Registration No :

Total Number of Pages : 02

B.Tech
BSCM1211

4th Semester Back Examination 2018-19
DISCRETE MATHEMATICS
**BRANCH : CSE, IT, ITE**
Time : 3 Hours
Max Marks : 70
Q.CODE : F1006
Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1   **Answer the following questions :**   **(2 x 10)**
  a) Write contrapositive of the statement: "G is tree if G is connenected and G does not contain any cycles".
  b) Write the following statement in symbolic form using quantifiers: "All the world respects some selfless leaders."
  c) Let $A = \{1,2,3,4\}$ and $R = \{(a,b)|\, a + b > 4\}$ be a relation on A. Find partition of A corresponding to R.
  d) Can a complete graph be a regular graph? Justify.
  e) Draw $K_{3,3}$ and $K_{3,4}$ graphs.
  f) When is a graph called Hamiltonian graph?
  g) State a few properties of a tree.
  h) State the four basic properties of a lattice.
  i) When is a lattice sais to be (a) bounded (b) distributive?
  j) How will you find minimum distance between any two code words in group code?

Q2 **a)** Check whether the hypothesis "It is not sunny this afternoon and it is colder than yesterday. We will go swimming only if it is sunny. If we do not go swimming, then we will take a canoe trip. If we take a canoe trip, then we will be home by sunset." lead to the conclusion: We will be home by the sunset.   **(5)**
  b) Without constructing truth table prove that the following is a tautology :   **(5)**
$$((p \vee q) \wedge \sim (\sim p \wedge (\sim q \vee \sim r))) \vee (\sim p \wedge \sim q) \vee (\sim p \wedge \sim r)$$

Q3 **a)** Using mathematical induction show that $11^n - 4^n$ is divisible by 7, for $n \geq 1$.   **(5)**
  b) Find the number of integers between 1 and 250 that are divisible by any of the integers 2, 3, 5 and 7.   **(5)**

Q4 **a)** Let R be a relation defined on a set of ordered pairs of positive integers such that for all $(x,y),(u,v) \in Z^+ \times Z^+$, $(x,y)\, R\, (u,v)$ if and only if $\frac{u}{x} = \frac{v}{y}$. Detrmine whether R is an equivalence relation.   **(5)**
  b) Solve the following recurrence relation: **(5)**
$a_r - 7a_{r-1} + 10a_{r-2} = 0$ given that $a_0 = 0, a_1 = 3$

Q5 **a)** Prove that a connected multigraph with at least two vertices has an Euler **(5)**
circuit if and only if each of its verices has even degree.

b) Prove that a disconnected simple graph G with n vertices and k components **(5)**
can have at most $\frac{(n-k)(n-k+1)}{2}$ edges.

Q6 **a)** Prove that a Ring is commutative if and only if $(a + b)^2 = a^2 + 2ab + b^2$ for **(5)**
$a, b \in R$.

b) Show that $G = \{1, -1, i, -i\}$ where $i = \sqrt{-i}$ is an abelian group with respect to **(5)**
multiplication as a binary operation.

Q7 Give the step by step procedure of Prim's algorithm. Find minimal spanning **(10)**
tree of the following connected graph by using Prim's algorithm.
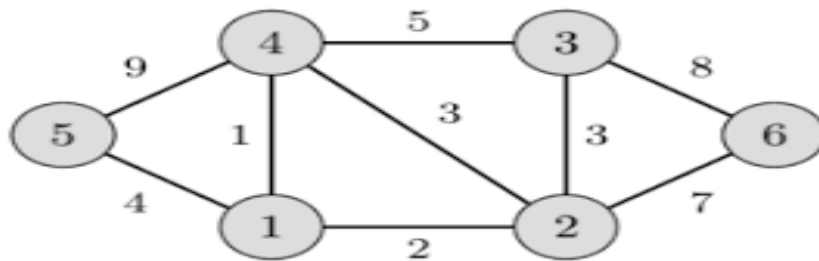
Q8 **Write short answer on any TWO :** **(5 x 2)**
  a) Boolean Algebra
  b) Group Code
  c) Group isomorphism.