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(FOR THE CANDIDATES ADMITTED

SUB CODE **21UPA6E1**

DURING THE ACADEMIC YEAR 2021 -2024 ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY 2024

PROFESSIONAL ACCOUNTING

MAXIMUM MARKS: 70

SEMESTER -VI

TIME : 3 HOURS

PART - III

OPERATION RESEARCH

SECTION - A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.(K1)

1. In a Linear Programming Problem function to be maximized or minimized is called -----
 - a) Construction
 - b) Objective function
 - c) Basic solution
 - d) Feasible solution
2. The allocation cells in the transportation table will be called ----- cell
 - a) Occupied
 - b) Unoccupied
 - c) Assignment
 - d) Finite
3. The application of assignment problems is to obtain -----
 - a) Only minimum cost
 - b) Only maximum profit
 - c) Minimum cost or maximum profit
 - d) Assign the jobs
4. The longest path in the network diagram is called ____ path.
 - a) Critical
 - b) Sub-critical
 - c) best
 - d) Worst
5. If there are more than two persons in a game then the game is known as _____
 - a) Non-zero-sum game
 - b) Open game
 - c) Multiplayer game
 - d) Big game

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. Define operation research.
7. Describe Transportation problem
8. Define the term in operation Research.
9. Justify the term PERT Network
10. Write short notes on pure strategy and mixed strategy

(CONTD 2)

SECTION – B**(5 X 4 = 20 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K3)**

11. a) An animal feed company must produce 200 kgs of a mixture consisting of ingredient X_1 and X_2 daily. X_1 costs Rs. 3 per kg and X_2 Rs.8 per kg. Not more than 80 kgs of x_1 can be used and at least 60 kgs of x_2 must be used. Find how much of each ingredient should be used if the company wants to minimum cost.

(OR)

b) Food A contains 20 units of vitamin X and 40 units of vitamin Y per gram. Food B contains 30 units each of vitamin's X and Y. The daily minimum human requirements of vitamin X and Y are 900 units and 1200 units respectively. How many grams of each type of food should be consumed to minimise the cost, if food A cost 60 paise per gram and food B costs 80 paise per gram.

12. a) Consider the following transportation cost table. The costs are given in rupees. The supply and demand are in units. Determine an optimal solution.

| Source | Restriction | | | | | Supply |
|---------------|-------------|-----|-----|-----|-----|--------|
| | 1 | 2 | 3 | 4 | 5 | |
| I | 40 | 36 | 26 | 38 | 30 | 160 |
| II | 38 | 28 | 34 | 34 | 198 | 280 |
| III | 36 | 38 | 24 | 28 | 30 | 240 |
| Demand | 160 | 160 | 200 | 120 | 120 | 240 |

(OR)

b) Find the minimum cost solution for the following transportation problem which has cost structure as

| From | To | | | Availabilities |
|---------------------|----|----|----|----------------|
| | 16 | 19 | 12 | |
| | 22 | 13 | 19 | 14 |
| | 14 | 28 | 8 | 16 |
| | | | | 12 |
| Requirements | 10 | 15 | 17 | |

13. a) Four jobs can be processed on four different machines, one job on one machine. Resulting times in minutes vary with assignments. They are given below.

| Jobs | Machines | | | |
|------|----------|----|----|----|
| | A | B | C | D |
| I | 42 | 35 | 28 | 21 |
| II | 30 | 25 | 20 | 15 |
| III | 30 | 25 | 20 | 15 |

| | | | | | |
|--|----|----|----|----|----|
| | IV | 24 | 20 | 16 | 12 |
|--|----|----|----|----|----|

Find the optimum assignment of jobs to machines and the corresponding time.

(OR)

b) Five different machines can do any of the five required jobs, with different profits resulting from each assignment as shown below.

Machines

| Jobs | A | B | C | D | E |
|------|----|----|----|----|----|
| 1 | 30 | 37 | 40 | 28 | 40 |
| 2 | 40 | 24 | 27 | 21 | 36 |
| 3 | 40 | 32 | 33 | 30 | 35 |
| 4 | 25 | 38 | 40 | 36 | 36 |
| 5 | 29 | 62 | 41 | 34 | 39 |

Find out maximum profit possible through optimal assignment.

14. a) The following table gives the activities in a construction project and other relevant information.

| Activity: | 1-2 | 1-3 | 2-3 | 2-4 | 3-4 | 4-5 |
|-----------------|-----|-----|-----|-----|-----|-----|
| Time | | | | | | |
| Duration (Days) | 20 | 25 | 10 | 12 | 6 | 10 |

i) Draw the network ii) Judge the critical path.

(OR)

b) A project has the following characteristic and time estimate – optimistic time (a), most likely time (m), and pessimistic time (b). Construct a PERT network. Find the critical path and the project duration.

| Activity | a | b | m |
|----------|---|---|-----|
| 1-2 | 1 | 5 | 1.5 |
| 2-3 | 1 | 3 | 2 |
| 2-4 | 1 | 5 | 3 |
| 3-5 | 3 | 5 | 4 |
| 4-5 | 2 | 4 | 3 |
| 4-6 | 3 | 7 | 5 |
| 5-7 | 4 | 6 | 5 |
| 6-7 | 6 | 8 | 7 |
| 7-8 | 2 | 6 | 4 |
| 7-9 | 4 | 8 | 6 |

| | | | |
|------|---|---|---|
| 8-10 | 1 | 3 | 2 |
| 9-10 | 3 | 7 | 5 |

15. a) Solve the following game $\begin{pmatrix} 3 & -2 \\ -2 & 5 \end{pmatrix}$

(OR)

- b) Find the following game by using the principle of Dominance:

| | | | | | | |
|----------|----|----------|----|----|----|----|
| | | Player B | | | | |
| | | B1 | B2 | B3 | B4 | B5 |
| Player A | A1 | 2 | 4 | 3 | 8 | 4 |
| | A2 | 5 | 6 | 3 | 7 | 8 |
| | A3 | 6 | 7 | 9 | 8 | 7 |
| | A4 | 4 | 2 | 8 | 4 | 2 |

SECTION - C

(4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS (16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS (FROM Qn. No : 17 to 21) (K4/K5)

16. An organization producing 4 different products viz, A, B, C, and D having 4 operators viz, P,Q,R and S who are capable of producing any of the four products, works effectively 7 hours a day. The times (in minutes) required for each operator for producing each of the products are given below in the cells of the following matrix along with profits (Rs. Per unit).

| Operators | Product | | | |
|--------------------|---------|----|----|----|
| | A | B | C | D |
| P | 6 | 10 | 14 | 12 |
| Q | 7 | 5 | 3 | 4 |
| R | 6 | 7 | 10 | 10 |
| S | 20 | 10 | 15 | 15 |
| Profits (Rs. Unit) | 3 | 2 | 4 | 1 |

Find out the assignment of operators which will maximum the profit.

17. A firm makes two types of furniture, chairs and tables. The contribution for each product as calculated by the accounting department is Rs. 20 per chair and Rs. 30 per table. Both products are processed on three machines M1, M2 and M3. The time required by each product and the total time available per week on each machine is as follows.

| Machine | Chair | Table | Available Hours |
|---------|-------|-------|-----------------|
| M1 | 3 | 3 | 36 |
| M2 | 5 | 2 | 50 |
| M3 | 2 | 6 | 60 |

How should the manufacture schedule his production in order to maximize contribution?

ETHICAL PAPER

18. A company has three plants at locations A, B and C which supply to warehouse located at D, E, F, G and H. Monthly plant capacities are 800, 500 and 900 units respectively. Monthly warehouses requirements are 400, 400, 500, 400 and 800 units respectively. Unit transportation costs (in Rs.) are given below.

| From | To | | | | |
|------|----|---|---|---|---|
| | D | E | F | G | H |
| A | 5 | 8 | 6 | 6 | 3 |
| B | 4 | 7 | 7 | 6 | 6 |
| C | 8 | 4 | 6 | 6 | 3 |

Determine an optimum distribution for the company in order to minimize the total transportation cost.

19. Consider a problem of assigning four clerks to four tasks. The times (hours) required to complete the tasks are given below:

| Clerks | Tasks | | | |
|--------|-------|---|---|---|
| | A | B | C | D |
| 1 | 4 | 7 | 5 | 6 |
| 2 | - | 8 | 7 | 4 |
| 3 | 3 | - | 5 | 3 |
| 4 | 6 | 6 | 4 | 2 |

Clerk 2 cannot be assigned to task A and Clerk 3 cannot assigned to task B. Find the optimum assignment schedules.

20. A project scheduling has the following characteristics

| Activity: | 1-2 | 1-3 | 2-4 | 3-4 | 3-5 | 4-9 | 5-6 | 5-7 | 6-8 | 7-8 | 8-10 | 9-10 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| Time | | | | | | | | | | | | |
| Days | 4 | 1 | 1 | 1 | 6 | 5 | 4 | 8 | 1 | 2 | 5 | 7 |

(i) Justify the CPM calculations in the tabular form.

(ii) Evaluate the Critical path.

21. Solve the following game using graphical method.

| | B1 | B2 |
|----|----|----|
| A1 | -6 | 7 |
| A2 | 4 | -5 |
| A3 | -1 | -2 |
| A4 | -2 | 5 |
| A5 | 7 | -6 |