UKA TARSADIA UNIVERSITY

BCA/BCA (Honors)/Integrated M.Sc. (IT)/MCA (Integrated) (Semester 1)
030010112(2015-16)/030240105(2016-17)/060010112(2015-16)/060060109(2015-16)
DSE1 Mathematics for Computer Application/DSE1 Mathematics For Computer Applications

Date :16/05/2017 **Time :**1:30PM- 4:30PM

Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 A) Answer the following. **[4]**

I) Find $(127)_8 = (?)_{10}$.

II) What will be the value of decimal number 5 in 2's complement method?

III) What is the law of duality?

IV) How many rows appear in a truth table for this compound proposition

q V p V ~s V ~r V ~t

Q 1 B) Answer the following in brief. (Any 3) **[6]**

I) Enlist two difference points between the bits used in a code such as ASCII and the bits used in binary numbers.

II) Let *P(x)* denotes the statement "x ≤ 4" What are these truth values?
(a) *P(0)* (b) *P(4)*

III) Convert given decimal number 1249 into hexadecimal number.

IV) If t and c denote tautology and contradiction respectively and p is a statement then prove.
(a) $p \vee t = t$ (b) $q \wedge c = c$

Q 2 Answer the following. **[10]**

A) Define Logical Implication. Determine the validity of the Compound statement (p v q) ^ (p -> r) ^ (q -> r) => r using Truth Table.

OR

A) Convert the following arguments into mathematical form, and then check the validity of the same.
"If you send me an e-mail message, then I will finish writing the program," "If you do not send me an e-mail message, then I will go to sleep early," and "If I go to sleep early, then I will wake up feeling refreshed" lead to the conclusion "If I do not finish writing the program, then I will wake up feeling refreshed."

B) Determine whether each of the following relations is a function with domain {a,b,c, d} or not. If relation is not a function, write the reason for it. Further, determine which of the properties among one-one, on-to and constant is/are satisfied by the functions given below:
R1={(a,b), (b,c),(d,b)}
R2={(a,a), (b,a), (c,a), (d,a),(c,c)}
R3={(a,d),(b,c),(c,b),(d,a)}
R4={(a,a),(b,a),(c,a),(d,a)}

OR

B) If S = { 1, 2, 3, 4, 5} and if the functions f, g, h : S → S are given by f = { (1,2), (2,1), (3,4), (4,5), (5,3)},g={(1,3),(2,5),(3,1),(4,2),(5,4)},h={(1,2),(2,2),(3,4),(4,3),(5,1)}

(a) Verify whether fog = gof
(b) Explain why f and g have inverses but h does not.

Q 3 Answer the following in detail. (Any 2) **[10]**

I) List three properties of Equivalence relation. Consider relation R = {(1, 1), (1, 2), (2, 1), (2, 2), (2, 3), (3, 2), (4, 4)} on {1, 2, 3, 4}. Check whether given relation is Equivalence relation or not.

II) Explain lattice homomorphism and lattice isomorphism.

III) Explain 2's complement binary addition with an appropriate example.

SECTION - 2

Q 4 A) Answer the following. **[4]**

I) Find the Recurrence relation of the sequence 2, 6, 18, 54, 162,..

II) Calculate the permutation 9P8.

III) What do you mean by symmetric matrix?

IV) Find the determinant of the given matrix: $\begin{vmatrix} 1 & 2 \\ 1 & 3 \end{vmatrix}$.

Q 4 B) Answer the following in brief. (Any 3) **[6]**

I) Using example, verify whether the value of determinant remains same or not if the order of any two rows is changed in determinant.

II) 10 integers are chosen from 1 to 100 inclusively. Using pigeon principle proves that we can find 2 disjoint non-empty subsets of the chosen integers such that the 2 subsets give the same sum of elements.

III) Evaluate

$$\begin{vmatrix} 20 & 11 & 31 \\ 11 & -7 & 4 \\ 19 & 11 & 30 \end{vmatrix}$$

IV) If $A = \begin{pmatrix} 2 & 1 & -1 \\ 5 & 2 & 3 \end{pmatrix}$ what is the order of the matrix and find A^T

Q 5 Answer the following. **[10]**

A) Briefly discuss any one application of Mathematical Induction in Computer Science domain. In a program, student has used the formula $1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{1}{6} n(n+1)(2n+1)$. Prove that formula used by student is correct by using Mathematical Induction.

OR

A) In how many ways can a photographer at a wedding arrange a six people in a row, including the bride and groom, if
a) The bride must be next to the groom?
b) The bride is not next to the groom?

B) Ram and Shyam are going to college. For this, Ram has selected the line-path with equation x + y + 1 = 0. Whereas Shyam has selected the line-path 3x + y – 5 = 0. Find the co-ordinate point of the college. After reaching to the college, they are planning to celebrate birthday in party plot which has co-ordinate (1,-3). Find the distance between the college and party plot. Also find the equation of line-path selected by them to reach to the college to the party plot.

OR

B) Find the equation to the straight line passing through the point of intersection of the lines 5x – 6y – 1 = 0 and 3x + 2y + 5 = 0 and perpendicular to the line 3x – 5y +11 = 0.

Q 6 Answer the following in detail. (Any 2) **[10]**

I) Explain the straight line equation with a straight line makes intercepts 3 and -5 on X and Y axes respectively. Find its equation

II) a. Prove that: $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a-b)(b-c)(c-a)$

b. Solve the equation: $\begin{vmatrix} x & 1 & 1 \\ 1 & x & 1 \\ 1 & 1 & x \end{vmatrix} = 0$

III) Find the equation of the line passing from the point P (1, – 3) and permendicular to the line 2y – 3x = 4.