

## B A B SC B COM DEGREE END SEMESTER EXAMINATION - APRIL 2026

## UGP (HONS) SEMETER - 2 :DISCIPLINE SPECIFIC COURSE

## COURSE : 24UMATDSC112- DISCRETE MATHEMATICS

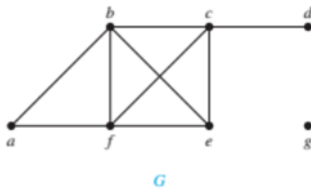
Duration – 2 hours

Max Marks – 70

**PART-A**

(Each question carries 2 marks. A maximum of 10 marks can be scored from this part.)

- 1 Compute the number of ways are there to select 2 cards such that the first card is an ace and the second card is not a king? A, CO1
- 2 Estimate the coefficient of  $w^3x^2y^2z^2$  in the expansion of  $(w + x + y + z + 1)^{10}$ . A, CO1
- 3 Let  $U = \{1,2,3,4,5,6,7\}$ ,  $A = \{1,2,3\}$ ,  $B = \{2,3,4\}$ ,  
show that  $(A \cap B)' = A' \cup B'$ . U, CO2
- 4 Explain union and intersection of two sets. Give their Venn diagram representation. U, CO2
- 5 Construct a Spanning tree for (a)  $K_{1,6}$ . A, CO3  
(b)  $K_4$ .
- 6 Verify Hand shaking theorem for the following graph G A, CO3



- 7 Explain a planar graph with an example. A, CO4
- 8 Explain Hamiltonian graph with an example. A, CO4

**PART-B**

(Each question carries 5 marks. A maximum of 30 marks can be scored from this part.)

- 9 (i) Compute the total number of ways a committee of 5 teachers and 4 students be chosen from 9 teachers and 15 students? A, CO1  
(ii) Calculate the number of combinations can the committee in (i) be formed if teacher A refuses to serve if student B is on the committee?
- 10 Calculate the number of bit strings of length eight either start with a 1 bit or end with the two bits 00? A, CO1
- 11 Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = 2x + 5$ . Check whether f is one-one function and an onto function? Give reason. Identify the inverse of the function if it exists. U, CO2
- 12 Define composition of functions .Let f and g be the functions from the set of integers to set of integers defined by  $f(x) = 2x + 3$  and  $g(x) = 3x^2$ .Find the composition of f and g. U, CO2
- 13 Draw all spanning trees of  $K_{2,2}$ . A, CO3
- 14 Explain depth first search and find the spanning tree of the graph G. A, CO3
- 15 Suppose that a connected planar graph has 6 vertices, each of degree 4. Compute the number of regions is the plane divided by a planar representation of this graph? A, CO4
- 16 Explain Konigsberg Bridge Problem. Represent the problem by means of a graph. A, CO4



**OBE: Questions to Course Outcome Mapping**

<b>CO</b>	<b>Course Outcome Description</b>	<b>CL</b>	<b>Questions</b>	<b>Total Marks</b>
CO1	Apply the basic concepts in combinatorial graph theory in science, business and industry.	A	1,2,9,10,17	29
CO2	Understand fundamental concepts in set theory, including set operations and functions.	U	3,4,11,12,18	29
CO3	Apply graph theoretical algorithms to solve problems in daily life.	A	5,6,13,14,19	29
CO4	Understand Euler's theorem to planar graphs and apply Dijkstra's algorithm to find the shortest path in weighted graphs.	A	7,8,15,16,20	29

Cognitive Level (CL): A – Apply , An –Analyze , U –Understand , Cr – Create , R –Remember

