[Total No. of Printed Pages:2] **CODE NO:- Z-314**

FACULTY OF ENGINEERING & TECHNOLOGY

S.E.(CSE/IT) Year Examination-June-2015

Discrete Mathematics

(Revised)

Time: Three Hours **Maximum Marks: 80**

"Please check whether you have got the right question paper."

i) Q. No. 1 of section A and Q. No. 6 of section B are compulsory.
ii) Solve any two questions from remaining in each section.
iii) Assume suitable data if necessary.
iv) Figure to right indicates full marks.

SECTION-A

Q.1 Attempt any five 10

1) Determine the power set P(A) of the set $A = \{\emptyset, \{\emptyset\}\}$
2) Prove that (A – B) $\subset$ B'
3) Explain discrete probability with example.
4) Define converse and contra positive of a proposition. give example.
5) From the conjunction of p and q of the following
(a) p:et is cold q:it is raining (b) p:5x+6=26 q: x>3
6) Let A={a,(a)} determine whether each of the following is true or false
(a) $\{\{a\}\} \subseteq$ p(A), (b) $\{\{\{a\}\}\} \subseteq$ p(A)
7) Explain equality of two sets.
8) Explain basic connectives of compound proposition.

Q.2 a) A ticket is drawn from a set of 20 tickets numbered 1 to 20 and kept aside. Then another ticket is drawn. Find the probability that both the tickets shows even numbers. 08

b) Prove intersection of sets in distributive W.R. to union of sets i.e. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ 07

Q.3 a) Prove by mathematical induction 1.2+3.4+5.6+-------+(2n-1)2n=n(n+1)(4n-1)/3 07

b) Show that p$\Leftrightarrow$q $\equiv (p \vee q) \Rightarrow (p \wedge q)$ using (1) truth table (2) algebra of proposition 08

Q.4 a) Explain universal modus ponens and universal modus tulles with example. 07

b) Shown that S is valid conclusion from the premises p $\Rightarrow$ q, p $\Rightarrow$ r, N(q $\wedge r$) and S v P. 08

Q.5 a) Show that $\exists y \forall x\, p(x,y) \Rightarrow \forall x \exists y p(x,y)$ 07

b) Let D={1, 2, 3, 9} determine the truth value of each of the following statements 08
1) $(\forall x \in D), x + 4 < 15$
2) $(\exists x \in D), x + 4 = 10$
3) $(\forall x \in D), x + 4 \leq 10$
4) $(\exists x \in D), x + 4 > 15$

SECTION-B

Q.6 Attempt any five 10

1) Let R be a relation on set A={1, 2, 3, 4} defined by R={(1,1),(2,2),(3,3),(4,4),(4,3),(4,2),(4,1),(3,2),(3,1)} find the zero – one matrix and directed graph of relation R.
2) Let A{2,3,4} and B={a, b, c} and f={(2,a),(3,b),(4,b)} find domain , co-domain and range of the function.
3) Let A={a, b}, B{ α, β} & C={1,2} find Cartesian product of (A$\times$ B)$\times$ C
4) Find the hamming distances between x & y

a) x =1101 y =1000
b) x =0010111 y = 0101011

5) Define panty- check code with example.
6) Define a cyclic group with example.
7) Explain the element of coding theory.
8) Define integral domain and field

Q.7 a) What is a partition of set let A={7,8,9} determine all the partition of the set. 07
b) Consider f, g and h, all the functions on the integers by $f(n)=n^2$, g(n) = n+1 and h(n) = n-1. Determine 1) hofog 2) gofoh 3) fogoh 4) hofof 08

Q.8 a) Explain pigeonhole principle with example. 07
b) Let A= {2, 4, 5, 10, 12, 20, 25}. Show that whether the relation is partial order relation and draw the hasse diagram & relation 08
R{(2,2),(2,4),(2,12),(4,12),(5,10),(5,20),(5,25),(10,20),(4,4),(5,5),(10,10),(12,12),(20,20),(25,25)}

Q.9 a) What is group ,explain with example. 07
b) Consider a ring (R, +1, *) defined by $a * a = a$ determine whether the ring is cumulative or not. 08

Q.10 a) Let C be the linear code defined by the check matrix 05

$$\begin{bmatrix} 1 & 1 & 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 \end{bmatrix}$$

If the word 110 110 is received and only one error has been made. What is the intended code word.
b) Construct a decoding table for the group code given by generator matrix. 10

$$G = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

Use the table to decode the following received code 11101, 11011, 10011, 01100.