

G. S. Mandal's  
**Maharashtra Institute of Technology, Aurangabad**  
 (An Autonomous Institute)  
 END SEMESTER EXAMINATION  
 Second Year B.Tech (Computer Science & Engineering)  
Feb/Mar 2023

Course Code: CSE202

Course Name: Discrete Mathematics and Graph Theory

Duration: 2Hrs

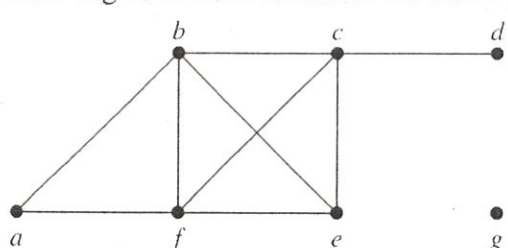
Max Marks: 50

Date:

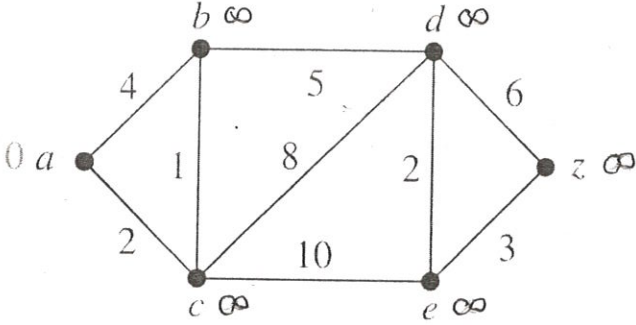
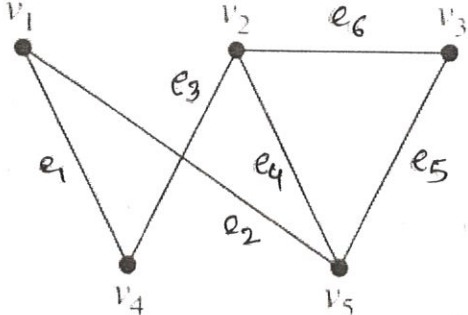
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Instructions:

- i) All questions are compulsory
- ii) Assume suitable data wherever necessary and clearly state it
- iii) Figures to right indicate full marks

Q. No.	Questions	Marks	CO	BL	PO	PI
Q. 1	Solve/Answer Any Five (Marks: 10)					
a)	Define Proposition	2	1	2	1	1.1.1
b)	Represent following set with set builder notation: "A is a set of all integers greater than 10"	2	2	2	1	1.1.1
c)	Let $P = \{a, b, c\}$ and $Q = \{1, 2, 3, 4\}$ , and $f: P \rightarrow Q$ such that $f = \{(a, 2), (b, 1), (c, 1)\}$ Find the domain, and range of function	2	3	2	1	1.1.1
d)	What is combination?	2	4	2	1	1.1.1
e)	Give the degree of each vertex for the below graph 	2	5	2	1	1.1.1
f)	Define Semi Group.	2	6	2	1	1.1.1
g)	Let, $P = \{1, 2, 3, 4\}$ , $Q = \{a, b, c\}$ and $R = \{(1, a), (2, b), (3, c), (4, c), (4, b)\}$ Find Complement of R	2	3	2	1	1.1.1
h)	Draw $K_{2,3}$ and $K_{1,5}$	2	5	2	1	1.1.1
Q. 2	Use mathematical induction to prove that $1 + 2 + 2^2 + \dots + 2^n = 2^{n+1} - 1$ whenever n is a positive integer. <b>OR</b> Demonstration That $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ Are Logically Equivalent.	8	1	3	1	1.1.1
Q. 3	A total of 1232 students have taken a course in Spanish, 879 have taken a course in French, and 114 have taken a course in Russian. Further, 103 have taken courses in both Spanish and French, 23 have taken courses in both Spanish and Russian, and 14	8	2	3	1	1.1.1

SET II

	<p>students have taken at least one of Spanish, French, and Russian, how many students have taken a course in all three languages?</p> <p><b>OR</b></p> <p>Draw the Venn diagrams for all set operations</p>					
Q. 4	<p>Let, <math>A = \{a, b, c, d\}</math>, <math>R = \{(a, a), (b, b), (c, c), (d, d), (b, a), (d, c)\}</math>, determine whether R is an equivalence relation.</p> <p><b>OR</b></p> <p>Let <math>A = \{1, 2, 3\}</math>, <math>R = \{(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)\}</math> Determine whether R is partial order relation or not.</p>	8	3	3	1	1.1.1
Q. 5	<p>Use Dijkstra's algorithm to find the length of a shortest path between the vertices a and z in the weighted graph displayed in Figure</p>  <p><b>OR</b></p> <p>Represent the graph shown in Figure with an incidence matrix</p> 	8	5	3	1	1.1.1
Q. 6	<p>Explain the product rule and sum rule with example.</p> <p><b>OR</b></p> <p>Prove that the structure <math>(Q, +, \cdot)</math> is a Field.</p>	8	4/6	3	1	1.1.1