B.Tech II Year I Semester (R15) Regular & Supplementary Examinations November/December 2017
DISCRETE MATHEMATICS
(Common to CSE & IT)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
- (a) What is proposition and mention types of proposition?
- (b) Define Tautology and contradiction.
- (c) What is power set? Give one example
- (d) Using the laws of set theory, simplify the following :
    (i) $A \cap (B - A)$ (ii) $(A - B) \cup (A \cap B)$
- (e) Define semi groups and monoids.
- (f) If $G = (z_6, +)$ and given that $H = \{0, 2, 4\}$, then show that H is non empty subset of G under the binary operation.
- (g) If $G = (V, E)$ is an undirected graph with $|V| = v$ and $|E| = e$ and no loops, show that $2e \leq v^2 - v$
- (h) A connected planner graph has 9 vertices having degrees 2, 2, 2, 3, 3, 3, 4, 4, 5 .How many edges are there? How many faces are there?
- (i) Determine the coefficient of xyz^5 and $x^3 z^4$ in the expansion of $(x + y + z)^7$.
- (j) Obtain the sequence generated by $(1 - 4x)^{-1/2}$.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) Show that $p \wedge (\neg q \vee r))$ and $p \vee (q \wedge \neg r)$ are logically not equivalent.

- (b) Hypothesis: If I join JNTU then I will get best education. If I get best education, then I will get job in USA. If I get job in USA then I will become a millionaire. I joined JNTU.
    Conclusion: I will become a millionaire.
    Give an argument using rules of inference to show that the conclusion follows from the hypothesis.

OR

3   Establish the validity of the following argument with reasons.

$$u \to r$$
$$(r \wedge s) \to (p \vee t)$$
$$q \to (u \wedge s)$$
$$\neg t$$
$$\overline{\therefore q \to p}$$

UNIT – II

4   Prove the following for any sets A, B, C
    (i) If $A \cap C = B \cap C$ and $A \cup C = B \cup C$ then $A = B$
    (ii) If $A\Delta C = B\Delta C$ then $A = B$

OR

5   If m, n are the positive integers with $1 < n \leq m$ then prove that:

$S(m + 1, n) = S(m, n - 1) + nS(m, n)$

UNIT – III

6   Prove that under semi group homomorphism, the properties of:
      (i) Associativity.
      (ii) Idem potency.
      (iii) commutativity are preserved.

OR

7   Determine the number of assignments of the Boolean variables w and y that will result in the value 1 for the following expressions when the value of x is 1.
      (i) $\bar{x}y + w$
      (ii) $\bar{x}y + xw$
      (iii) $xy + w$ (iv) $x + xy + w$

UNIT – IV

8   If $G = (V, E)$ is an undirected graph or multigraph with no isolated vertices, then G has an Euler circuit if and only if G is connected and every vertex in G has even degree

OR

9   If $G = (V, E)$ is a loop free undirected graph with $|v| = n \geq 3$ and if $|E| \geq \binom{n-1}{2} + 2$ then G has a Hamilton cycle.

UNIT – V

10   A committee of eight is to be formed from 16 men and 10 women. In how many ways can the committee be formed if: (i) There are no restrictions? (ii) There must be 4 men and 4 women. (iii) There should be an even number of women. (iv) More women than men. (v) At least 6 men.

OR

11   Find a formula to express $0^2 + 1^2 + 2^2 + \ldots\ldots + n^2$ as a function of n .

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