**SUBJECT CODE NO:- P-309**
**FACULTY OF ENGINEERING AND TECHNOLOGY**
**S.E. (CSE/IT) Examination May/June 2017**
**Discrete Mathematics**
**(Revised)**

**[Time: Three Hours]** **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B
1. Q 1 from section A and Q.6 from the section B are compulsory
2. Solve any two questions from remaining in each section.
3. Draw diagram are graphs wherever required.
4. Figure to the right indicate full marks

Section A

Q.1 Attempt any five 10

1. What is set and explain associate law of the sets

2. What is power set and determine the power set P(A) of the set A = { 3, 2, ∅ }

3. Let $A = \{\emptyset , q \}$ construct the following sets

a) $\{\emptyset \} - A$

b) A ∩ P (A)

4. Explain countable & uncountable sets

5. Which of the following proposition are true and which are false

a) If the earth is round then earth travels around the sun

b) If tiger have wings, the RDX is dangerous

6. How to test the logical equivalences of two propositions

7. Prove that the proposition $p \cap (q \cap \ \sim p)$ is a contradiction

8. what is quantifiers give example

Q.2 a) To prove $AU\,(\overline{B} \ \cap C\,) = (\,AU\overline{B}\,) \cap (\,AUC)$ using venn diagram 07

b) A card is drawn at random from a well shuffled pack of 52 cards find probability of getting 08
i) a jack , a queen and a king
ii) a two of heart or two of diamond

Q.3 a) Explain negations of compound statement with example 07

b) prove by mathematical induction 08

$$\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+------+\frac{1}{(2n-1)(2n+1)}=\frac{n}{2n+1}$$

Q.4 Show that 07

$$\exists y\,\forall x\,p\,(x,y)\Longrightarrow\forall x\,\exists y\;p(x,y)$$

B) Determine whether the conclusion t is valid conclusion in the following premises 08

$$p\Rightarrow q,\quad q\Rightarrow r,\quad r\Rightarrow s,\quad \sim s\ and\ pvt$$

Q.5 a) What is conditional proposition or implication write converse, contra positive and inverse of implication of following statement 07

p: It rains

q: the crop will grow

b) Rewrite the following argument using quantifier, variable and predicate symbol 08

i) If a number is odd, then its square is odd

ii) All healthy people eat an apple a day

iii) Ram is not a healthy person

iv) $K^2$ is odd

Section B

Q.6 Attempt <u>any five</u> 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 group of relation R

2) What is equivalences classes

3) Explain Cartesian product of three sets

4) If A = { 2,3,4} and B = {5,6} determine all function from A to B

5) Find the hamming weight of the given words

a) 1001101

b) 1110011

6) Define parity- check code

7)Define normal subgroup and Abelian group

8) Define integral domain and field

2017

Q.7 a) Define chain and Antichain explain with example 07

b) Consider the function f , g: R $\rightarrow$ R 08

defined $by\ f\ (x) = x^2 + 3x + 1\ ,\ \ g\ (x) = 2x - 3$

find the composition function

i) fof

ii) fog

iii) gof

iv) gog

Q.8 a) Explain pigeonhole principle and show that if 10 colors are used to paint 101 building then atleast 11 building have the same color 07

b) let $A = \{1,2,3,4,5,12,15,25\}$& R be the binary relation on set A such that R ={(a,b) / a divides b} show that R is partial order relation & hence draw hasse diagram of the relation 08

Q.9 a) Let ( A,$*$) be a semigroup, for every a and b in A, if a≠b then a $*$b ≠ b $*$ a 08

1) show that for every a in A , a $*$ a = a

2. show that for every a, b in A, a$* b * a = a$

3. show that for every a,b,c in A, a$* b * c = a$

b)Consider a ring ( R, t,$*$ ) defined by a$* a = a$ , determine whether the ring is commutative or not 07

Q.10 a) What is hamming distances explain with example 07

b) Let 08

$$\begin{bmatrix} 110000 \\ 011010 \\ 001001 \end{bmatrix}$$

This is parity check matrix for a 6 bit linear code

The word 111001 and 101011 are received. Use the matrix to decide whether or not the words are likely to have been correctly transmitted.

2017