

**SUBJECT CODE NO:- E-103**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(CSE/IT) Examination Nov/Dec 2017**  
**Discrete Mathematics**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Q.no.1 from section A and Q. No.6 from section B are compulsory
  - 2) Solve any two question from Q.No.2 to Q. no.5 in section A and any two question from Q.No.7 to Q. no. 10 on section B
  - 3) Assume suitable data if necessary

## Section A

- Q.1 Solve any five question of the following 10
- a) Explain conditional probability
  - b) Explain distributive law of sets
  - c) Find the power set of each of these sets
    - i)  $\{a\}$
    - ii)  $\{a, b\}$
  - d) Write the following set in tabular form
    - i)  $A = \{x : x^2 = 9\}$
    - ii)  $B = \{x : x \text{ is a multiple of } 3 \text{ and } 0 < x < 20\}$
  - e) Explain Logical implication with example
  - f) Define principle of Duality
  - g) Show that  $\neg(\neg p)$  and  $p$  are logically equivalent
  - h) Define Existential Quantifier
- Q.2 08
- a) Let A,B,C be sets. Show that  $(A - B) - C = (A - C) - (B - C)$
  - b) A bag contain 5 white , 3 black & 4 red balls are successively drawn out and not replaced 07  
what is probability that they are alternately of different color
- Q.3 08
- a) Let  $p, q, r$  denotes primitive statement 08  
Use truth table to verify the following logical equivalences  
 $[(p \vee q) \rightarrow r] \Leftrightarrow [(p \rightarrow r) \wedge (q \rightarrow r)]$
  - b) Determine whether 07  
 $[(p \vee q) \wedge (p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow r$  is a tautology
- Q.4 08
- a) Show that it is a valid conclusion from the premises  $P \Rightarrow q, q \Rightarrow r, r \Rightarrow s, \sim S$  and pvt. 08
  - b) Lets  $p(x)$  be the open statement “  $x^2 = 2x$ ” where the universe comprise all integers 07  
Determine whether each of the following statement is true or false
    - a)  $P(0)$
    - b)  $P(1)$
    - c)  $P(2)$
    - d)  $P(-2)$
    - e)  $x.p(x)$

- Q.5 a) Construct truth table for  $(P \wedge (\sim p \vee q)) \wedge \sim q$  07  
 b) For all  $n \in \mathbb{Z}^+$ , prove  $\sum_{i=1}^n i = 1 + 2 + 3 + \dots + n = n(n+1)/2$  using mathematical induction 08

Section – B

- Q.6 Solve any five question of the following 10
- What are differences between Cartesian product & relation?
  - 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
  - Explain homomorphism with example
  - Explain cyclic group
  - Give an example of a relation which is
    - Reflexive and transitive but not symmetric
    - Symmetric and reflexive but not transitive
  - Define parity – check code with example
  - Find the hamming weight of the given words
    - 1010101
    - 11100111
  - What is inverse of a function give example?
- Q.7 a) Let  $f(x) = 2x+3$ ,  $g(x) = 3x+4$  and  $h(x) = 4x$  for where R is set of real numbers find gof, fog, foh & goh 08  
 b) Explain Equivalence classes & partition of a Equivalence relation with example 07
- Q.8 a) Let  $A = \{1, 2, 3, 4, 5\}$  and  $R = \{(1,2), (1,1), (2,1), (2,2), (3,3), (4,4), (4,5), (5,4), (5,5)\}$  08  
 Be relation on A. determine the relation R is equivalence relation and find equivalences classes & partitions 07  
 b) Explain pigeonhole principle with example
- Q.9 a) Explain triple repetition code with example 08  
 b) Consider a ring  $(R, +, \cdot)$  defined by  $a \cdot a = a$  determine whether the ring is cumulative or not 07
- Q.10 a) Explain LaGrange theorem in detail 08  
 b) Explain decoding with coset leaders in detail with example 07