

(FOR THE CANDIDATES ADMITTED

DURING THE ACADEMIC YEAR 2021 ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI
END-OF-SEMESTER EXAMINATIONS : DECEMBER-2022

COURSE NAME: B.B.A
SEMESTER: III

MAXIMUM MARKS: 70
TIME : 3 HOURS

PART - III

MATHEMATICAL TECHNIQUES-II

SECTION - A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

K1

1. Operation research is the application of _____ methods to arrive at the optimal solution to the problems.
a) Economical b) Scientific c) a and b both d) artistic
2. Which techniques is used in find and a solution for optimizing a given objectives such profit maximization or cost reduction under certain constraints?
a) Queuing theory b) Game theory c) Linear programming d) CPM
3. The _____ is a special type of LPP where the objectives consists in minimizing transportation cost of a given commodity from a number of sources or origins (e.g factory, manufacturing facilities) to a number of destinations (eg. warehouse, store
a) Transportation problem b) Assignment problem c) Game theory d) Decision theory
4. The operation research technique which helps in minimizing total waiting and service costs is _____.
a) Queuing theory b) Decision theory c) Network analysis d) Game theory.
5. A PERT network has 9 activities path .the standard deviation of each activities on the critical path is 3 . The standard deviation of the critical path is _____.
a) 3 b) 9 c) 81 d) 27

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.

K2

6. Define operation research
7. Explain on graphical method.
8. Indicate the features of assignment problems.
9. Relate the concept of pure and mixed strategies.
10. Infer the decision tree.

SECTION – B

(5 X 4 = 20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. K3

11. a) Examine the scope of operation research.

(OR)

- b) Show the limitations models of operation research.

12.a) Solve the following LP problem using simplex method.

$$\text{Maximize } Z=6X_1+8X_2$$

Subject to

$$5X_1+10X_2 \leq 60$$

$$4X_1+4X_2 \leq 40$$

$$X_1 \text{ and } X_2 \geq 0$$

(OR)

b) Solve the following LP problem using simplex method.

$$\text{Maximize } Z=10X_1+15X_2+20X_3$$

Subject to

$$2X_1+4X_2+6X_3 \leq 24$$

$$3X_1+9X_2+6X_3 \leq 30$$

$$X_1 \text{ and } X_2 + X_3 \geq 0$$

13.a) Solve and find the optimal distribution by using vogel 's approximation methods in the first stage to get the initial basic feasible .

| | | Market | | | | | Supply |
|--------|---|--------|-----|-----|-----|-----|--------|
| | | 1 | 2 | 3 | 4 | 5 | |
| Plant | 1 | 10 | 2 | 16 | 14 | 10 | 300 |
| | 2 | 6 | 18 | 12 | 13 | 16 | 500 |
| | 3 | 8 | 4 | 14 | 12 | 10 | 825 |
| | 4 | 14 | 22 | 20 | 8 | 18 | 375 |
| Demand | | 350 | 400 | 250 | 150 | 400 | |

(OR)

b) Compare Transportation and assignment problem

14.a) There are three clerks in the loan section of a bank to process the initial queries of customers. The arrivals rate of customer follows Poisson distribution and it is 20 per hour The service rate also follows Poisson distribution and it is 9 customer per hour find the following

a) Average waiting of customers in the queue as well as in the system.

b) Average waiting time per customer in the queue as well as in the system.

(OR)

b) Consider the payoff matrix of player A as shown in table and Sketch it optimally using graphical method

| | | PLAYER A | | | | |
|----------|---|----------|---|---|----|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Player A | 1 | 3 | 6 | 8 | 4 | 4 |
| | 2 | -7 | 4 | 2 | 10 | 2 |

15.a) Determine the details of a project involving 14 activities

| Activities | Immediate predecessors (s) | Duration (months) |
|------------|----------------------------|-------------------|
| A | - | 2 |
| B | - | 6 |
| C | - | 4 |
| D | B | 3 |
| E | A | 6 |
| F | A | 8 |
| G | B | 3 |
| H | C,D | 7 |
| I | C, D | 2 |
| J | E | 5 |
| K | F,G,H | 4 |
| L | F,G,H | 3 |
| M | I | 13 |
| N | J,K | 7 |

- i) construct the CPM network
 ii) determine the critical path and project completion time.

(OR)

- b) Describe the concept of CPM and PERT.

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. Outline the classifications of operation research.
 17. Solve the following LP Problem using graphical methods.

$$\text{Minimize } Z=2x_1+3x_2$$

Subject to

$$X_1+X_2 \geq 6$$

$$7X_1+X_2 \geq 14$$

$$X_1 \text{ and } X_2 \geq 0$$

18. Consider the transportation problem

| | | Market | | | | | Supply |
|--------|---|--------|-----|-----|-----|-----|--------|
| | | 1 | 2 | 3 | 4 | 5 | |
| Plant | 1 | 10 | 2 | 16 | 14 | 10 | 300 |
| | 2 | 6 | 18 | 12 | 13 | 16 | 500 |
| | 3 | 8 | 4 | 14 | 12 | 10 | 825 |
| | 4 | 14 | 22 | 20 | 8 | 18 | 375 |
| Demand | | 350 | 400 | 250 | 150 | 400 | |

Analyze the initial basic feasible solution using each of the following methods and compare their total cost

- i) northwest corner method
- ii) least cost cell method

19. Summarise the Hungarian method.

20. Consider the payoff matrix of player A as shown in table and solve it optimally using graphical method

| | | PLAYER A | | | | |
|----------|---|----------|---|----|----|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Player A | 1 | 3 | 0 | 6 | -1 | 7 |
| | 2 | -1 | 5 | -2 | 2 | 1 |

21. A project consists of activities from A to H as shown in table .The immediate predecessor(s) and the duration in months of each of the activities are given in the same table

A) Draw the project network and , find the CPM and the corresponding project completion time

| Activity | Immediate predecessor (s) | Duration (months) |
|----------|---------------------------|-------------------|
| A | - | 5 |
| B | - | 2 |
| C | A | 3 |
| D | C | 4 |
| E | C | 2 |
| F | B | 4 |
| G | D | 7 |
| H | E,F | 6 |
