

OPERATIONS RESEARCH (2013 Scheme)

Time: 3 Hours

Max Marks: 100

- Answer all the questions
- Ordinary calculator can be used

Essays:

(2x20=40)

1. Solve the following assignment problem by Hungarian method, where time taken by the workers to perform each job is given.

workers	Job			
	A	B	C	D
1	45	40	51	67
2	57	42	63	55
3	49	52	48	69
4	41	45	60	55

2. A small project composed of 7 activities with time estimates are listed in the table below.

Activity	Estimated Duration (weeks)		
	Optimistic	Most liked	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	1	6	15

Draw the project network and identify all paths through it. Find expected duration and variance for each activity. Find expected project length

Short Essays:

(2x10=20)

3. Define OR and explain briefly its applications.

4. At a certain petrol pump, customers arrive in a Poisson process with an average time of 5 minutes between arrival. The time intervals between services at the petrol pump follow an exponential distribution and as such the mean time taken to service a unit is 2 minutes. On the basis of this information answer the following questions:

- What would be the expected average queue length
- What would be the average number of customers in the queue.
- How long on average does a customer wait in the queue.
- How much time on average does a customer spend in the system.

Short notes:

(8x5=40)

5. Two products A & B are processed on the machines M₁, M₂, M₃. The processing times per unit, machine availability and profit per unit are as under.

Machine	Processing time (hrs)		Availability.(hrs)
	A	B	
M ₁	2	3	1500
M ₂	3	2	1500
M ₃	1	1	1000
Profit per unit	10	12	

6. Solve the following LPP by graphical method.

$$\text{Max. } Z = 3x_1 + 4x_2 \text{ Subject to } 4x_1 + 2x_2 \leq 8 \quad 2x_1 + 5x_2 \leq 10 \quad x_1 \geq 0, x_2 \geq 0$$

7. Describe any two methods of obtaining initial basic feasible solutions for transportation problem.

8. Briefly state advantages and limitations of the queuing theory.

9. Solve the following game.

	B1	B2	B3	B4
A1	8	7	15	12
A2	9	14	8	10
A3	10	12	14	13

10. Explain the Monte – Carlo technique and its limitations.

11. Define inventory and add a note on inventory management.

12. Define: • critical paths • slack time • dummy activity with reference to PERT and CPM.
