

B.SC. (I. T.) SEM. - I (CBCS - 2015 COURSE) : SUMMER - 2018

SUBJECT: DISCRETE MATHEMATICS

Day: **Friday**
Date: **25/05/2018**

S-2018-0943

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

N.B.:

- 1) Q. No. 1 is **COMPULSORY**.
- 2) Attempt any **FOUR** out remaining **SIX** questions.
- 2) Figures to the right indicate **FULL** marks.

- Q.1**
- a) i) Which of these sets are equal? **(01)**
 $\{1, 2, 3\}, \{3, 2, 3, 1\}, \{2, 1, 2, 3\}, \{2, 3, 1, 2\}$.
 - ii) Set $S = \{1, 2, 3\}$. Find Power(S). **(02)**
 - iii) Let $N = \{1, 2, 3, \dots\}$ and for each $n \in N$. Let $A_n = \{n, 2n, 3n, \dots\}$. **(02)**
Find $A_3 \cap A_5$ and $A_4 \cap A_5$.
 - b) i) Perform the following conversions: **(03)**
 $(164)_8$ to binary; $(101001)_2$ to octal; $(B5ED)_{16}$ to decimal.
 - ii) Perform the operations $(36 - 17)$ in binary using 2's complement arithmetic. **(02)**
 - c) i) Given $A = \{1, 2, 3, 4\}$ and $B = \{x, y, z\}$. Let R be the following relation from A to B. **(04)**
 $R = \{(1, y), (1, z), (3, y), (4, x), (4, z)\}$.
Determine matrix M_R , Domain and Range of R and R^{-1} .
 - ii) Find all partitions of $S = \{a, b, c, d\}$. **(03)**
 - iii) Simplify using K-map $F(A, B, C, D) = \sum(1, 3, 4, 6, 9, 11)$. **(03)**
- Q.2** In a class of 80 students, 50 students know English, 55 know French and 46 know German language. 37 students know English and French, 28 students know French and German, 25 students know English and German and 7 students know none of the language. Find out **(10)**
- i) How many students know all three languages?
 - ii) How many students know exactly two languages?
 - iii) How many know only one language?
- Q.3**
- a) Let R and S be the following relations on $A = \{1, 2, 3\}$; **(05)**
 $R = \{(1, 1), (1, 2), (2, 3), (3, 1), (3, 3)\}$
 $S = \{(1, 2), (1, 3), (2, 1), (3, 3)\}$
Find i) RoS ii) S^2
 - b) Let $f : R \rightarrow R$ be defined by $f(x) = 3 - 4x$ **(05)**
 - i) Check whether f is one-to-one, onto or bijective
 - ii) If f is convertible, determine f^{-1}

P. T. O.

- Q.4 a)** Let n and r be non negative integers such that $r \leq n$ (05)
then prove that ${}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r$
- b)** A committee of 7 has to be formed from 9 boys and 4 girls. In how many (05)
ways can this be done when the committee consists of
i) Exactly 3 girls ii) At least 3 girls
iii) At most 3 girls
- Q.5** Given the Boolean functions $F = xy'z + x'y'z + xyz$ (10)
i) List the truth table
ii) Simplify using Boolean algebra.
- Q.6** Represent $(46.5)^{10}$ as a floating point binary number. The normalized mantissa (10)
has 16 bits and exponent 8 bits.
- Q.7** Among integers 1 to 300, how many of them are divisible neither by 3, nor by (10)
5, nor by 7.

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