the function swap ( ) and using the same template exchange two int variables. **(08 Marks)**
b. Explain any four functions of standard template library (STL). **(04 Marks)**
c. Write a C++ program to demonstrate the try, throw and catch keywords for implementing exception handling. **(08 Marks)**

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06CS45

Fourth Semester B.E. Degree Examination, Dec 08 / Jan 09
Microprocessors

Time: 3 hrs. Max. Marks:100

Note : ***Answer FIVE full questions, selecting atleast TWO questions from each Part A and Part B.***

PART - A

1 a. Explain with neat diagram, the internal architecture of 8086 microprocessor. Clearly state functions of following in brief. i) Queue ii) BIU iii) AX iv) IP. **(10 Marks)**

b. Explain any five addressing modes with example of each. Also mention the effective offset address of memory location. **(10 Marks)**

2 a. Write and explain instruction template for MOV instruction. Find out machine code for the instruction MOV [SI], al. **(10 Marks)**

b. Find and explain errors, if there are any, in the following instructions.
i) MOV BH, DX ii) OUT 65H, al iii) MUL BL, CL iv) POP F
v) SHR AX, 02. **(10 Marks)**

3 a. Write an ALP to add 5, 16 bit unsigned binary numbers and save the sum and average in memory locations. **(06 Marks)**

b. Write an ALP to calculate delay of 100 milliseconds for 8086 MP working at 10 MHz clock. **(06 Marks)**

c. Compare macro and procedure with example of each. **(08 Marks)**

4 a. Explain conditional and unconditional jump instructions in 8086 MP with example of each. Clearly differentiate between short, near and far jump. **(10 Marks)**

b. Write an ALP to find factorial of single digit number using recursive procedure. Describe stack operations when CALL and RET instructions are executed. **(10 Marks)**

PART - B

5 a. Explain following with example of each. i) DAA ii) Xlat iii) SCASB iv) DD v) PUBLIC. **(10 Marks)**

b. Write an ALP to count number of 1 in given 16 bit unsigned binary number. Save the count in memory locations. **(05 Marks)**

c. Write procedure to convert two digits packed BCD number to two ASCII characters and store them in memory location. **(05 Marks)**

6 a. With neat diagram, explain minimum mode configuration of 8086 MP. **(08 Marks)**

b. Explain with neat timing diagram, the bus activities during a memory read machine cycle. **(06 Marks)**

c. With neat diagram, explain memory organization in 8086 microprocessor. **(06 Marks)**

7 a. Explain the action taken by 8086 MP when an interrupt occurs. Explain interrupt vector table. **(10 Marks)**

b. Show the sequence of ICW and OCW to initialize IC 8259 with base address of FF10H as follows : Edge triggered, Only one 8259 IC, 8086 MP, Interrupt type 40H corresponds to IR_0 input, Normal EOI, Nonbufferred mode, not fully specially nested mode, IR_1 and IR_3 inputs unmasked. **(10 Marks)**

8 a. Explain different methods of parallel data transfer with waveforms. **(10 Marks)**

b. With internal diagram, explain function of various blocks of 8255 PPI. Find out CW for 8255 PPI with A, B port as input and C port as output in mode O. **(10 Marks)**

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06CS46

Fourth Semester B.E. Degree Examination, Dec.08 / Jan.09

Computer Organization

Time: 3 hrs. Max. Marks:100

Note : *Answer FIVE full questions, selecting at least two questions from each Part A and Part B.*

Part A

1 a. Explain the different functional units of a computer with a neat block diagram. **(10 Marks)**
b. Write the basic performance equation. Explain the role of each of the parameters in the equation on the performance of the computer. **(05 Marks)**
c. Represent the number 81234561 in 32-bit Big-endian and little-endian memory organization. **(05 Marks)**

2 a. What is the need for an addressing mode? Explain the following addressing modes with examples: immediate, direct, indirect, index, relative. **(07 Marks)**
b. What is subroutine linkage? How are parameters passed to subroutines? **(06 Marks)**
c. What is a stack frame? Explain. **(07 Marks)**

3 a. Discuss the different schemes available to disable and enable interrupts. **(06 Marks)**
b. How are simultaneous interrupt from more than one devices handled? **(06 Marks)**
c. What does the term "cycle steating" mean? **(02 Marks)**
d. Write a note on any one bus arbitration scheme. **(06 Marks)**

4 a. Draw and explain the block diagram of a typical serial interface. How does it compare with a parallel interface? **(10 Marks)**
b. Explain the main phases involved in SCSI bus operation. **(10 Marks)**

Part B

5 a. Differentiate between SRAM and DRAM. **(02 Marks)**
b. Sketch and explain the internal organization of a $2M \times 8$ dynamic memory chip. **(07 Marks)**
c. Explain any one cache mapping function. **(05 Marks)**
d. A computer has byte addressable memory with a cache that can hold eight 32-bit words. Each cache block consists of one 32-bit word. The following sequence of hex addresses are read during program execution:
200, 204, 208, 2OC, 2F4, 2FO, 200, 204, 218, 21C, 24C, 2F4
Assuming that the cache is initially empty, show the contents of the cache if
i) direct mapping is used ii) associative mapping with LRU replacement is used. **(06 Marks)**

6 a. Draw a block diagram and explain how a virtual address from the processor is translated into a physical address in the main memory. **(05 Marks)**
b. Write notes on: i) Optical technology used in CD systems ii) RAID Disk arrays. **(08 Marks)**
c. Draw a figure to illustrate and explain a 16-bit carry look ahead adder using 4-bit adder blocks. Show that the carry and sum are generated in 5 and 8 gate delays respectively. **(07 Marks)**

7 a. Draw the hardware implementation of Booth's multiplication algorithm. **(04 Marks)**
b. Trace the steps in the above implementation to multiply -5×-4. **(05 Marks)**
c. Illustrate the steps for non-restoring division algorithm on the following data: dividend = 1011, divisor = 0101. **(05 Marks)**
d. If A and B are two single precision floating point numbers where
A = 44900000H and B = 42A00000H
Show the results of (A+B) and (A-B). **(06 Marks)**

8 a. Draw a figure of the single bus organization of the processor unit. **(04 Marks)**
b. List the actions needed to execute the instruction Add R1, (R3). Write the sequence of control steps to perform the actions for a single bus structure. Explain the steps. **(10 Marks)**
c. Compare hardwired control unit with micro programmed control unit. **(06 Marks)**

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