B.SC. (I. T.) SEM. - I (CBCS - 2015 COURSE) : WINTER - 2017

SUBJECT: DISCRETE MATHEMATICS

Day: **Saturday** Time: **10.00 a.m. to 01.00 p.m.**

Date: **16/12/2017** **W-2017-0843** Max Marks: 60

N.B:

1) Attempt **ANY SIX** questions.
2) Figures to the right indicate **FULL** marks.

Q.1 **a)** Prove by contradiction that $\sqrt{2}$ is not rational. **(05)**

b) U = {a, b, c, d, e}; A={a,b,d}; B ={b,d,e}. Find:- **(05)**
i) AUB; ii) B'; iii) B'- A' iv) (A∩B)'

Q.2 In a survey of 120 people , it was found that: **(10)**

a) 65 read Newsweek; 45 read Time, 42 read Fortune.

b) 20 read both Newsweek and time, 25 read both Newsweek and Fortune, 15 read both Time and Fortune.

c) 8 read all three magazines.

Find the number of people who read i) at least one magazine; ii) Exactly one magazine.

Q.3 Let A = {1, 2, 3}; B = {a, b, c} and C = {x, y, z}. Consider the following relations R and S from A to B and B to C respectively: R= {(1, b), (2, a), (2, c)}; S = {(a, y), (b, x), (c, y), (c, z)}. Find: a) R o S; b) M_R c) M_S, d) M_{ROS} e) Arrow diagram of R and S. **(10)**

Q.4 **a)** Consider the following relations on A = {1,2,3}:- **(06)**
R={(1,1), (1,2), (1,3), (3,3)}; S ={(1,1), (1,2), (2,1), (2,2), (3,3)}
Determine whether or not each relation is i) Reflexive; ii) Symmetric ; iii) Transitive

b) Prove by mathematical induction that the sum of the first n odd integers is n^2 **(04)**

Q.5 **a)** A debating team consists of 3 boys and 3 girls. Find the number of ways they can sit in a row where:- **(05)**
i) There are no restrictions; ii) Boys and girls are each to sit together;
iii) Only the girls are to sit together.

b) What are the maximum and minimum number that can be represented in the IEEE 754 floating point format? **(05)**

Q.6 **a)** List the advantages and disadvantages of 2's complement and 1's complement representation. **(06)**

b) Simplify the following Boolean functions in SOP and POS forms using Karnaugh map: **(04)**
F = w'(x' y + x' y'+ xyz) + x' z'(y + w)
d = w' x (y' z + yz') + w y z (don't care condition)

Q.7 **a)** A pizza shop sells five (05) kinds of pizzas. Find the number of ways a customer can buy **(05)**
i) 8 pizzas; ii) a dozen pizzas

b) State De Morgan's theorem for three variables. Using De Morgan's theorem show that: **(05)**
(A+B)' (A' + B')'= 0

Q.8 **a)** Define "function". Let X= {1, 2, 3, 4}. Determine whether each relation on X is a function from X into X: **(05)**
i) f = {(2, 3), (1, 4), (2, 1), (3, 2), (4, 4)}.
ii) g ={(3, 1), (4, 2), (1, 1)}
iii) h = {(2, 1), (3, 4), (1, 4), (2, 1), (4, 4)}.

b) Represent $(46.5)_{10}$ as a floating point binary number in IEEE 754 format. The normalized mantissa has 23 bits and exponent 8 bits. **(05)**

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