

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 $P = "p \text{ is prime}"$ and given $p = 2$. What is the truth value of p .
 - (f) Write the negation of $p \rightarrow q$.
 - (g) $36 = \underline{\hspace{2cm}} \pmod{7}$, 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 $11x = 15 \pmod{20}$. 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

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