

Code No: R21053

R10
SET - 1

II B. Tech I Semester Supplementary Examinations, Dec - 2015
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING
 (Com. to CSE, IT, ECC)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
 All Questions carry **Equal** Marks

1. a) Write the following statements into symbolic form and verify for the validity of conclusion. (4M)
 i) All men are mortal. ii) Socrates is a man. iii) Therefore Socrates is a mortal.
 b) Show that $\neg(p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences (5M)
 Show that $\forall x(P(x) \wedge Q(x))$ and $\forall xP(x) \wedge \forall xQ(x)$ are logically equivalent (6M)
2. a) Use Fermat's little theorem to compute $5^{2003} \bmod 7$, $5^{2003} \bmod 11$, and $5^{2003} \bmod 13$. (8M)
 b) Construct a formula for the sum of the first n positive odd integers. Then prove your conjecture using mathematical induction. (7M)
3. a) Draw Venn diagrams for each of these combinations of the sets A, B, C, and D. (9M)
 i) $(A \cap B) \cup (C \cap D)$ ii) $\bar{A} \cup \bar{B} \cup \bar{C} \cup \bar{D}$ iii) $A - (B \cap C \cap D)$
 b) Let $A = \{a, b, c\}$, $B = \{x, y\}$, and $C = \{0, 1\}$. Find i) $A \times B \times C$. ii) $C \times B \times A$. (6M)
4. a) Find the adjacency matrix and incidence matrix for $K_{m,n}$, K_n ? (8M)
 b) Show that a graph G is self complementary if it has $4n$ or $4n+1$ vertices (n is non negative integer). (7M)
5. a) Find the number of edges in the following trees: i) tree with 10,000 vertices (8M)
 ii) full binary tree with 1000 internal vertices iii) full 3-ary tree with 100 vertices
 b) What is the Chromatic number of K_n and C_n ? Color K_5 and C_5 graphs? (7M)
6. a) Define the terms with examples: Group, Abelian Group, Semi Group, Monoid (8M)
 b) Show that set $G = \{1, 2, 3, 4, 5\}$ is not a group under addition and multiplication modulo 6. (7M)
7. a) Suppose that there are 1807 freshmen at your school. Of these, 453 are taking a course in computer science, 567 are taking a course in mathematics, and 299 are taking courses in both computer science and mathematics. How many are not taking a course either in computer science or in mathematics? (8M)
 b) Describe the circular permutation. Find the number of circular 3 – permutations of 5 people (7M)
8. a) What is the solution of the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ with initial conditions $a_0 = 1$ and $a_1 = 6$? (8M)
 b) Solve the recurrence relation using generating function (7M)
 $a_n - 6a_{n-1} = 0$ for $n \geq 1$ and $a_0 = 1$