PVP 14

Code: IT1T4, IT2T7RS

I B.Tech - I Semester – Regular / Supplementary Examinations
December - 2016

DISCRETE MATHEMATICS
(INFORMATION TECHNOLOGY)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer ***all*** the questions.   All questions carry equal marks

11 x 2 = 22 M

1.

a) Construct the truth table of NOR gate.
b) Use De Morgan's laws to write the negation of statement, "You study or you don't get a good grade."
c) Explain law of syllogism with an example.
d) Draw the Peterson's K_5 graph.
e) Draw the Hasse diagram of the positive divisors of 16.
f) Distinguish between cycle and circuit.
g) Write the Euler's formula for planar graph.
h) Explain Pigeons' Principle.
i) Explain the relation between C(n, r) and P(n, r).
j) Find the number of seating arrangement of 10 people around a round table.
k) Express the sequence $\{1, 2^1, 2^2, 2^3, 2^4, \ldots\}$ as generating function.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) Construct a truth table for $[(p \wedge q) \vee \neg r] \leftrightarrow p$. 8 M

   b) Find the Disjunctive Normal Form (DNF) and Conjunctive Normal Form (CNF) of the following expression. 8 M

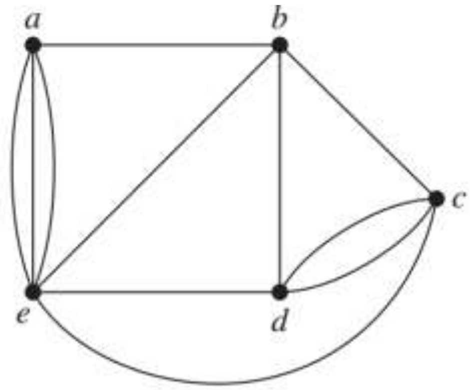
$$\neg[(\neg p \rightarrow q) \rightarrow r]$$

3. a) Using Mathematical Induction, prove that $(3^{2n} - 1)$ is divisible by 8 for every $n \geq 1$. 8 M

   b) For a, b e $\mathbb{Z}$, define aRb if and only if $a^2 - b^2$ is divisible by 3. Then prove that R defines an equivalence relation on $\mathbb{Z}$.
   8 M

4. a) Define with examples:
   Equivalence Relation, Compatible relation and Partial Order Relation 6 M

   b) Determine whether the given graph has an Euler circuit or an Euler path and construct such a path if one exists.
   10 M



5. a) In a sample of 100 logic chips, 23 have a defect type D_1, 26 have a defect type D_2, 30 have a defect type D_3, 7 have defects types D_1 and D_2, 8 have defects types D_2 and D_3 and 3 have all three types of defects. Find the number of chips having: 8 M

   i) At least one defect ii) No defects

   b) Prove the identity: $C(n, r-1) + C(n, r) = C(n+1, r)$. 8 M

6. a) Find the coefficient of x^5y^9 in the expansion of $(2x-5y)^{14}$. 6 M

   b) Solve the following recurrence relation: 10 M

   $$a_n - 3a_{n-2} + 2a_{n-3} = 0,\ n \geq 3,\ \&\ a_0 = 1,\ a_1 = a_2 = 0.$$