U.G. 5th Semester Examination 2021

MATHEMATICS (Honours)

Paper : SEC-1

[Discrete Mathematics]

(CBCS)

Full Marks : 32   Time : 2 Hours

The figures in the margin indicate full marks.
Notations and symbols have their usual meanings.

Group - A

(4 Marks)

1. Answer any *four* questions :   4×1=4

    (a) Define a connected graph.

    (b) If a graph G has 54 vertices and 17 connected components, then how many edges are there?

    (c) Define a cyclic graph.

    (d) Let A and B be sets with 3 and 4 objects respectively. How many bijective mapping can be drawn from A to B.

    (e) Let P = "p is prime" and given $p = 2$. What is the truth value of p.

    (f) Write the negation of $p \to q$.

    (g) $36 = $ _____ (mod 7), fill in the blank.

Group - B

(10 Marks)

Answer any *two* questions :   2×5=10

2. Prove that there are infinite number of primes.

3. Draw a complete graph K_5 with vertices *A, B, C, D, E*. Draw all complete subgraph of K_5 with 4 vertices.

4. Solve $f = ABC' + AB'C'$ using *K*-map.

5. Define isomorphism of graphs. If two graphs have the same number of vertices and same number of edges, are they isomorphic? Justify your answer.

Group - C

(18 Marks)

Answer any **two** questions :   2×9=18

6. (a) Describe seven bridge problem of Konigsberg. Draw a graph for the problem. Hence show that one can not walk through all the bridge without repeat.   2+2+2

   (b) Draw $K_{2, 3}$, the bipartite graph with two and three vertices. What is the sum of degrees of all the vertices.   2+1

7. (a) Find the solution to the recurrence

   relation $a_n = 3a_{n-1} + 4a_{n-2}$

   with initial condition $a_0 = 5$ and $a_1 = 8$.   5

   (b) Solve $11_x = 15 \pmod{20}$.   4

8. (a) Show that an equivalence relation on a set, make a partition on the set and conversly.   5

   (b) Find the disjunctive normal form of $(x + y)(x' + z) + xy'$.   4

_____