

M COM DEGREE END SEMESTER EXAMINATION MAY - 2015

M COM SEMESTER - 2

COURSE: P2COMT10 - OPERATIONS RESEARCH

Time: 3 Hours

Max.Marks: 75

SECTION A

Answer **all** questions. Each question carries **2** marks

1. What is an assignment problem?
2. What is operation research?
3. What is a network diagram?
4. What is degeneracy in transportation problem?
5. Define game theory.
6. What is objective function?
7. What is pure strategy?
8. What is slack?
9. What is "maxmin"?
10. Explain queuing theory? Give two areas where it can be applied.

(2 x 10 = 20)

SECTION B

Answer **any five** questions each question carries **5** marks

11. Explain the role of operations research in management.
12. What are the uses of linear programming.
13. What is initial feasible solution? How it is obtained in transportation problem?

14. A firm makes two products X and Y and has a total production capacity of 18 tones per day. x and y require the same production capacity. The firm has a permanent contract to supply at least 2 tones of x and 3 tones of y per day to another company. Each tonne of x requires 20 machine hours production time and each tonne of y requires 50 machine hours production time. The maximum machine hours available per day is 360 hours. The profit is Rs. 80 per tonne for x and Rs. 120 per tonne for Y. Formulate the problem as a Linear Programming Problem

15. Construct a network diagram for the following

B and C follows A, E follows B, F follows D and C and G follows E and F. A, B, C, D, E, F and G are having duration of 3, 7, 4, 2, 7, 4 and 7 days respectively.

16. A physician purchases a particular vaccine on Monday of each week. The vaccine must be used within the week following, otherwise it becomes worthless. The vaccine costs Rs. 2 per dose and the physician charges Rs. 4 per dose. In the past 50 weeks the physician has administered the vaccine in the following quantities :

Doses per week:	20	25	50	60
Number of weeks:	5	15	25	5

Determine how many doses the physician should buy every week?

17. In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution also exponential with an average 36 minutes calculate:

- (1) The mean queue size
- (2) The probability that the queue size exceeds 10

18. Five different machines can do any of the five required jobs, with different profits resulting from each assignment as given below:

	Machines				
Jobs	A	B	C	D	E
1	30	37	40	28	40

2	40	24	27	21	36
3	40	32	33	30	35
4	25	38	40	36	36
5	29	62	41	34	39

Find out the maximum profit possible through optimal assignment

(5 x 5 = 25)

SECTION C

Answer **any two** questions in this section each question carries **15** marks

19. Define operations research. What are the uses of operations research. What are its benefits and limitations.

20. The following table shows the requirements of each market and availability of supply and the unit transportation cost(in rupees) from each warehouse to each market

		Market				SUPPLY
		P	Q	R	S	
Warehouse	A	6	3	5	4	22
	B	5	9	2	7	15
	C	5	7	8	6	8
Requirements		7	12	17	19	

The shipping clerk has worked out the following schedule from experience:

12 units from A to Q, 1 unit from A to R, 9 units from A to S, 15 units from B to R, 7 units from C to P, and 1 unit from C to R. Required:

1. Find the optimal schedule and minimum total transportation cost
2. If the clerk is approached by a carrier of route, C to Q who offers to reduce his rate in the hope of getting some business by how much the rate should be reduced before the clerk will offer him the business.

21. A furniture company can produce four types chairs Each chair is first made in the carpentry shop and then varnished, waxed, and polished in the finishing shop. Man required in each shop are:

	Type of Chair			
	1	2	3	4
Carpentry shop	4	9	7	10
Finishing Shop	1	1	3	40
Contribution / Chair (in Rs)	12	20	18	40

Total number of man-hours available per month in Carpentry and finishing Shops are 600 and 4000 respectively. Assuming abundant supply of raw material and demand for finished products, determine the number of each type chairs to be produced for profit maximisation by Simplex Method.

22. Following details are available in respect of a project :

Activity	Least time (days)	Greatest time (days)	Most likely time (days)
1-2	3	15	6
1-3	2	14	5
1-4	6	30	12
2-5	2	8	5
2-6	5	17	11
3-6	3	15	6
4-7	3	27	9
5-7	1	7	4
6-7	2	8	5

You are required to

1. Draw network diagram
2. Find the critical path and project duration.
3. What is the probability that the project will be completed by 27 days?

$$(15 \times 2 = 30)$$
