(Please write your Exam Roll No.) *Exam Roll No. .....*

END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] FEBRUARY 2023

Paper Code: CIC205 ***Subject: Discrete Mathematics***

Time: 3 Hours ***Maximum Marks: 75***

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit. Assume missing data, if any.

Q1 Answer all the following questions briefly: **(3x5=15)**

a) Represent the statement using predicate and quantifier and negate it
For all the real number x if $x > 5$ then $x^2 > 25$ **(3)**

b) Evaluate the condition of the function to be Surjective? Give Example of it **(3)**

c) Find the Converse and Contrapositive of the Statement "If x is positive then $x \neq 0$" **(3)**

d) Define Euler path and Euler circuit with the help of Example **(3)**

e) Prove that Set of All ineteger Z does not form a Group Under Multiplication with identity element as 1 **(3)**

UNIT–I

Q2 a) Draw the following set operations with the help of Venn diagram **(4)**

i) Union
ii) Intersection
iii) Disjoint
iv) Difference

b) Prove that "if $x,y \in Z$ (set of integer)such that xy is odd then both x and y are odd, by proving its contrapositive **(4)**

c) Show that $((p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow (p \rightarrow r)$ is tautology By Rules of Preposition **(7)**

Q3 a) Prove the statement " if x is an integer and x^2 is even the x is also even **(4)**

b) Check the validity of the argument. If the races are fixed or the casinos are cooked, then the tourist trade will decrease, if the tourist trade decreases, then the police will be happy. The police force is never happy therefore the races are not fixed. **(4)**

P.T.O.

c) In how many ways can a team of 11 cricketers be chosen from 6 bowlers ,4 wicket keepers and 11 batsmen to give a majority of batsmen if atleast 4 bowlers are to be included and there is one wicket keeper? **(7)**

UNIT–II

Q4 a) Analyse all the three cases of Master method in solving Recurrance Relation **(7)**

b) Minimize the given function using K-map **(8)**
F = ABC'D' + ABC'D + AB'C'D + ABCD + AB'CD + ABCD' + AB'CD'

Q5 a) Let A = { 1,2,3,4,6} and R is a relation on Set A such that aRb if a/b (a divide b) Check wheather Relation R is POSET **(7)**

b) What are the different Solution methods for first order Recurrence Relations with constant coefficient? Explain with example? **(8)**

UNIT-III

Q6 a) Show that if $a^2 = e$ for all a in a group G(A, *) , then G is Commutative **(5)**

b) Explain homomorphism, Isomorphism, and Automorphism with Example **(5)**

c) State and Prove Lagrange's Theorem **(5)**

Q7 a) Analyse the necessary condition for the group to be Abelian? Give one Example **(5)**

b) State Cayley's Theorem **(5)**

c) If for each a and b in group G , if $(ab)^2 = a^2b^2$, show that G is abelian **(5)**

UNIT – IV

Q8 a) Evaluate the total numbers of Colours Required for Proper Colouring of Complete Graph such that No two Adjacent vertex should have same colour.. **(8)**

b) State and Prove the BFS algorithm with Example **(7)**

Q9 Write short notes on the following:

a) Five Colour Theorem **(8)**

b) Minimum Spanning Tree **(7)**

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