

B.Sc. (I. T.) Sem. - I (CBCS - 2015 Course) : SUMMER - 2019
SUBJECT- DISCRETE MATHEMATICS

Day: Wednesday
Date: 15/05/2019

S-2019-1269

Time: 02.30 p.m. to 05.30 p.m.
Max. Marks: 60

N.B.:

- 1) Attempt **ANY SIX** full questions.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat diagrams **WHEREVER** required.

- Q.1** a) Using direct proof technique, prove that if n and m are both odd, then $n + m$ is even. (06)
- b) Define Power Set. Determine the power set of the set $A = \{a, b, c, d\}$ (04)
- Q.2** a) Prove by mathematical induction that the sum of the first n natural numbers is $n(n + 1)/2$. (04)
- b) Out of 140 students 60 have taken math, 45 science, and 20 both. Find the number of students who have taken (i) at least one; (ii) neither math nor science. (06)
- Q.3** A class has 10 male students and 8 female students. Find the number of ways that the class can elect (i) a class representative; (ii) 2 class representatives, one male and one female; (iii) A class president and a vice president. (10)
- Q.4** a) Perform the operations $(+42)_{10} + (-13)_{10}$ and $(-42)_{10} - (-13)_{10}$ in binary using signed 2's complement method. (04)
- b) Simplify using Boolean algebra: (i) $A'B + ABC' + ABC$; (ii) $AB + A(CD + CD')$ (06)
- Q.5** a) What are the maximum and minimum numbers that can be represented in the IEEE 754 floating point format? (04)
- b) State De Morgan's theorem for three variables. Determine its validity using truth tables. (06)
- Q.6** Simplify the following Boolean function in SOP and POS forms using Karnaugh map: (10)
 $F = w'(x'y + x'y' + xyz) + x'z'(y + w)$ and
 $d = w'x(y'z + yz')$ (don't care condition)
- Q.7** Given $A = \{1, 2, 3, 4\}$ and $B = \{x, y, z\}$. Let R be the following relation from A to B : - $R = \{(1, y), (1, z), (3, y), (4, x), (4, z)\}$ (10)
Determine the matrix of R ; R^{-1} ; domain and range of R
- Q.8** Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be given by $f(x) = 3x^2 + 5$ where \mathbb{R} is the set of real numbers. (10)
Determine whether f is bijective or not giving reasons.

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