

Paper–M.C.–205 : Operations Research

(Same for USOL Candidates)

Time Allowed : 3 Hrs.

Maximum Marks : 80

Note : Attempt five questions, at least one question from each Unit. Each question carries 16 marks.

UNIT-I

1. A company manufactures two types of models M_1 and M_2 . Each M_1 model required 4 hours of grinding and 2 hours of polishing, while each M_2 model requires 2 hours of grinding and 5 hours of polishing. The company has 2 grinders and 3 polishers. Each grinder works for 40 hours a week and each polisher works for 60 hours a week. Profit on a M_1 model is Rs. 30 and that on a M_2 model Rs. 40. Formulate this as a LPP and solve it graphically.

2. (a) How can one achieve optimal solution ? Explain with the help of hypothetical problem.
 (b) Write note on infeasibility and unboundedness.
3. The manager of an oil refinery has to decide upon the optimal mix of 2 possible blending processes of which the inputs and outputs per production run are as follows :

Process	Input			Output	
	Crude A	Crude B	Gasoline X	Gasoline Y	
1	5	3	5	8	
2	4	5	4	4	

The maximum amounts available of Crude A and B are 200 units and 150 unit respectively. Market requirements shows that at least 100 units of Gasoline X and 80 units Gasoline Y must be produced. Profits per production run from process 1 and process 2 are Rs. 30 and Rs. 40 respectively. Formulate the LPP and solve it graphically.

UNIT-II

4. (a) Describe the special cases in assignment problems.
 (b) Solve the following assignment problem :

	I	II	III	IV	V
A	1	3	2	3	6
B	2	4	3	1	5
C	5	6	3	4	6
D	3	1	4	2	2
E	1	5	6	5	4

5. (a) Write note on travelling salesman's problem.
 (b) Find the optimal solution to the following TP :

		Warehouses				Capacity
		W ₁	W ₂	W ₃	W ₄	
Factories	F ₁	19	30	50	10	7
	F ₂	70	30	40	60	99
	F ₃	40	8	70	20	18
Demand		5	8	7	14	

UNIT-III

6. The following table represents a set of activity times for a PERT network :

Activity	A	B	C	D	E	F	G	H	I	J	K
t_0 (week)	6	1	1	1	1	1	2	4	4	2	2
t_m	7	2	4	2	2	5	2	4	4	5	2
t_p	8	9	7	3	9	9	8	4	10	14	8
Predecessors	-	-	-	A	A, B	C	C	E, F	E, F	D, H, I, G	

Draw the network and determine the critical path, expected time of completing the project. Determine the probability that the project will be completed within 25 weeks.

7. (a) Explain the prior and posterior analysis of Bernoulli process. Find the Bayes estimate of parameter p in a Bernoulli process.
 (b) Explain individual and group replacement problems.
8. A small assembly plant assembles computers through 9 interlinked according to following precedence/processes :

Stage	Duration (Hours)
1-2	4
1-3	12
1-4	10
2-4	8
2-5	6
3-6	8
4-6	10
5-7	10
6-7	0
6-8	8
7-8	10
8-9	6

- (a) Tabulate EST, EFT, LST and LFT for all stages
 (b) Find the critical path and assembly duration
 (c) Tabulate total float, free float and independent float.

UNIT-IV

9. The following table gives the arrival pattern at a cafeteria at one minute interval. The service is taken as 2 person in one minute in one counter.

No. of person arriving : 0 1 2 3 4 5 6 7

Probability percentage : 5 10 15 30 20 10 5 5

Using Monte Carlo simulation and using the following random numbers, find the length of the queue at the end of 10 minutes.

Random nos : 05, 25, 16, 80, 35, 48, 67, 79, 90, 09, 14, 01, 92

10. (a) Explain Saddle Point and Fair game.

(b) Solve the following game by graphical method :

		Player B				
		1	6	8	4	3
Player A	1	3	6	8	4	3
	2	-7	4	2	10	2