KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

(6 Pages) **Reg. No:……**

Question Code: 26E00710 **Course Code: 25PECO11**

PG Degree - End Semester Examinations, April 2026

First Semester

M.COM

Operations Research

(For those who joined in June 2025 onwards)

Time : 3Hours **Maximum : 75 Marks**

PART – A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

CO:1 K:1 1. Operation research approach is

(a) Multi-disciplinary (b) Scientific

(c) Intuitive (d) Collect essential data

CO:1 K:1 2. In India operations research came into existence in _____

(a) 1949 (b) 1950

(c) 1951 (d) 1952

CO:2 K:2 3. The allocated cells in Transportation Problem will be called _____.

(a) Occupied cell (b) Assigned cell

(c) Unoccupied cell (d) Unassigned cell

CO:2 K:2 4. The cost of transportation to a dummy destination in TP is set equal to _____.

(a) One (b) Variable cost

(c) Infinity (d) Zero

CO:3 K:1 5. The time between the starting of the first job and completion of the last job in sequencing problems is called _____.

(a) Total time (b) Assignment time

(c) Elapsed time (d) Idle time

CO:3 K:2 6. A Mixed strategy game can be solved by _____ method.

(a) Algebraic (b) Matrix

(c) Simplex (d) Graphical

CO:4 K:2 7. The objective of network analysis is to

(a) Minimize total project cost
(b) Minimize total project duration
(c) Minimize production delays, interruption and conflicts
(d) Maximize total project cost

CO:4 K:2 8. The objective of _____ problem is to assign a number of resources to an equal number of activities.

(a) Transportation
(b) Assignment
(c) linear programming
(d) Sequencing

CO:5 K:2 9. A decision tree is mainly used for

(a) Data entry
(b) Linear Programming
(c) Decision making under uncertainty
(d) Inventory control

CO:5 K:2 10. The main objective of queuing theory is to

(a) Eliminating waiting lines completely
(b) Minimize Cost and Waiting time
(c) Increase arrival rate of customers
(d) Reduce Service rate

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 250 words.

CO:1 K:4 11. (a) Describe the benefits of operation research.

(OR)

(b) Solve the following LPP by Simplex Method:

Maximum $z = 3x_1 + 4x_2$

Subjective Constraints, $x_1 + x_2 \leq 450$, $2x_1 + x_2 \leq 600$ where x, $x \geq 0$

CO:2 K:4 12. (a) How transportation problem is differ from assignment problem?

(OR)

(b) Analyse the following assignment problem to determine the least cost allocation of the available machine to five jobs.

	A	B	C	D
I	10	12	19	11
II	5	10	7	8
III	12	14	13	11
IV	8	15	11	9

CO:3 K:4 13. (a) Categorise the features of game theory.

(OR)

(b) Following table shows the minimum time (in hours) for 5 jobs on two different machines. Passing is not allowed. Find the optimal sequence in which jobs should be processed.

Jobs	A	B	C	D	E
Machine M_1	5	9	6	7	9
Machine M_2	8	4	9	5	6

CO:4 K:4 14. (a) Distinguish between CPM and PERT.

(OR)

(b) Draw the network diagram for the following project.

Activity	Time estimate (Week)
1-2	5
1-3	6
1-4	3
2-5	5
3-6	7
3-7	10
4-7	4
5-8	2
6-8	5
7-9	6
8-9	4

CO:5 K:4 15. (a) Summarize the concept for computation of waiting time and idle time cost.

(OR)

(b) Customers arrive at a booking office window, being manned by a single individual at a rate of 25 per hour. Time required to serve a customer has exponential distribution with a mean of 120 seconds. Find the mean waiting time of a customer in the queue.

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 600 words.

CO:1 K:4 16. (a) Explain the limitations of operations research.

(OR)

(b) Solve the following LP problem graphically.

Maximize $z = 8 x_1 + 6 x_2$

Subject to, $2 x_1 + x_2 \leq 1000$

$x_1 + x_2 \leq 800$

$x_1 \leq 400$

$x_2 \leq 700$

$x_1 \geq 0, x_2 \geq 0$

CO:2 K:4 17. (a) Determine the various methods of basic feasible solution.

(OR)

(b) Find the optimal transportation plan for the following table of shipping cost, availability and requirements using North-West Corner method:

Plant / Market	A	B	C	Requirement
1	21	11	8	30
2	16	20	12	25
3	10	7	18	35
4	12	8	9	40

Availability	40	50	70	130 / 160

CO:3 K:4 18. (a) Examine the different methods of game theory. State the rules.

(OR)

(b) Find the strategies for both players and the value of the game for two-person zero-sum game whose payoff matrix is given as follows:

Player B	$B1$	$B2$	$B3$
	1	3	11

Player A	$A1$	$A2$	$A3$
	1	3	11

CO:4 K:5 19. (a) Analyse the objectives of network analysis.

(OR)

(b) Find out the expected time of completion time for various activities, with the given data.

Activity	Optimistic time	Pessimistic Time	Most likely time
1-2	5	12	7
1-3	12	17	13
2-4	15	21	18
3-4	2	5	3
2-5	8	14	10
4-5	21	35	26

CO:5 K:4 20. (a) Discuss the procedure for application of queuing models.

(OR)

(b) A departmental store has a single cashier. During the rush hours, customers arrive at the rate of 20 customers per hour. The average number of customers that can be processed by the cashier is 24 per hour. Assume that the conditions for the use single – channel queuing model apply. What is the

i. Probability that the cashier is idle?

ii. Average number of customer in the queuing system?

iii. Average time a customer spends in the system?

iv. Average number of customers in the queue?

Average time a customer spends in the queue waiting for service?