Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.Sc.I**

FMCC101

1st Semester Regular/Back Examination 2017-18
Discrete Mathematics
BRANCH : M.Sc.I(MC)
Time: 3 Hours
Max marks: 70
Q. Code: B825
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)** Find the conjuction of the statement given below & specify the truth value .
- **b)** Describe different types of proofs.
- **c)** Draw Hasse diagram (D_{12}, |).
- **d)** Give an example of a relation which is symmetric but not Reflexive and Transitive.
- **e)** What is method of Principle of Inclusion-Exclusion?
- **f)** Prove that a circuit and the complement of any spanning tree must have at least one edge in common.
- **g)** Define Binary Tree and complete Binary Tree.
- **h)** Describe chromatic number. What is the Chromatic number corresponding to a polygon of 10 sides ?
- **i)** Define field with an example.
- **j)** What is the principle of duality on a lattice ?

Q2 **a)** Prove by Mathematical induction that $6^{2n+2} + 7^{2n+1}$ is divisible by 43 for each positive integer n. **(5)**

b) Prove that if n is a positive integer then n is odd iff n^2 is odd. **(5)**

Q3 **a)** How many positive integers not exceeding 1000 are divisible by 7. **(5)**

b) Solve the recurrence relation by generating function method $a_n = 3a_{n-1} + 4^n$ with the initial condition $a_0 = 0.$ **(5)**

Q4 **a)** Show that a relation R is reflexive and circular iff it is an equivalence relation. **(5)**

b) Using Warshall algorithm, find all the transitive closure of R ={(1,1), (1,2), (2,2), (2,3)} **(5)**

Q5 **a)** Consider a set of integers from 1 to 250. Find how many of these numbers are divisible by 3 or 5 or 7. Also indicate how many are divisible 3 or 7 but not by 5 and divisible by 3 or 5. **(5)**

b) Find the number of primes not exceeding 100 using principle of inclusion and exclusion. **(5)**

Q6 **Write short notes on.** **(10)**

A. Krushkal's Algorithm,
B. Dijkastra's Algorithm,
C. Hamiltonian Paths & Cycles.

Q7 **a)** If (G, *) is a group with identity e and if a*a=e for all a in G, then show that G is abelian. **(5)**

b) Prove that H be a subgroup of a group G & a, b belongs to G then aH=bH iff $a^{-1}b \in H$. **(5)**

Q8 **a)** Show that the set $Z_7 = \{0,1,2,3,4,5,6\}$ forms a ring under addition and multiplication module 7 . **(5)**

b) Let R is a ring, then for all a, b, c ϵ R. **(5)**
a.0 = 0.a = 0
a.(-b) = (-a).b = -(a.b)
(-a).(-b) = a.b