III CS/IS

USN | | | | | | | | | | 10MAT31

Third Semester B.E. Degree Examination, June 2012
Engineering Mathematics – III

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Obtain the Fourier series for the function

$$f(x)=\begin{cases}1+\dfrac{2x}{\pi}, & -\pi\le x\le 0\\ 1-\dfrac{2x}{\pi}, & 0\le x\le \pi\end{cases}$$ and deduce $\dfrac{1}{1^2}+\dfrac{1}{3^2}+\dfrac{1}{5^2}+........=\dfrac{\pi^2}{8}$. **(07 Marks)**

b. Find the half range cosine series for the function $f(x)=(x-1)^2$ in $0<x<1$ **(06 Marks)**

c. Obtain the constant term and the coefficient of the first sine and cosine terms in the Fourier expansion of y as given below. **(07 Marks)**

x	0	1	2	3	4	5
y	9	18	24	28	26	20

2 a. Express the function

$$f(x)=\begin{cases}1, & |x|\le 1\\ 0, & |x|>1\end{cases}$$ as a Fourier integral and hence evaluate $\displaystyle\int_0^\infty \frac{\sin x}{x}\,dx$. **(07 Marks)**

b. Find the sine and cosine transform of $f(x)=e^{-ax}$, $a>0$ **(06 Marks)**

c. Find the inverse Fourier sine transform of $\dfrac{e^{-as}}{s}$. **(07 Marks)**

3 a. A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is vibrating giving to each of its points a velocity $\lambda x(l - x)$, find the displacement of the string at any distance x from one end and at any time t. **(07 Marks)**

b. Find the temperature in a thin metal bar of length 1 where both the ends ate insulated and the initial temperature in bar is $\sin\pi x$. **(07 Marks)**

c. Find the solution of Laplace equation, $\dfrac{\partial^2 u}{\partial x^2}+\dfrac{\partial^2 u}{\partial y^2}=0$, by the method of separation of variables. **(06 Marks)**

4 a. Fit a parabola $y = a + bx + cx^2$ to the following data: **(07 Marks)**

x	-3	-2	-1	0	1	2	3
y	4.63	2.11	0.67	0.09	0.63	2.15	4.58

b. A fertilizer company produces two products Naphtha and Urea. The company gets a profit of Rs.50 per unit product of naphtha and Rs.60 per unit product of urea. The time requirements for each product and total time available in each plant are as follows:

Plant	Hours required		Available hours
	Naphtha	Urea	
A	2	3	1500
B	3	2	1500

The demand for product is limited to 400 units. Formulate the LPP and solve it graphically. **(06 Marks)**

c. Solve the following using Simplex method:

Maximize $Z = x_1 + 4x_2$

Subject to constraints $-x_1 + 2x_2 \le 6$; $5x_1 + 4x_2 \le 40$; $x_j \ge 0$. **(07 Marks)**

PART – B

5 a. Use Regula-falsi method to find a root of the equation $2x - \log_{10}x = 7$ which lies between 3.5 and 4. **(06 Marks)**

b. Solve by relaxation method.
$10x - 2y - 2z = 6$; $-x + 10y - 2z = 7$; $-x - y + 10z = 8$ **(07 Marks)**

c. Use the power method to find the dominant eigenvalue and the corresponding eigenvector of the matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ with the initial eigenvector as $[1\ 1\ 1]^T$. **(07 Marks)**

6 a. The following data is on melting point of an alloy of lead and zinc where t is the temperature in Celsius and P is the percentage of lead in the alloy, tabulated for P = 40(10)90 (i.e., P from 40 to 90 at intervals of 10). Find the melting point of the alloy containing 86% of lead.

P	40	50	60	70	80	90
t	180	204	226	250	276	304

(07 Marks)

b. Using Lagrange's formula, find the interpolation polynomial that approximates to the functions described by the following table:

x	0	1	2	5
f(x)	2	3	12	147

and hence find f(3). **(07 Marks)**

c. Evaluate $\int_0^5 \frac{dx}{4x+5}$, by using Simpson's $\frac{1}{3}^{rd}$ rule, taking 10 equal parts. Hence find log 5. **(06 Marks)**

7 a. Solve the partial differential equation
$$\frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2} = -10(x^2 + y^2 + 10)$$
over the square with side x = 0, y = 0, x = 3, y = 3 with u_0 on the boundary and mesh length h = 1. **(07 Marks)**

b. Solve the heat equation $\frac{\partial U}{\partial t} = \frac{\partial^2 U}{\partial x^2}$, subject to the conditions
$$U(0,t) = u(1,t) = 0 \text{ and } u(x,0) = \begin{cases} 2x & \text{for } 0 \le x \le 1/2 \\ 2(1-x) & \text{for } 1/2 \le x \le 1 \end{cases}$$
Taking h = 1/4 and according to Bender Schmidt equation. **(06 Marks)**

c. Evaluate the pivotal values of the equation $u_{tt} = 16\, u_{xx}$ taking h = 1 upto t = 1.25. The boundary conditions are $u(0, t) = u(5, t) = 0$, $u_t(x, 0) = 0$ and $u(x, 0) = x^2(5 - x)$. **(07 Marks)**

8 a. If $U(z) = \frac{2z^2 + 5z + 14}{(z-1)^4}$, evaluate u_2 and u_3. **(06 Marks)**

b. Find the Z-transform of i) $\sin(3n + 5)$ ii) $\frac{1}{(n+1)!}$. **(07 Marks)**

c. Solve the $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ using Z-transforms. **(07 Marks)**

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III CS / IS

USN | | | | | | | | | | | **06CS32**

Third Semester B.E. Degree Examination, June 2012
Electronics Circuits

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Sketch and explain with the circuit, the combination clippers which limit the output between ±5V.Assume diode voltage is 07V. **(08 Marks)**

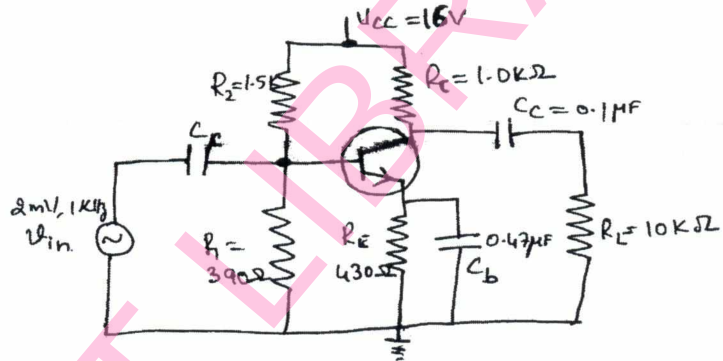
b. What is Clamping? With neat diagram and waveform, explain the working of negative clamper and also write the condition for stiff clamper. **(07 Marks)**

c. Explain Varactor diode with its characteristic curves. **(05 Marks)**

2 a. With circuit diagram, explain base bias amplifier and give the importance of capacitor. **(06 Marks)**

b. Explain small signal operation of amplifiers. **(04 Marks)**

c. For the circuit given below fig.Q2(c), (i) Calculate the input impedence of the base with $\beta = 100$; (ii) Draw the DC equivalent circuit; (ii) Draw the AC equivalent circuit using T and Π model. **(10 Marks)**



$R_1 = 390\Omega$
$R_2 = 1.5k\Omega$
$R_C = 1k\Omega$
$R_E = 430\Omega$
$C_C = 0.1\mu F$
$C_6 = 0.47\mu F$

fig.Q2(c)

3 a. What is multistage amplifier? With the neat circuit diagram explain two stage CE amplifier and derive equation for voltage gain. **(10 Marks)**

b. For the swamped amplifier shown fig.Q3(b) below, calculate; (i) Input impedence of the base;
(ii) The input impedence of the stage; (iii) AC input voltage to the base; (iv) Voltage gain; (v) AC voltage across the load.
Neglect re **(10 Marks)**

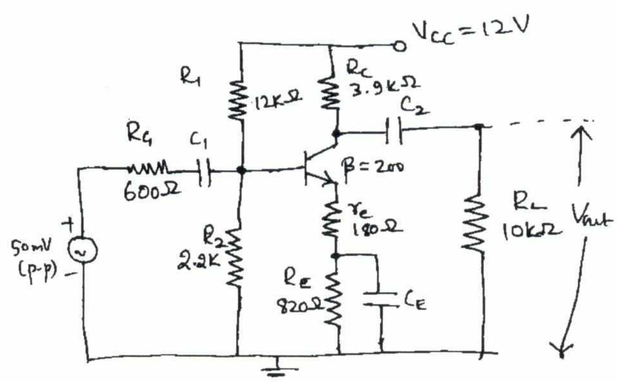


fig.Q3(b)

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. Explain the classification of amplifiers based on their operation. **(06 Marks)**

b. Draw the DC load line and AC load line for a VDB amplifier. **(05 Marks)**

c. With the circuit diagram explain push pull power amplifier and list the advantages and disadvantages of push pull amplifier. **(09 Marks)**

PART – B

5 a. What is ohmic region of E–MOSFET? With the circuit diagram determine whether the MOSFET is based in the ohmic region. **(10 Marks)**

b. The E–MOSFET in the circuit fig.Q5(b) has following parameters $V_{4S(ON)}$= 4.5V, $I_{D(OW)}$= 75 mA and $R_{DS(ON)}$=10Ω. Calculate the output voltage. Show the equivalent circuit. **(04 Marks)**

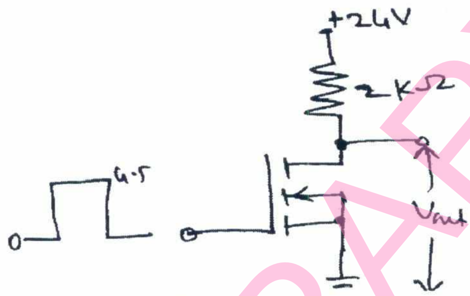


fig.Q5(b)

c. Discus in detail CMOS Operation and power consumption. **(06 Marks)**

6 a. Draw the frequency response diagram of an AC amplifier and identify cut off frequency, mid band gain. **(04 Marks)**

b. Define DECIBEL power gain, DECIBEL voltage gain. For the cascaded amplifier shown below, calculate the decibel voltage gain of each stage and the overall decibel gain fig.Q6(b). **(06 Marks)**

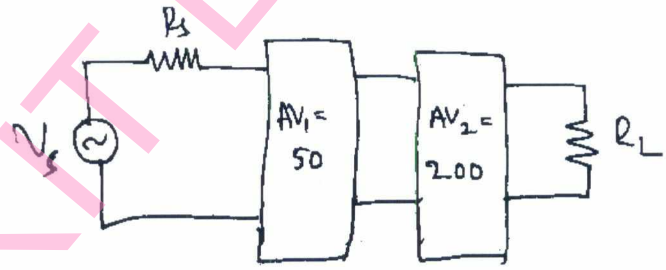


fig.Q6(b)

c. Explain the various types of negative feed back amplifiers. **(10 Marks)**

7 a. Explain with circuit diagram the inverting Schmitt trigger. Draw the input and output wave form for R_1 = 90kΩ, R_2 = 10kΩ, and V_{Sat} = ±10V, show the hystersis curve. **(10 Marks)**

b. With the functional block diagram of 555 explain the astable operation. Draw the output wave form across the capacitar. **(10 Marks)**

8 a. Define load regulation and line regulation. **(04 Marks)**

b. Draw the circuit diagram of zener and two transistor discreate series regulator and derive output voltage equation. **(06 Marks)**

c. What is fold back current? With the circuit diagram explain how fold back current is limited. **(06 Marks)**

d. Discus linear IC voltage regulator. **(04 Marks)**

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USN | | | | | | | | | | **10CS33**

Third Semester B.E. Degree Examination, June 2012
Logic Design

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Realize basic gates, using only NOR gates. **(06 Marks)**
 b. State the DeMorgan's theorems for two variables and prove the same using perfect induction. **(06 Marks)**
 c. What is HDL? Explain verilog program the structures. **(08 Marks)**

2 a. Using K-Map technique simplify
 $f(a, b, c, d) = \Sigma(1, 2, 4, 5, 6, 8, 9, 11, 15) + dc(3, 7, 13)$. **(05 Marks)**
 b. Using Quine Mc Clusky method simplify,
 $f(w, x, y, z) = \Sigma(0, 1, 3, 4, 7, 12, 14, 15)$ **(10 Marks)**
 c. Does circuit in Fig. 2(c), experience hazard? If so, verify the same with timing diagram. **(05 Marks)**

Fig. Q2(c)

3 a. Prove that a 4 : 1 Mux can be realized, using only 2 : 1 multiplexers. **(06 Marks)**
 b. Using a 3 : 8 decoder realize a full adder. **(06 Marks)**
 c. Implement the following Boolean functions, using suitable PLA.
 $f_1 = \Sigma(0, 1, 4, 6)$, $f_2 = \Sigma(2, 3, 4, 6, 7)$
 $f_3 = \Sigma(0, 1, 2, 6)$, $f_4 = \Sigma(2, 3, 5, 6, 7)$. **(08 Marks)**

4 a. Explain the characteristic of an ideal clock. **(04 Marks)**
 b. What do you mean by characteristic equation of a flip – flop? Derive characteristic equation for S.R. Flip-Flop. **(06 Marks)**
 c. Write the state table and state diagram for the circuit shown in Fig. Q4(c). **(10 Marks)**

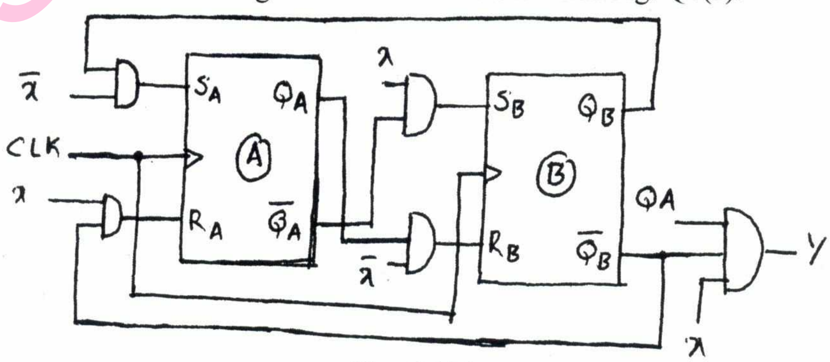

Fig. Q4(c)

PART – B

5 a. With neat timing diagram, explain the working of a 4-bit SISO register. **(10 Marks)**

b. With neat diagram, explain how 7495 can be connected to function as switched tail counter. **(05 Marks)**

c. Write verilog code for Johnson counter. **(05 Marks)**

6 a. Design mod – 12 counter using 7493. **(04 Marks)**

b. What do you mean by lockout condition in counters? Using J.K Flip-Flops design self correcting mod-6 counter. **(12 Marks)**

c. Bring out the differences between synchronous and asynchronous counters. **(04 Marks)**

7 a. With the aid of neat block diagrams, define Mealy and Moore machines. **(06 Marks)**

b. Draw the ASM chart for Mealy machine shown in Fig. Q7(b). **(04 Marks)**

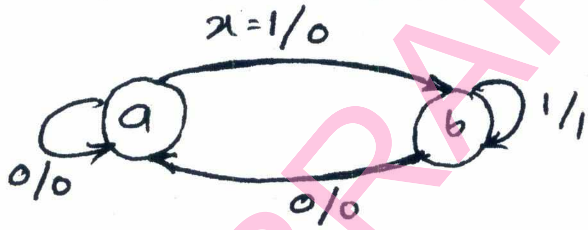

Fig. 7(b)

c. Reduce the state table in Table Q7(c), using implication table method. **(10 Marks)**

PS	NS		O/P	
	x = 0	x = 1	x = 0	x = 1
a	h	c	1	0
b	c	d	0	1
c	h	b	0	0
d	f	h	0	0
e	c	f	0	1
f	f	g	0	0
g	g	c	1	0
h	a	c	1	0

Table Q7(c)

8 a. With neat circuit diagram, explain the working of R – 2R ladder DAC. **(08 Marks)**

b. Explain the working of ADC. **(08 Marks)**

c. Calculate conversion time for 10-bit ADC operating at 5MHz clock. **(04 Marks)**

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USN | | | | | | | | | | **10CS34**

Third Semester B.E. Degree Examination, June 2012

Discrete Mathematical Structures

Time: 3 hrs. Max. Marks:100

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

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.

PART – A

1 a. Let $S = \{21, 22, 23, \ldots, 39, 40\}$. Determine the number of subsets A of S such that :
i) $|A| = 5$
ii) $|A| = 5$ and the largest element in A is 30
iii) $|A| = 5$ and the largest element is at least 30
iv) $|A| = 5$ and the largest element is at most 30
v) $|A| = 5$ and A consists only of odd integers. **(10 Marks)**

b. Prove or disprove: For non-empty sets A and B, $P(A \cup B) = P(A) \cup P(B)$ where P denotes power set. **(05 Marks)**

c. In a group of 30 people, it was found that 15 people like Rasagulla, 17 like Mysorepak, 15 like Champakali, 8 like Rasagulla and Mysorepak, 11 like Mysorepak and Champakali, 8 like Champakali and Rasagulla and 5 like all three. If a person is chosen from this group, what is the probability that the person will like exactly 2 sweets? **(05 Marks)**

2 a. Verify that $[p \to (q \to r)] \to [(p \to q) \to (p \to r)]$ is a tautology. **(05 Marks)**

b. Write dual, negation, converse, inverse and contrapositive of the statement given below :
If Kabir wears brown pant, then he will wear white shirt. **(05 Marks)**

c. Define $(p \uparrow q) \Leftrightarrow \neg(p \wedge q)$. Represent $p \vee q$ and $p \to q$ using only $\uparrow$. **(05 Marks)**

d. Establish the validity or provide a counter example to show the invalidity of the following arguments : **(05 Marks)**

i) $p \vee q$
$\neg p \vee r$
$\neg r$
———
$\therefore q$

ii) p
$p \to r$
$p \to (q \vee \neg r)$
$\neg q \vee \neg s$
———
$\therefore s$

3 a. For the universe of all polygons with three or four sides, define the following open statements:
$i(x)$: all the interior angles of x are equal
$h(x)$: all sides of x are equal
$s(x)$: x is a square
$t(x)$: x is a triangle

Translate each of the following statements into an English sentence and determine its truth value:
i) $\forall x\, [s(x) \leftrightarrow (i(x) \wedge h(x))]$
ii) $\exists x\, [t(x) \to (i(x) \leftrightarrow h(x))]$

Write the following statements symbolically and determine their truth values.
iii) Any polygon with three or four sides is either a triangle or a square
iv) For any triangle if all the interior angles are not equal, then all its sides are not equal. **(08 Marks)**

3 b. Let p(x, y) denote the open statement x divides where the universe consists of all integers. Determine the truth values of the following statements. Justify your answers.
i) $\forall x\ \forall y\ [p(x, y) \wedge p(y, x) \rightarrow (x = y)]$ ii) $\forall x\ \forall y\ [p(x, y) \vee p(y, x)]$ **(06 Marks)**

c. Prove that for every integer n, n^2 is even if and only if n is even. **(06 Marks)**

4 a. Prove $\sum_{i=1}^{n} \frac{1}{i(i+1)} = \frac{n}{n+1} \quad \forall n \in z^+$. **(06 Marks)**

b. Prove $2^n < n! \quad \forall\ n > 3$ and $n \in z^+$. **(06 Marks)**

c. Define an integer sequence recursively by
$a_0 = a_1 = a_2 = 1$
$a_n = a_{n-1} + a_{n-3}\ \forall\ n \geq 3$.
Prove that $a_{n+2} \geq (\sqrt{2})^n \quad \forall\ n \geq 0$. **(08 Marks)**

PART – B

5 Let $A = \{\alpha, \beta, \gamma\}$, $B = \{\theta, \eta\}$, $C = \{\lambda, \mu, \nu\}$.

a. Find $(A \cup B) \times C$, $A \cup (B \times C)$, $(A \times B) \cup C$ and $A \times (B \cup C)$. **(08 Marks)**

b. Give an example of a relation from A to $B \times B$ which is not a function. **(04 Marks)**

c. How many onto functions are there from (i) A to B, (ii) B to A? **(02 Marks)**

d. i) Write a function $f : A \rightarrow C$ and a function $g : C \rightarrow A$. Find $g \circ f : A \rightarrow A$.
ii) Write an invertible function $f : A \rightarrow C$ and find its inverse. **(06 Marks)**

6 a. Let $A = \{1, 2, 3, 4\}$, $B = \{w, x, y, z\}$ and $C = \{p, q, r, s\}$. Consider $R_1 = \{(1, x), (2, w), (3, z)\}$ a relation from A to B, $R_2 = \{(w, p), (z, q), (y, s), (x, p)\}$ a relation from B to C.
i) What is the composite relation $R_1 \circ R_2$ form A to C?
ii) Write relation matrices $M(R_1)$, $M(R_2)$ and $M(R1 \circ R2)$
iii) Verify $M(R_1) \cdot M(R_2) = M(R_1 \circ R_2)$ **(06 Marks)**

b. Let $A = \{1, 2, 3, 6, 9, 12, 18\}$ and define a relation R on A as xRy iff $x|y$. Draw the Hasse diagram for the poset (A, R). **(06 Marks)**

c. Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$ and define R as $(x_1, y_1)R(x_2, y_2)$ iff $x_1 + y_1 = x_2 + y_2$.
i) Verify that R is an equivalence relation on A.
ii) Determine the equivalence class [(1, 3)].
iii) Determine the partition induced by R. **(08 Marks)**

7 a. Define a binary operation $*$ on Z as $x * y = x + y - 1$. Verify that $(Z, *)$ is an abelian group. **(07 Marks)**

b. Let $f : G \rightarrow H$ be a group homomorphism onto H. If G is an abelian group, prove that H is also abelian. **(07 Marks)**

c. The encoding function $E : Z_2^2 \rightarrow Z_2^5$ is given by the generator matrix $G = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 & 1 \end{bmatrix}$.
i) Determine all the code words.
ii) Find the associated parity-check matrix H. **(06 Marks)**

8 a. If $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \in M_2(R)$, prove that $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is a unit of this ring if and only if $ad - bc \neq 0$. **(08 Marks)**

b. Let R be a ring with unity and a, b be units in R. Prove that ab is a unit of R and that $(ab)^{-1} = b^{-1}a^{-1}$. **(06 Marks)**

c. Find multiplicative inverse of each (non-zero) element of Z_7. **(06 Marks)**

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USN | | | | | | | | | | | 10CS35

Third Semester B.E. Degree Examination, June 2012
Data Structures with C

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Define a pointer. Write a C function to swap two numbers using pointers. **(05 Marks)**

b. Explain the functions supported by C to carryout dynamic memory allocation. **(05 Marks)**

c. Explain performance analysis and performance measurement. **(10 Marks)**

2 a. Define structure and union with suitable example. **(08 Marks)**

b. Write a C program with an appropriate structure definition and variable declaration to store information about an employee using nested structures. Consider the following fields like Ename, Empid, DOJ (Date, Month, Year) and salary (Basic, DA, HRA). **(12 Marks)**

3 a. Write a C-program to implement the two primite operations on stack using dynamic memory allocation. **(08 Marks)**

b. Write an algorithm to convert infix to postfix expression and apply the same to convert the following expression from infix to postfix :

i) (a * b) +c/d

ii) (((a/b)-c) + (d * e)) – (a * c). **(12 Marks)**

4 a. Define linked list. Write a C program to implement the insert and delete operation on a queue using linked list. **(10 Marks)**

b. Write a C-function to add two polynomials using linked list representation. Explain with suitable example. **(10 Marks)**

PART – B

5 a. Define binary trees. For the given tree find the following :

i) Siblings

ii) Leaf nodes

iii) Non-leaf nodes

iv) Ancestors

v) Level of trees. **(08 Marks)**

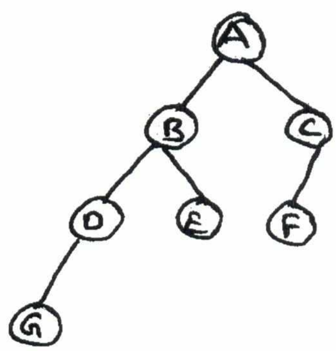

Fig.Q.5(a)

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.

b. Write the C-routines to traverse the given tree using i) inorder ; ii) pre order ; iii) post order. **(12 Marks)**

6 a. Define ADT of binary search tree. Write the iterative search function and recursive search function of BST. **(08 Marks)**

b. Construct the binary tree for the given expressions :

i) Pre order : / + ∗ 1 $ 2 3 4 5

A B D G C E H I F

ii) In order : 1 + 2 ∗ 3 $ 4 – 5

D G B A H E I C F. **(08 Marks)**

c. Define furest with example. **(04 Marks)**

7 a. Define leftlist trees. Explain varieties of leftlist trees. **(08 Marks)**

b. Write short notes on :

i) Priority queues

ii) Binomial heaps

iii) Priority heaps

iv) Fibonacci heaps. **(12 Marks)**

8 a. Define AVL trees. Write a C-routine for

i) Inserting into an AVL tree

ii) LL and LR rotation. **(10 Marks)**

b. Explain the following with example :

i) Red-black trees

ii) Splay trees. **(10 Marks)**

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USN | | | | | | | | | | 10CS36

Third Semester B.E. Degree Examination, June 2012
Object Oriented Programming with C++

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Describe the following characteristics of object oriented programming :
i) Encapsulation ii) Polymorphism iii) Inheritance. **(08 Marks)**
b. Write the general form of function. Explain the different types of argument passing techniques, with example. **(08 Marks)**
c. What are pointers? Explain with example. **(04 Marks)**

2 a. What is class? How it is created? Write a C++ programme to create a class called employee with data members : name, age and salary. Display at least '5' employee information. **(10 Marks)**
b. What are constructors? How is a constructor different from member function? Illustrate with example. **(06 Marks)**
c. What is data hiding? How it is achieved in C++? Explain with example. **(04 Marks)**

3 a. What are friend functions? Why they are required? Illustrate with example. **(10 Marks)**
b. What is the use of operator overloading? Write a programme to overload the following operators :
i) Pre – increment ii) Post – decrement operators. **(10 Marks)**

4 a. What is inheritance? How to inherit a base class as protected? Explain the inheriting multiple base classes. **(06 Marks)**
b. With an example, explain the inheriting multiple base classes. **(06 Marks)**
c. Explain with example base class access control. **(08 Marks)**

PART – B

5 a. Explain the different order of invocation of constructors and destructors in inheritance, with simple example. **(12 Marks)**
b. Explain with example, "granting access" with respect to inheritance. **(08 Marks)**

6 a. What are virtual functions? What is the need of virtual function? How is early binding is different from late binding? **(06 Marks)**
b. What is pure virtual function? Explain with an example. **(08 Marks)**
c. How to inherit a virtual attributes? Explain with example. **(06 Marks)**

7 a. What is exception handling? Write a C++ programme to demonstrate the "try", "throw" and "catch" keywords for implementing exception handling. **(10 Marks)**
b. What is standard template library (STL)? List and explain any five member functions from "list" and "vector" classes. **(10 Marks)**

8 Write a short note on :
a. C++ stream classes
b. File operation
c. Function overloading
d. Inline function. **(20 Marks)**

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MATDIP301

Third Semester B.E. Degree Examination, June 2012

Advanced Mathematics – I

Time: 3 hrs. Max. Marks:100

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

1 a. Express $z=\dfrac{2-\sqrt{3}i}{1+i}$ in the form a + ib. **(06 Marks)**

b. Find modulus and amplitude of $z=\dfrac{3+i}{2+i}$. **(07 Marks)**

c. Find all the values of $z=\left(\dfrac{1}{2}+i\dfrac{\sqrt{3}}{2}\right)^{3/4}$. **(07 Marks)**

2 a. Find the nth derivative of $y=e^{ax}\cos(bx+c)$. **(06 Marks)**

b. If $y=\sin(m\sin^{-1}x)$ prove that $(1-x^2)y_{n+2}-(2n+1)x\,y_{n+1}+(m^2-n^2)y_n=0$. **(07 Marks)**

c. Expand $y=\log(1+x)$ in Maclaurins series upto 5th term. **(07 Marks)**

3 a. If $u=\dfrac{x^2y^2}{x+y}$, find the value of $x^2\dfrac{\partial^2u}{\partial x^2}+2xy\dfrac{\partial^2u}{\partial x\partial y}+y^2\dfrac{\partial^2u}{\partial y^2}$. **(06 Marks)**

b. If $u=3x^2+y^2$ and $x^2-y^2=1$, find $\dfrac{du}{dx}$. **(07 Marks)**

c. If $x=r\cos\phi$, $y=r\sin\phi$, $z=z$, find $\dfrac{\partial(x,y,z)}{\partial(r,\phi,z)}$. **(07 Marks)**

4 a. Obtain the reduction formula for $\int_0^{\pi/2}\sin^n x\,dx$ and hence obtain $\int_0^{\pi/2}\sin^4 x\,dx$. **(06 Marks)**

b. Evaluate $\int_0^1 x^2(1-x^2)^{7/2}dx$. **(07 Marks)**

c. Evaluate $\int_0^1\int_0^3 x^3y^3\,dx\,dy$. **(07 Marks)**

5 a. Evaluate $\int_0^1\int_0^2\int_0^3(x+y+z)\,dz\,dy\,dx$. **(06 Marks)**

b. Evaluate $\int_0^\infty x^2e^{-4x}\,dx$ using gamma function. **(07 Marks)**

c. Find $\beta\left(\dfrac{5}{2},\dfrac{3}{2}\right)$ in terms of gamma function.. **(07 Marks)**

6 a. Solve the equation $\sqrt{1-y^2}\,dx+\sqrt{1-x^2}\,dy=0$. **(06 Marks)**

b. Solve $\dfrac{dy}{dx}=\dfrac{x-y}{x+y}$. **(07 Marks)**

c. Solve $\dfrac{dy}{dx}=(x+y)^2$. **(07 Marks)**

7 a. Solve $\dfrac{dy}{dx}=\dfrac{\sin 2x-\tan y}{x\sec^2 y}$. **(06 Marks)**

b. Solve $\dfrac{d^2y}{dx^2}+x^2y=x^2$. **(07 Marks)**

c. Solve $\dfrac{dy}{dx}+\sin xy=\sin x\cos x$. **(07 Marks)**

8 a. Solve $(D^2+a^2)y=x^2$. **(06 Marks)**

b. Solve $(D^3+D^2-D-1)y=e^{2x}$. **(07 Marks)**

c. Solve $(D^4-1)y=\sin x+2$. **(07 Marks)**

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