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Semester VII (B.Tech.)

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Jaypee University of Engineering & Technology, Guna

T3- (Odd Semester- 2023)

18B14CI645 – GRAPH ALGORITHMS AND APPLICATIONS

Maximum Duration: 2 Hours

Maximum Marks: 35

Notes:
1. This question paper has 5 questions.
2. Write relevant answers only.
3. Do not write anything on question paper (Except your Er. No.).

		Marks	CO No.
Q1.	Describe the weighted bipartite graph matching and find the least cost of assignment of jobs (P, Q, R, S, T) to the people (A, B, C, D, E) for the following cost data using Hungarian algorithm. Represent the solution on the graph.	**[07]**	**CO5**

Jobs ⇨	P	Q	R	S	T
A	85	75	65	125	75
B	90	78	66	132	78
C	75	66	57	114	69
D	80	72	60	120	72
E	76	64	56	112	68

Q2.	(a)	Elaborate the intersection graph and its type with suitable examples	**[03]** **CO2**
	(b)	Find the stable matching (marriage) using the Gale Shapley algorithm with males making proposals and represent the matching on the graph. Data of preferences are given in table below.	**[04]** **CO4**

Males preferences	Female preferences
A: O M N L P	L : D B E C A
B: P N M L O	M : B A D C E
C: M P L O N	N : A C E D B
D: P M O N L	O : D A C B E
E: O L M N P	P : B E A C D

Q3. Describe the Ford Fulkerson algorithm with suitable operational flow chart and find the maximum flow from node **s** to node **t** of the following network (fig.1) graph using Ford Fulkerson algorithm (show the graphical iteration of the computation). **[07]** **CO4**

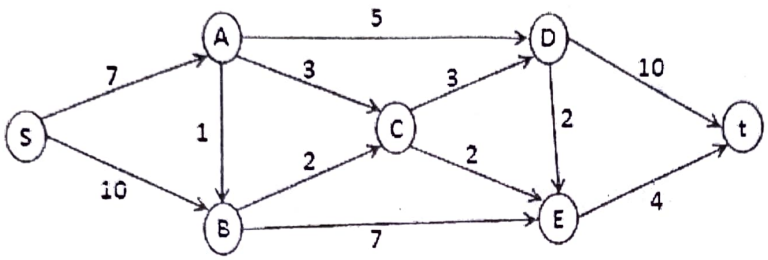

Fig. 1

Q4. Answers the following:

(a) If the simple graph G have v-vertices and e- edges, find the no. of edges in G^1 (complementary graph). Draw the simple graph & its complementary graph by taking v = 5 and e = 7. **[03]** **CO3**

(b) If G be a connected simple planner graph (**n** -vertices, **m**-edges) in which every region is bounded by at least **k**-edges , then show that: **[04]** **CO2**

$$m(k-2) \leq k(n-2).$$

Q5. Describe the following with suitable example and diagram: **[07]** **CO3**

(a) Minor graph

(b) Maximal and maximum matching

(c) Union and intersection of two graph

(d) Planner graph separator and its properties