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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
T3 EXAMINATION- May 2018
M-Tech-II/B-Tech-VIII

COURSE NAME: ADVANCED ALGORITHMS   MAX. MARKS: 35
COURSE CODE: 10M11CI211
COURSE CREDITS: 3   MAX. TIME: 2 Hr

Note: All questions are compulsory. Carrying of a mobile phone during examinations will be treated as a case of unfair means.

Question 1:   **[2x5 Marks]**
a) What is Equilibrium, explain Nash equilibrium?
b) Explain Centrality with suitable example?
c) Write difference between Dynamic programming vs Branch & Bound technique?
d) Write the difference between Las Vegas and Monte Carlo randomized algorithms with suitable example?
e) Proof: Vertex Cover problem is NPC ,

Question 2: Two players: The employee (R) and the employer (V). R has to choose whether to pursue training that costs Rs 100 to herself or not. V has to decide whether to pay a fixed wage of Rs 1000 to R or share the revenues of the enterprise 50:50 with R. The output is positively affected by both training and revenue sharing. Indeed, with no training and a fixed wage total output is Rs2000, while if either training or profit sharing is implemented the output rises to Rs2200. If both training and revenue sharing are implemented the output is Rs2500.
1. Construct the pay-off matrix
2. Is there any equilibrium in dominant strategies?
3. Can you find the solution of the game with Iterated Elimination of Dominated Strategies?
4. Is there any Nash equilibrium?

       [8 Marks]

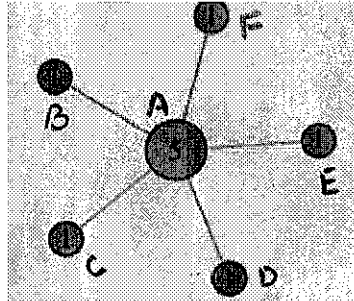**Question 3:** Consider a game with characteristic function v is given by: **[6 Marks]**

$$v(\emptyset) = 0 \quad \begin{matrix} v(\{1\}) = 1 & v(\{1,2\}) = 4 \\ v(\{2\}) = 0 & v(\{1,3\}) = 3 \\ v(\{3\}) = 1 & v(\{2,3\}) = 5 \end{matrix} \quad v(\{1,2,3\}) = 8$$

Calculate: Imputation, Core and Shapley Value

Question 4:

Compute Degree Centrality, Betweenness Centrality and closeness centrality of a given graph for all nodes   **[6 Marks]**

Question 5:   **[5 Marks]**

Determine whether n x n matrices A, B, and C satisfy the condition AB = C in only $O(n^2)$ steps and computer your algorithms error probability?