PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MA DEGREE EXAMINATION MAY 2023
(Fourth Semester)

Branch – **ECONOMICS**

OPERATIONS RESEARCH

Time: Three Hours   Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (5 x 1 = 5)

1.   The objective functions and constraints are linear relationship between -------------.
     (i) Variables   (ii) Constraints
     (iii) Functions   (iv) All of the above

2.   The application of assignment problems is to obtain _____.
     (i) only minimum cost   (ii) only maximum profit
     (iii) minimum cost or maximum profit   (iv) assign the jobs

3.   Which one of the following is a part of every game theory model?
     (i) Players   (ii) Payoffs   (iii) Probabilities   (iv) Strategies

4.   Which of the following is not an inventory?
     (i) Machines   (ii) Raw material
     (iii) Finished products   (iv) Consumable tools

5.   Activity in a network diagram is represented by?
     (i) Rectangles   (ii) Arrows   (iii) Squares   (iv) Circles

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks   (5 x 3 = 15)

6. a) Explain the scope of operations research.
                              (OR)
   b) Solve the following Linear Programming Problem by using graphical method
      Maximize $Z = 20X_1 + 10X_2$
      Subject to
      $$10X_1 + 5X_2 \leq 50$$
      $$6X_1 + 10X_2 \leq 60$$
      $$4X_1 + 12X_2 \leq 48$$
      X_1 and $X_2 \geq 0$.

7. a) Determine the types of transport problem.
                              (OR)
   b) State the West Corner Rule.

8. a) Show the characteristics of Queuing system.
                              (OR)
   b) Solve the following game $\begin{bmatrix} 3 & -2 \\ -2 & 5 \end{bmatrix}$.

9. a) Explain the reasons for carrying inventory.
                              (OR)
   b) Following table gives the running costs per year and resale price of a vehicle whole purchase price is Rs 5200.

Year	1	2	3	4	5	6	7
Resale value(Rs)	3500	2700	1800	1000	850	600	425
Running costs (Rs)	600	850	1000	1250	1400	1475	2000

At what year is the replacement due?

Cont...

10. 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

    Duration(days) :   20   25   10   12   6   10

    Draw the network for the project.

    (OR)

    b) State the network scheduling.

SECTION –C (30 Marks)
Answer ALL questions

ALL questions carry EQUAL Marks   (5 x 6 = 30)

11. a) Analyze the various uses and limitations of operations research.

    (OR)

    b) Solve the following LPP by using simplex method

    Max $z = 45X_1 + 80X_2$

    Subject to

    $5X_1 + 20X_2 \leq 400$

    $10X_1 + 15X_2 \leq 450$

    X_1 and $X_2 \geq 0$.

12. a) Solve the following transport problem for minimum cost

Destinations	Origins				Requirements
	A	B	C	D	
1	7	4	3	4	15
2	3	2	7	5	25
3	4	4	3	7	20
4	9	7	5	3	40
Availability	12	8	35	25	$\frac{100}{80}$

    (OR)

    b) Enumerate the practical applications of assignment problem.

13. a) Solve the game whose pay-off matrix is

    Player B

    Player A $\begin{matrix} & 1 & 2 & 3 \\ 1 & 4 & -1 & 5 \\ 2 & 0 & 5 & 3 \\ 3 & 5 & 3 & 7 \end{matrix}$.

    (OR)

    b) Evaluate the application areas of queuing theory.

14. a) Elucidate the various types of inventory decisions.

    (OR)

    b) XYZ company buys is lots of 2000 units which is only 3 months supply. The cost per unit is Rs.125 and the ordering cost is Rs.250. The inventory carrying cost is 20% of unit value. How much money can be saved by using economic order quantity?

15. a) 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
Days :	4	1	1	1	6	5	4	8	1	2	5	7

    Summarise the CPM calculations in a tabular form and determine the critical path.

    (OR)

    b) Predict the advantages of network analysis.

Z-Z-Z   END