UKA TARSADIA UNIVERSITY

BCA/MCA (Integrated) (Semester 1)
030010112(2015-16)/060060109(2015-16)
DSE1 Mathematics For Computer Applications

Date :18/11/2017 **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) What is the benefit of performing subtraction operation using 2's complement method?

II) Write the negation of the proposition "My program is giving me 100% accurate outputs."

III) What do you mean by indirect method of proof?

IV) Find $0.010101_2 = ?_8$

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

I) How many bits are used respectively for mantissa part and exponent part in 16- bit floating point representation? Convert given binary number 11.101 into 16-bit floating point representation.

II) What is the use of quantifier? Identify the quantifier in the statement "Some of my students are good in study as well as sports."

III) Find binary addition of 1100101.101, 1010101.001, and 101011.110.

IV) Let P: You are good in Mathematics, Q: You are good in Logic. Then, P→Q: If you are good in Mathematics then you are good in Logic. Write the truth table for the same.

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

A) Write down steps to derive the Conjunctive Normal form of given Compound statement. Find the Conjunctive Normal form of a statement (p ^ ~(q v r)) v (p -> q) without using Truth Table.

OR

A) Prove the following implications by using truth tables:

(i) $(p \rightarrow (q \rightarrow r)) \Rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$

(ii) $(p \rightarrow (q \rightarrow s)) \wedge ((\sim r \vee p) \wedge q) \Rightarrow r \rightarrow s$

B) Library management system manage list of authors and books. Each book can be written by multiple authors and each author can write multiple books. An author list is a= {Shomesh Chouwdary, Vijay Ruknana, Saraswati M., Lalit Patel} and book list is b = {RDBMS, C++, Java, Pearl, Shell}. Relation R= {({Shomesh Chouwdary, Vijay Ruknana}, RDBMS), ({Shomesh Chouwdary, Saraswati M.}, C++), ({Vijay Ruknana, Saraswati M.}, Pearl)} where authors as 1st element and book as 2nd element of tuple in the list.
Write necessary steps to determine whether the relation R on the set of author and book list is Reflexive, Symmetric, Antisymmetic and/or Transitive.

OR

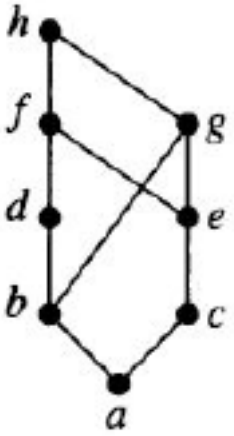
B) If R = { (x, x^2)} and S = { (x, 2x) }, where x is a non-negative integer, find

(a) $R \cup S$
(b) $R - S$
(c) $R \oplus S$
(d) $R \cap S$

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

I) Convert number -4_{10} to the following representations:
(a) Unsigned binary
(b) One's complement
(c) Two's complement
(d) Signed magnitude

II) Does a PO set have multiple greatest and least elements? Write greatest and least elements for the below given PO set. Write the matrix representation for the given Hasse diagram.



III) Explain when lattice is said to be bounded and distributive with an example.

SECTION - 2

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

I) Find a recurrence relation and give initial conditions for the number of bit strings of length n that do not contain two consecutive 0s. How many such bit strings are there of length five?

II) State at least one usage of counting principle.

III) Write an example of scalar matrix.

IV) Find the determinant of the given matrix $\begin{vmatrix} 6 & 3 \\ 2 & 4 \end{vmatrix}$.

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

I) Perform any two operations on Determinant of 2 x 2 orders.

II) From a club consisting of a men and 7 women, in how many ways can we select a committee of:
(a) 3 men and 4 women?
(b) 4 persons which has at-least one woman?

III) What is Pigeon Hole principle? Write two different real world situations where Pigeon Hole principle is used.

IV) Write down the steps used to solved equations having three variables using Cramer rule.

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

A) Suppose there are 9 faculty members in mathematics department and 11 in the computer science department.

i. How many ways are there to select an event committee if the committee is to consist of three faculty members from the mathematics department and four from the computer science department?

ii. How many ways to select an event committee of seven members with at-least three members from mathematics department?

iii. How many ways to select event committee of seven members with at-most four members from computer science department.

OR

A) Use mathematical induction to prove that $1 + 2 + \ldots\ldots + n = n(n+1)/2$ for every positive integer.

B) Consider a line passing through vertices (2, 5) and (-4, -2). Find the equation of the line. Also find it's intersection point with the line passing through vertices (2, -3) and (-5, 1).

OR

B) A cricket ground is to be developed by cricket association of a small village. The standard radius of cricket ground is 137.16 meters. What should be the length of square plot to accommodate the cricket ground?

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

I) In a puzzle game, points of parallel lines are given. Points of line A are (k, 3) and (-2, 1). Points of line B are (-3, 2) and (1, 0). Find the value of k and equations of both parallel lines.

II) Solve the equations $4x + 10y = 2xy$ and $5x + 16y = 3xy$ using Cramer's rule.

III) Determine the slope and the y-intercept of the line whose equation is $8x + 3y = 5$. Also find the equation of line perpendicular to the given line.