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10MAT31

Third Semester B.E. Degree Examination, Dec.2013/Jan.2014
Engineering Mathematics – III

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Find the Fourier series expansion of the function $f(x) = |x|$ in $(-\pi, \pi)$, hence deduce that $\frac{\pi^2}{8} = \sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$. **(06 Marks)**

b. Obtain the half-range cosine series for the function, $f(x) = (x-1)^2$ in the interval $0 \le x \le 1$ and hence show that $\pi^2 = 8\left\{\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + ...\right\}$ **(07 Marks)**

c. Compute the constant term and first two harmonics of the Fourier series of f(x) given by, **(07 Marks)**

x	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$	2π
f(x)	1.0	1.4	1.9	1.7	1.5	1.2	1.0

2 a. Obtain the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$. **(06 Marks)**

b. Find the Fourier transform of $f(x) = \begin{cases} 1-x^2 & \text{for } |x| \le 1 \\ 0 & \text{for } |x| > 1 \end{cases}$ and evaluate $\int_0^{\infty} \frac{x\cos x - \sin x}{x^3} dx$. **(07 Marks)**

c. Find the inverse Fourier sine transform of $\frac{s}{1+s^2}$. **(07 Marks)**

3 a. Obtain the various possible solutions of two dimensional Laplace's equation, $u_{xx} + u_{yy} = 0$ by the method of separation of variables. **(07 Marks)**

b. Solve the one-dimensional wave equation, $C^2 \frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$, $0 < x < l$ under the following conditions (i) $u(0, t) = u(l, t) = 0$ (ii) $u(x, 0) = \frac{u_0 x}{l}$ where u_0 is constant (iii) $\frac{\partial u}{\partial t}(x,0) = 0$. **(07 Marks)**

c. Obtain the D'Almbert's solution of the wave equation $u_{tt} = C^2 u_{xx}$ subject to the conditions $u(x, 0) = f(x)$ and $\frac{\partial u}{\partial t}(x,0) = 0$. **(06 Marks)**

4 a. Find the best values of a, b, c, if the equation $y = a + bx + cx^2$ is to fit most closely to the following observations. **(07 Marks)**

x	1	2	3	4	5
y	10	12	13	16	19

b. Solve the following by graphical method to maximize $z = 50x + 60y$ subject to the constraints, $2x + 3y \le 1500$, $3x + 2y \le 1500$, $0 \le x \le 400$ and $0 \le y \le 400$. **(06 Marks)**

c. By using Simplex method, maximize $P = 4x_1 - 2x_2 - x_3$ subject to the constraints, $x_1 + x_2 + x_3 \le 3$, $2x_1 + 2x_2 + x_3 \le 4$, $x_1 - x_2 \le 0$, $x_1 \ge 0$ and $x_2 \ge 0$. **(07 Marks)**

PART – B

5 a. Using Newton-Raphson method, find a real root of $x\sin x + \cos x = 0$ nearer to π, carryout three iterations upto 4-decimals places. **(07 Marks)**

b. Find the largest eigen value and the corresponding eigen vector of the matrix,

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

By using the power method by taking the initial vector as $[1\ 1\ 1]^T$ carryout 5-iterations. **(07 Marks)**

c. Solve the following system of equations by Relaxation method:
$12x + y + z = 31$; $2x + 8y - z = 24$; $3x + 4y + 10z = 58$ **(06 Marks)**

6 a. A survey conducted in a slum locality reveals the following information as classified below,

Income per day in Rupees 'x'	Under 10	10 – 20	20 – 30	30 – 40	40 – 50
Numbers of persons 'y'	20	45	115	210	115

Estimate the probable number of persons in the income group 20 to 25. **(07 Marks)**

b. Determine f(x) as a polynomials in x for the data given below by using the Newton's divided difference formula. **(07 Marks)**

x	2	4	5	6	8	10
f(x)	10	96	196	350	868	1746

c. Evaluate $\int_0^1 \frac{x}{1+x^2}dx$ by using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule by taking 6 – equal strips and hence deduce an approximate value of $\log_e 2$. **(06 Marks)**

7 a. Solve the wave equation, $\frac{\partial^2 u}{\partial t^2} = 4\frac{\partial^2 u}{\partial x^2}$, subject to u(0, t) = 0, u(4, t) = 0, $u_t(x, 0) = 0$ and $u(x, 0) = x(4 - x)$ by taking h = 1, K = 0.5 upto 4-steps. **(07 Marks)**

b. Solve numerically the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the conditions, u(0, t) = 0 = u(1, t), $t \geq 0$ and $u(x, 0) = \sin \pi x$, $0 \leq x \leq 1$, carryout the computation for two levels taking $h = \frac{1}{3}$ and $K = \frac{1}{36}$. **(07 Marks)**

c. Solve $u_{xx} + u_{yy} = 0$ in the following square region with the boundary conditions as indicated in the Fig. Q7 (c). **(06 Marks)**

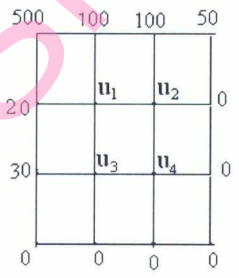

Fig. Q7 (c)

8 a. Find the z-transform of, (i) $\sinh n\theta$ (ii) $\cosh n\theta$ (iii) n^2 **(07 Marks)**

b. Find the inverse z-transform of, $\frac{2z^2 + 3z}{(z+2)(z-4)}$. **(06 Marks)**

c. Solve the difference equation, $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ by using z-transform. **(07 Marks)**

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10CS32

Third Semester B.E. Degree Examination, Dec.2013/Jan.2014

Electronic Circuits

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the criteria for selecting a suitable operating point and factors affecting the stability. **(08 Marks)**

b. Determine the operating point for a fixed bias circuit shown in Fig.Q1(b). Given $\beta = 100$ and $V_{BE} = 0.7V$. Draw the load line.

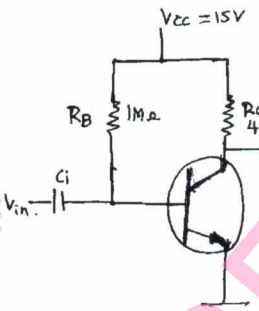

Fig.Q1(b) **(07 Marks)**

c. Explain transistor as a switch. **(05 Marks)**

2 a. What are the differences between BJTs and FETs? **(06 Marks)**

b. Explain the working of a CMOS inverter. **(04 Marks)**

c. Explain the construction, working and principle of operation of an n-channel JFET. **(10 Marks)**

3 a. Explain the classification of optoelectronic devices. **(06 Marks)**

b. Define the following terms:
i) Responsivity ii) NEP
iii) Response time iv) Quantum efficiency **(04 Marks)**

c. Explain the working of cathode ray tube with a neat diagram. What are the advantages and disadvantages of CRT? **(10 Marks)**

4 a. What is the need for cascading amplifier? Explain two stage cascaded amplifier with a block diagram. **(08 Marks)**

b. Derive the expressions for: i) Current gain ii) Input impedance
iii) Voltage gain iv) Output admittance **(12 Marks)**

PART – B

5 a. Briefly explain the classification of amplifier based on input and output parameter of interest [V_i, V_o, I_i and I_o]. **(12 Marks)**

b. With a neat block diagram, explain amplifier with negative feed back. **(04 Marks)**

c. Calculate the values of harmonic distortion components for an output signal having an amplitude of 5V at fundamental frequency, second harmonic component of 0.5V, third harmonic component of 0.2V and fourth harmonic component of 0.05V and find total harmonic distortion. **(04 Marks)**

6 a. What are necessary conditions for loop gain and phase shift for sustained oscillations according to Barkhausen criterion? **(04 Marks)**

b. Explain the working of an Astable multivibrator using IC 555 timer with circuit diagram and relevant waveforms. **(08 Marks)**

c. Explain the working of RC low pass RC high pass circuit. **(08 Marks)**

7 a. Explain the steps involved in custom design of mains transformer. **(06 Marks)**

b. What are SMPS? Compare linear power supplies with SMPS. **(07 Marks)**

c. Explain the working of three terminal voltage regulators. **(07 Marks)**

8 a. What should be the slew rate choosen for an OPAMP as an inverting amplifier configuration with gain of 10 when input is a sinusoidal signal with peak to peak value of 2V and highest frequency expected is 50 Hz? **(04 Marks)**

b. Explain the working of an OPAMP window comparator with circuit diagram. **(08 Marks)**

c. Explain the lead and lag type of phase shifter. **(08 Marks)**

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10CS33

Third Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Logic Design

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With the aid of the circuit diagram, explain the operation of 2 – input TTL NAND gate. **(08 Marks)**

b. What are universal gates? Implement the following function using universal gates only $\overline{((A+B)C)}D$. **(06 Marks)**

c. Write the truth table of the logic circuit having 3 input A, B and C and output output expressed as $y = A\overline{B}C + ABC$. Also simplify the expression using Boolean expression and implement the logic circuit using NAND gates? **(06 Marks)**

2 a. Using Q – M method, simplify the expressions f(A, B, C, D) = Σ(0, 3, 5, 6, 7 11, 14). Write the gate diagram for the simplified expression using NAND – NAND gates. **(10 Marks)**

b. A digital system is to be designed in which the month of the year is given as input is four bit form. The month January is represented as '0000' February '0001' and so on. The output of the system should be '1' corresponding to the input of the month containing 31 days or otherwise it is '0' consider the excess numbers in the input beyond '1011' as don't care conditions for system of four variables (A, B, C, D) find the following :

i) Boolean expression in Σm and πm form
ii) Write the truth table
iii) Using K – map, simplify the Boolean expression of canonical minterm form
iv) Implement the simplified equation using NAND – NAND gates. **(10 Marks)**

3 a. Write a 4: 1 MUX verilog program using conditional 'assign' and 'case' statement. **(06 Marks)**

b. What are static hazards? How to design hazards free circuit? Explain with an example. **(06 Marks)**

c. Explain IV – bit magnitude comparator. **(08 Marks)**

4 a. Draw the logic diagram of clock D – flip/flop write its truth table and characteristic equation, state diagram and excitation table, what is the draw back JK flip/flop. **(10 Marks)**

b. Differentiate between combinational circuit and sequential circuits. **(05 Marks)**

c. Show how a SR flip/flop can be converted into T – flip/flop. **(05 Marks)**

PART – B

5 a. Using negative edge triggered JK flip/flop, draw the logic diagram of a 4-bit serial-in-serial-out shift register. Draw the waveform to shift the binary number 1010 into this register. Also draw the waveform for 4 clock transistor when J = K = 0. **(08 Marks)**

b. Explain the working of mod – 4 ring counter. **(06 Marks)**

c. Explain with a neat diagram, how shift register can be applied for serial addition. **(06 Marks)**

6 a. With the help of neat block diagram and timing diagram, explain the working of a mod -16 ripple counter constructed using the edge triggered JK- flip/flop. **(08 Marks)**

b. Design asynchronous counter for the sequence $0 \rightarrow 4 \rightarrow 1 \rightarrow 2 \rightarrow 6 \rightarrow 0 \rightarrow 4$, using SR flip-flop. **(12 Marks)**

7 a. Design a sequence detector that receives bindery data stream as its input, X and signals when a combinations '011' arrives at the input by making its output. Y high which otherwise remain line consider data is coming from left, i. e the first bit to be identified is 1. Second 1 and third 0 from the input sequence. Design mealy model? **(14 Marks)**

b. Realize the sequential circuit for the state diagram. **(06 Marks)**

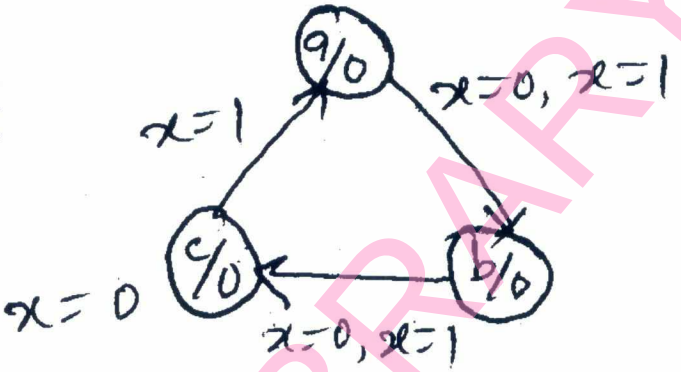

Fig. Q7(b)

8 a. Explain 2-bit simultaneous A/D converter. **(10 Marks)**

b. What is binary ladder? Explain the binary ladder with a digital input of 1000. **(06 Marks)**

c. What is accuracy and resolution of the D/A converter? What is the resolution of a 12 bit D/A converter which uses binary ladder? If the full scale output is + 10 V, what is the resolution in volts? **(04 Marks)**

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10CS34

Third Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Discrete Mathematical Structures

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define power set of a set. Determine power sets of the following sets.
$A = \{a, \{b\}\}$ $B = \{\phi, 1, \{\phi\}\}$. **(04 Marks)**

b. Using laws of set theory show that $(A \cap B) \cup [B \cap ((C \cap D) \cup (C \cap D))] = B \cap (A \cup C)$. **(05 Marks)**

c. In a survey of 260 college students, the following data were obtained; 64 had taken Mathematics course, 94 had take CS course, 58 had take EC course, 28 had taken both Mathematics and EC course, 26 had taken both Mathematics and CS course, 22 had taken both CS and EC course, and 14 had taken all three types of courses. Determine :
i) How many of these students had taken none of the three courses?
ii) How many had taken only CS course? **(06 Marks)**

d. An integer is selected at random from 3 through 17 inclusive. If A is the event that a number divisible by 3 is chosen, and B is the even that the number exceeds 10. Determine Pr(A), Pr(B), $Pr(A \cap B)$ and $Pr(A \cup B)$. **(05 Marks)**

2 a. Let p, q be primitive statements for which implication $p \rightarrow q$ is false. Determine the truth values of the following : i) $p \wedge q$ ii) $\neg p \vee q$ iii) $q \rightarrow p$ iv) $\neg q \rightarrow \neg p$. **(05 Marks)**

b. By constructing truth table. Show that the compound propositions $p \wedge (\neg q \vee r)$ and $p \vee (q \wedge \neg r)$ are not logically equivalent. **(05 Marks)**

c. Prove that $(\neg p \vee q) \wedge (p \wedge (p \wedge q)) \Leftrightarrow p \wedge q$. Hence deduce that $(\neg p \wedge q) \vee (p \vee (p \vee q)) \Leftrightarrow p \vee q$. **(05 Marks)**

d. Show that $R \vee S$ follows logically from the premises. $C \vee D$, $(C \vee D) \rightarrow \neg H$, $\neg H \rightarrow (A \wedge \neg B)$ and $(A \wedge \neg B) \rightarrow R \vee S$. **(05 Marks)**

3 a. Write down the converse, inverse and contrapositive of the following statement, for which the set of real numbers is the universe. Also indicate their truth values. $\forall_x [(x>3) \rightarrow (x^2>9)]$. **(06 Marks)**

b. Write the following propositions in symbolic form and find its negation. For all x, if x is odd then $x^2 - 1$ is even. **(04 Marks)**

c. Let p(x), q(x) and r(x) be open statements, determine whether the following argument is valid or not

$$\forall_x [p(x) \rightarrow q(x)]$$
$$\forall_x [q(x) \rightarrow r(x)]$$
$$\therefore \forall_x [p(x) \rightarrow r(x)].$$

(06 Marks)

d. Give a direct proof of he statement : "The square of an odd integer is an odd integer" . **(04 Marks)**

4 a. Using mathematical induction, prove that $4n < (n^2 - 7)$ for all positive integers $n \geq 6$. **(06 Marks)**

b. For the Fibonacci sequence F_0, F_1, F_2 - - - -. Prove that $F_n = \frac{1}{\sqrt{5}}\left[\left(\frac{1+\sqrt{5}}{2}\right)^n - \left(\frac{1-\sqrt{5}}{2}\right)^n\right]$. **(08 Marks)**

c. Find an explicit formula for $a_n = a_{n-1} + n$, $a_1 = 4$ for $n \geq 2$. **(06 Marks)**

PART – B

5 a. Define the Cartesian product of two sets. For any non – empty sets A, B and C prove that $A \times (B \cup C) = (A \times B) \cup (A \times C)$. **(05 Marks)**

b. Define the following with one example for each i) Function ii) one – to one function iii) on to function. **(06 Marks)**

c. State the pigeonhole principle. An office employs 13 clerks. Show that at least 2 of them will have birthdays during the same month of the year. **(04 Marks)**

d. Let $f : R \to R$, $g : R \to R$ be defined by $f(x) = x^2$, and $g(x) = x + 5$. Determine $f \cdot g$ and $g \cdot f$. Show that the composition of two functions is not commutative. **(05 Marks)**

6 a. Let A = {1, 2, 3, 4}, and let R the relation defined by $R = \{(x, y) \mid x, y \in A, x \leq y\}$. Determine whether R is reflexive, symmetric antisymmetric, or transitive. **(05 Marks)**

b. What is partition of a set. If R = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 3), (3, 3), (4, 4)} defined on the set A = {1, 2, 3, 4}. Determine the partition induced. **(05 Marks)**

c. Define partial order. If R is a relation on A = {1, 2, 3, 4} defined by X R Y if x|y. Prove that (A, R) is a POSET. Draw its Hasse diagram. **(06 Marks)**

d. Let A = {2, 3, 4, 6, 8, 12, 24} and let ≤ denotes the partial order of divisibility that is $x \leq y$ means x|y. Let B = {4, 6, 12}. Determine :
   i) All upper bounds of B
   ii) All lower bounds of B
   iii) Least upper bound of B
   iv) Greatest lower bound of B. **(04 Marks)**

7 a. Define abelian group. Prove that a group G is abelian iff $(ab)^2 = a^2b^2$ for all a, b, ∈ G. **(07 Marks)**

b. If H and K are subgroups of a group G. Prove that $H \cap K$ is also a sub group of G. **(05 Marks)**

c. Define homomarphism anod isomorphism in group. Let f be homomorphism from a group G_1 to group G_2. Prove that
   i) If e_1 is the identity in G_1 and e_2 is the identity in G_2, then $f(e_1) = e_2$
   ii) $f(a^{-1}) = [f(a)]^{-1}$ for all $a \in G_1$. **(08 Marks)**

8 a. An encoding function $E : Z_2^2 \to Z_2^5$ 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
   iii) Use H to decode received words : 1 1 1 0 1, 1 1 0 1 1. **(07 Marks)**

b. A binary symmetric channel has probability P = 0.05 of incorrect transmission. If the word C = 011011101 is transmitted, what is the probability that i) single error occurs ii) a double error occurs iii) a triple error occurs iv) three errors occur no two of them consecutive? **(08 Marks)**

c. Define a ring. In a ring (R, +, 0) for all a, b ∈ R, prove that
   i) $a \cdot 0 = 0 \cdot a = 0$
   ii) $a(-b) = (-a)\, b = -(ab)$. **(05 Marks)**

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10CS35

Third Semester B.E. Degree Examination, Dec. 2013/Jan. 2014
Data Structures with C

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer FIVE full questions, selecting atleast TWO questions from each part.***
2. Missing data, if any, may be suitable assumed.

PART – A

1 a. What is an ADT? Briefly explain the categories that classify the functions of a data type. Write an ADT for natural number. **(10 Marks)**

b. What is time complexity? Determine the time complexity of an iterative and recursive functions that adds n elements of the array using tabular method. **(10 Marks)**

2 a. Develop a structure to represent planet in the solar system. Each planet has fields for the planet's name, its distance from the sun in miles and the number of moons it has. Write a program to read the data for each planet and store. Also print the name of the planet that has less distance from the sun. **(08 Marks)**

b. What is a polynomial? What is the degree of the polynomial? Write a function to add two polynomials? **(08 Marks)**

c. For the given sparse matrix A and its transpose, give the triplet representation. A is the given sparse matrix, and B will be its transpose.

$$A = \begin{bmatrix} 15 & 0 & 0 & 22 & 0 & -15 \\ 0 & 11 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & -6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 91 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -28 & 0 & 0 & 0 \end{bmatrix}$$

Fig. Q2(c) Sparse Matrix **(04 Marks)**

3 a. Define stack. Implement push and pop functions for stack using arrays. **(08 Marks)**

b. Implement addq and deleteq functions for the circular queue. **(06 Marks)**

c. Write the postfix form of the following expressions

i) (a + b) * d + e/(f + a * d) + c

ii) ((a/(b – c + d)) * (e – a) * c)

iii) a/b – c + d * e – a * c. **(06 Marks)**

4 a. Write the different polynomial representation, with an example. **(06 Marks)**

b. For the given sparse matrix write the diagrammatic linked list representation? **(06 Marks)**

$$A = \begin{bmatrix} 5 & 0 & 0 & 0 \\ 3 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 8 & 0 & 0 & 2 \\ 0 & 0 & 7 & 0 \end{bmatrix}$$

Fig. Q4(b) : 5 × 4 Sparse Matrix

c. Define equivalence class. Write the linked list representation for the twelve polygons numbered 0 through 11 using the following pairs overlap?
$0 \equiv 4, 3 \equiv 1, 6 \equiv 10, 8 \equiv 9, 7 \equiv 4, 6 \equiv 8, 3 \equiv 5, 2 \equiv 11, 11 \equiv 0.$ **(08 Marks)**

PART – B

5 a. What is a tree? Explain
i) Root node
ii) Degree
iii) Siblings
iv) Depth of a tree and give examples. **(08 Marks)**

b. What is a binary tree? State its properties? How it is represented using array and linked list, give example? **(08 Marks)**

c. Define a max heap? Write a C function to insert an item into max heap? **(04 Marks)**

6 a. Explain the following, with an example
i) Selection trees
ii) Forests and its traversals. **(08 Marks)**

b. Describe the binary search tree, with an example. Write a recursive function to search for a key value in a binary search tree. **(08 Marks)**

c. Write the adjacency matrix and adjacency list for the following graph. **(04 Marks)**

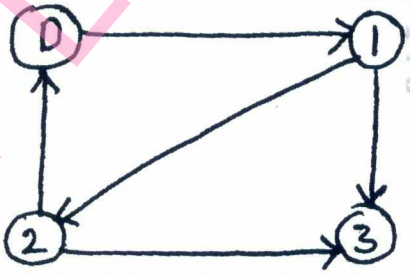

Fig. Q6(c) Directed graph

7 a. Briefly explain the following, with an example :
i) HBLT ii) WBLT. **(08 Marks)**

b. Write short notes on :
i) Priority queues
ii) Binomial heaps
iii) Fibonacci heaps. **(12 Marks)**

8 a. What is an AVL tree? Write the algorithm to insert an item into AVL tree. **(08 Marks)**

b. Explain the Red-Black-Tree with an example. State its properties. **(08 Marks)**

c. What is a splay tree? Briefly explain the different types of splay trees. **(04 Marks)**

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10CS36

Third Semester B.E. Degree Examination, Dec.2013/Jan.2014

Object Oriented Programming 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. Explain various features of object oriented programming. **(08 Marks)**

b. What is inline function? Explain with an example. Mention its advantages. **(06 Marks)**

c. What is function overloading? Write a program to swap two integer and two float number using function overloading. **(06 Marks)**

2 a. What is class? Write a program to create a class called employee which consists name, desg, ecode and salary as a data member and read, write as a function member, using this class to read and print 10 employee information. **(08 Marks)**

b. What is constructor? Mention its types. Explain parameterized constructor with an example. **(06 Marks)**

c. Explain three access specifiers. **(06 Marks)**

3 a. Why friend function is required? Write a program to add two complex number using friend function. **(08 Marks)**

b. Explain generic function with an example. **(06 Marks)**

c. Write a program to overload + + operator. **(06 Marks)**

4 a. Mention types of inheritance. Explain multiple and multilevel inheritance with example. **(08 Marks)**

b. What is function overriding? Give an example. **(06 Marks)**

c. Write a program to illustrate protected members in base class inheritance. **(06 Marks)**

PART – B

5 a. Explain the order of innovocation of constructor and destructor with an example. **(10 Marks)**

b. Explain with an example virtual base class. **(05 Marks)**

c. Explain passing parameter to base class. **(05 Marks)**

6 a. Difference between early binding and late binding. **(06 Marks)**

b. What is virtual function? Explain with an example. **(08 Marks)**

c. Explain the abstract class with an example. **(06 Marks)**

7 a. What are the flags that associated with the file operation? **(06 Marks)**

b. Explain the following functions:
i) setfill( ) ii) width( ) iii) precision( ) iv) setiosflags( ) **(08 Marks)**

c. Mention the name of file movement pointer. Explain each. **(06 Marks)**

8 a. Explain C++ exception handling function with example. **(08 Marks)**

b. What is vector? Explain function of a vector. **(06 Marks)**

c. Write a program to create a list and sorting the elements of the list. **(06 Marks)**

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MATDIP301

Third Semester B.E. Degree Examination, Dec.2013/Jan.2014

Advanced Mathematics – I

Time: 3 hrs. Max. Marks:100

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

1 a. Express the complex number $\frac{(1+i)(1+3i)}{1+5i}$ in the form x + iy. **(06 Marks)**

b. Find the modulus and amplitude of $\frac{(3-\sqrt{2i})^2}{1+2i}$. **(07 Marks)**

c. Expand $\cos^8\theta$ in a series of cosines multiples of θ. **(07 Marks)**

2 a. Find the n^{th} derivative of sin(ax + b). **(06 Marks)**

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

c. Find the nth derivative of $\left[\frac{1}{5(x-1)} + \frac{-3/2}{\left(\frac{-3}{2}-1\right)(2x+3)}\right]$. **(07 Marks)**

3 a. Using Taylor's theorem, express the polynomial $2x^3 + 7x^2 + x - 6$ in powers of (x – 1). **(06 Marks)**

b. Using Maclaurin's series, expand tan x upto the term containing x^5. **(07 Marks)**

c. If $Z = x^3 + y^3 - 3axy$ then prove that $\frac{\partial^2 z}{\partial y \partial x} = \frac{\partial^2 z}{\partial x \partial y}$. **(07 Marks)**

4 a. If $u = x \log xy$ where $x^3 + y^3 + 3xy = 1$, find $\frac{du}{dx}$. **(06 Marks)**

b. If z = f(x, y) and $x = e^u + e^{-v}$ and $y = e^{-u} - e^v$, prove that $\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \cdot \frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y}$. **(07 Marks)**

c. If $u = x + 3y^2 - z^3$, $v = 4x^2yz$, $w = 2z^2 - xy$, find the value of $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at (1, –1, 0). **(07 Marks)**

5 a. Obtain the reduction formula for $\int \sin^n x\,dx$. **(06 Marks)**

b. Evaluate $\int_0^a \frac{x^7 dx}{\sqrt{a^2 - x^2}}$. **(07 Marks)**

c. Evaluate $\int_1^2 \int_3^4 (xy + e^y)dydx$. **(07 Marks)**

6 a. Evaluate $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z} dxdydz$. **(06 Marks)**

b. Find the value of $\left|\left(\frac{1}{2}\right)\right.$. **(07 Marks)**

c. Prove that $\beta(m,n) = \frac{\lfloor(m)\,\lfloor(n)}{\lfloor(m+n)}$. **(07 Marks)**

7 a. Solve $\frac{dy}{dx} = e^{3x-2y} + x^2 \cdot e^{-2y}$. **(06 Marks)**

b. Solve $\frac{dy}{dx} = \frac{x^2 - y^2}{xy}$ which is homogeneous in x and y. **(07 Marks)**

c. Solve $\frac{dy}{dx} - \frac{y}{x+1} = e^{3x}(x+1)$. **(07 Marks)**

8 a. Solve $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = e^x$. **(06 Marks)**

b. Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = \sin 2x$. **(07 Marks)**

c. Solve $(D^2 - 1)y = x \sin 3x + \cos x$. **(07 Marks)**

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