DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
COMPUTER ENGINEERING
THIRD SESSIONAL
SUBJECT: (CE-422) DISCRETE MATHEMATICS

Examination	**: B.Tech Semester – IV**	**Seat No.**	**: 82**
Date	**: 19, March 2024**	**Day**	**: Tuesday**
Time	**: 01:00 PM to 02:15 PM**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed. **[12]**

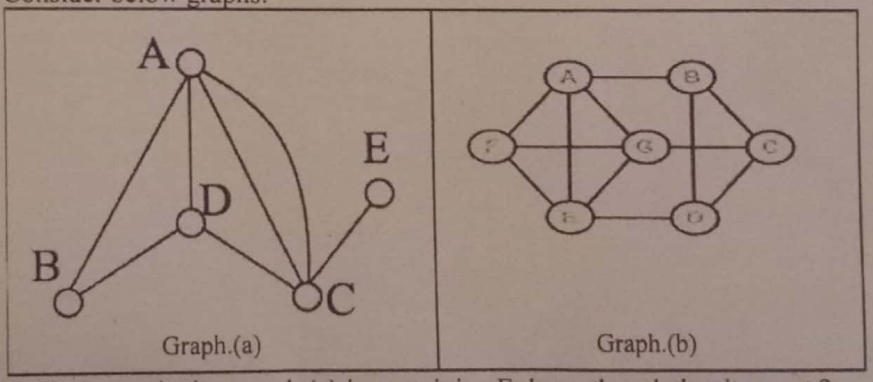
CO2	U	(a)	Check whether the structure {0, 2, 4, 6}, +8 is Group or not.	[2]
CO2	U	(b)	Let G be the set of rational numbers under composition * defined by a * b = ; a,b ∈ G. Check whether (G, *) is group or not.	[2]
CO2	R	(c)	Define: Order of an element in the Group.	[1]
CO2	A	(d)	Construct an example a semigroup that is not a monoid.	[1]
CO6	A	(e)	How many different messages can be represented by sequences of three dashes and two dots? Support your answer with a math formula.	[2]
CO6	N	(f)	If Mr. Discrete has three shirts and two trousers, in how many different ways can he dress up? Mention the reasoning.	[2]
CO6	U	(g)	Find the immediate next 4-combination of the set {1, 2, 3, 4, 5, 6} after {1, 2, 5, 6}.	[2]

Q.2 Attempt ***Any THREE*** from the following questions. **[12]**

CO3 N (a) I. Determine the minimum number of colors required to properly color a graph of structure C_n [2]

II. What is the minimum number of edges necessary in a simple planar graph with 15 regions? [2]

CO3 A (b) Consider below graphs: [4]

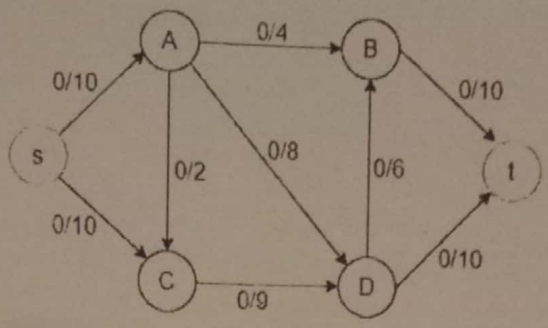


Graph.(a) Graph.(b)

1. Find out whether graph (a) is containing Euler path and circuit or not ?
2. Find out whether graph (b) is containing Hamiltonian path and circuit or not ?

CO3 R (c) Prove by induction: "The number of vertices is one more than the number of edges in a tree". [4]

CO3 A (d) Consider the below transport network. Find Maximum flow using ford-Fulkerson algorithm. [4]



Q.3 Attempt the following questions. **[12]**

CO6 A (a) A factory produces certain type of output by 3 machines. The respective daily production figures are-machine X: 3000 units, machine Y: 2500 units and machine Z: 4500 units. Past experience shows that 1% of the output produced by machine X is defective. The corresponding fractions of defectives for the other two machines are 1.2 and 2 percent respectively. An item is drawn from the day's production. What is the probability that it is defective? If the drawn item is found to be defective, what is the probability that it has been produced by machine Y? [6]

CO6 A (b) In an experiment three coins are tossed simultaneously. Find the probability distribution of the number of heads when three fair coins are tossed simultaneously. [6]

OR

Q.3 Attempt the following questions. **[12]**

CO6 A (a) A man plays a game of roulette in a casino. The roulette wheel has 18 black, 18 red and 2 green slots. When the wheel is spinning, he tosses a ball into the wheel and the ball lands in one of the slots. The man has to pay Rs. 190 for every try. If the ball lands in a red slot, he wins, else he loses. In the long run, what is his expected gain or loss per try? [6]

CO6 A (b) Calculate the mutual information provided by the occurrence of the event R that red appeared when a dice was rolled for the event F that 4 appeared on the face of the dice. Prove that mutual information is a symmetric measure on the information concerning two events theoretically as well as empirically for said events R and F. [6]

Bloom's Taxonomy levels: R-Remembering, U- Understanding, A-Applying, N-Analyzing, E- Evaluating, C-Creating