22ECP419

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MA DEGREE EXAMINATION MAY 2024
(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. Operations research is based upon collected information, knowledge and advanced study of various factors impacting a particular operation. This leads to more informed _____
   (i) Management processes (ii) Decision making
   (iii) Procedures (iv) None of these

2. In assignment problem of maximization, the objective is to maximise
   (i) Profit (ii) optimization (iii) cost (iv) None of the above

3. Service mechanism in a queuing system is characterized by
   (i) server's behavior (ii) customer's behavior
   (iii) customers in the system (iv) all of the above

4. When compared to instantaneous replenishment, does a finite replenishment rate lead to
   (i) the same size batches (ii) larger batches
   (iii) smaller batches (iv) either larger or smaller batches

5. ---------- is an event oriented network diagram.
   (i) CPM (ii) PERT (iii) Histogram (iv) Ogive

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

6. a) Explain in brief the Primal and Dual problems.

   (OR)

   b) Solve the following LPP by using revised simplex method:
   Max. $z = x_1 + 2x_2$
   Subject to $x_1 + 2x_2 \leq 3$
   $x1 + 2x2 \leq 1$
   $x1, x2 \geq 0$

7. a) State the common methods to obtain an initial basic solution for a transportation Problem.

   (OR)

   b) How do you calculate ABC analysis with examples?

8. a) Solve the following pay-off matrix:

		Player B		
Player A	Strategies	I	II	III
	I	6	8	6
	II	4	12	2

   (OR)

   b) Explain the basic elements of Queuing Theory.

9. a) A pipeline is due for repairs. It will cost Rs. 10000/- and lasts for 3 years. Alternatively, a new pipeline can be laid at a cost of Rs. 30000/- and lasts for 10 years. Assuming the cost of capital to be 10 % and ignoring salvage value, which alternative should be chosen?

   (OR)

   b) What are costs that are involved in carrying inventory?

Cont...

10. a) Distinguish between PERT and CPM.

(OR)

b) Generate the Network diagram for the following data:-

Activities	Predecessors
A	--
B	--
C	A
D	A
E	B
F	B
G	D,E
H	F,G

SECTION -C (30 Marks)

Answer **ALL** questions

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

11. a) Solve the following games by linear programming i.e., by simplex method:

(i) $\begin{bmatrix} 3 & -1 & -3 \\ -3 & 3 & -1 \\ -4 & -3 & 3 \end{bmatrix}$ (ii) $\begin{bmatrix} 1 & -1 & -1 \\ -1 & -1 & 3 \\ -1 & 2 & -1 \end{bmatrix}$

(OR)

b) Assess the characteristics of Operations Research.

12. a) Solve the transportation problem using Least cost Methods.

	D1	D2	D3	D4	Supply
01	6	4	1	5	14
02	8	9	2	7	16
03	4	3	6	2	5
Demand	6	10	15	4	35

(OR)

b) Find the initial basic feasible solution to the following Transportation problem using vogel's approximation method [VAM].

	1	2	3	4	Supply
A	3	8	7	4	30
B	1	7	5	9	40
C	8	4	3	2	50
Demand	25	35	40	20	

13. a) Find Solution of game theory problem using saddle point

Player A\Player B	B1	B2	B3	B4
A1	20	15	12	35
A2	25	14	8	10
A3	40	2	10	5
A4	-5	4	11	0

(OR)

b) Find Solution of game theory problem using dominance method.

Player A\Player B	**B1**	**B2**	**B3**	**B4**
A1	3	5	4	2
A2	5	6	2	4
A3	2	1	4	0
A4	3	3	5	2

14. a) A fleet owner finds form his past records that the cost per year of running a vehicle whose purchase price is Rs. 50000/- are as under:

Year:	1	2	3	4	5	6	7
Running cost in Rs.:	5000	6000	7000	9000	21500	18000	18000
Resale value in Rs.:	30000	15000	7500	3750	2000	2000	2000

Thereafter running cost increases by Rs.2000/- per year but resale value remains constant at Rs. 2000/-. At what stage the replacement is due?

(OR)

b) Classify the different Methods and functions of Inventory Control.

15. a) A project schedule 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

You are require to

1. Construct network diagram.
2. Compute the earliest event time and latest event time.
3. Determine the critical path and total project duration.
4. Compute total and free float for each activity.

(OR)

b) The following table shows the jobs of a network along with their time estimates.

Activity	**Estimated duration (weeks)**		
	Optimistic	**Most likely**	**Pessimistic**
1-2	1	7	13
1-6	2	5	14
2-3	2	14	26
2-4	2	5	8
3-5	7	10	19
4-5	5	5	17
6-7	5	8	29
5-8	3	3	9
7-8	8	17	32

You are request to

1.Draw the project network.
2.Find the expected duration and variance of each activity.
3.Calculate the earliest and latest occurrence for each event.
4.Calculate expected project length.
5.Calculate the variance and standard deviations of project length.
6.Find the probability of the project completing into 40 days.

Z-Z-Z

END