Total No. of Questions : 10]

SEAT No. :

P2227

[Total No. of Pages : 6

[5254]-560
B.E. (Mechanical/Sandwich Engineering)
OPERATIONS RESEARCH (Semester -II)
(2012 Pattern) (Elective -II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***

2) ***Figures to the right side indicate full marks.***

3) ***Use of calculator is permitted.***

4) ***Assume suitable data, if necessary.***

Q1) a) Define terms of Linear programming: Basic Solution, Feasible Solution. **[4]**

b) Obtain the optimal strategies for both persons and the value of game for two person zero sum game whose pay off matrix is as follows (Use graphical Method) **[6]**

		Player B	
		B1	B2
Player A	A1	1	–3
	A2	3	5
	A3	–1	6
	A4	4	1
	A5	2	2
	A6	–5	0

OR

Q2) a) Explain Hungarian Method to solve assignment problems. **[4]**

P.T.O

b) Find out the initial feasible solution by **Vogel's Approximation Method (VAM)** **[6]**

Destinations

Plants or Origins	1	2	3	4	Supply
1	2	3	11	7	6
2	1	0	6	1	1
3	5	8	15	9	10
Requirement	7	5	3	2	Total = 17

Q3) a) What is balanced and unbalanced transportation problem? **[4]**

b) Five jobs are to be assigned to 5 machines to minimize the total time required to process the jobs on machines. The time is in hours for processing each job on each machine is given in the following matrix. Make assignment of jobs to machines so that total assignment cost should be reduced. **[6]**

Machines

		A	B	C	D	E
	1	2	4	3	5	4
	2	7	4	6	8	4
Jobs	3	2	9	8	10	4
	4	8	6	12	7	4
	5	2	8	5	8	8

OR

Q4) a) Explain the break even chart. **[4]**

b) The annual demand of parts is 3200. The unit cost is Rs. 6 and inventory carrying charges are estimated as 25% per annum. If the cost per procurement is Rs. 150 find: **[6]**

i) Economic order quantity

ii) Time between two consecutive orders

iii) Number of orders per year

iv) The optimum cost

Q5) a) What are the situations which make replacement of items necessary?**[6]**

b) An engineering is offered two types of material handling equipments A and B. A is priced at Rs. 5,00,000 including the cost of installation and the cost for the operation and maintenance are estimated as Rs 60,000 for each of the first 5 years and increasing every year by Rs.20,000 in the sixth and the subsequent year. Equipment B the same rated capacity is priced at Rs.2,50,000 including the cost of installation and the cost for the operation and maintenance are estimated as Rs 1,20,000 for each of the first 5 years ane increasing every year by Rs.20,000 in the fifth year onwards. The company expected the return of 10% on all its investment. Neglect the scrap value of the equipment at the end of its economic life, determine which equipment the company should buy? **[10]**

OR

Q6) a) Explain detailed procedures to solve problems of dynamic programming. **[6]**

b) A manufacturer has to supply his customers with 600 units of his product per year. Shortage are not allowed and storage amount of 60 paise per unit per year. The set up cost per run is Rs.80.00. Find out the **[10]**

i) Economic ordering quantity

ii) Minimum yearly average cost

iii) Minimum yearly total inventory cost. When the cost per unit item is 2/- per unit.

iv) Optimum number of orders per year

v) The optimum period of supply per optimum order.

The increase in the order cost associated with ordering (i) 20% more than the EOQ.

Q7) a) What is the need of simulation? How can you use simulation to solve industrial problems? **[6]**

b) Six jobs are to be process on three machines. the processing time is as follows, Find the optimal schedule so that the total elapsed time is minimized. **[10]**

Job	J1	J2	J3	J4	J5	J6
Machine M1[Turning]	10	3	5	4	2	1
Machine M2[Threading]	2	4	6	3	1	2
Machine M3[Knurling]	8	6	7	9	7	7

OR

Q8) a) Explain with the help of neat sketch a generalized queuing model. **[6]**

b) A road transport company has one reservation clerk on duty at a time. He handles the information of bus schedules and makes reservations. Customers arrive at the rate of 8 per hour and the clerk can arranges, service 12 customers per hour. After stating your assumptions answer the following. **[10]**

i) What is the average number of customers waiting for the service?

ii) What is the average time a customer has to wait before being served?

The manager is contemplating to install a computer system for handling information and reservations. This is expected to reduce the service time from 5 minutes to 3 minutes. The additional cost of having new system is Rs.50 /day. If the cost of goodwill of having to wait is estimated to be 12 paisa per minute spent waiting, before being served, should company install the computer system. Assume an 8 hour working day.

Q9) a) Explain the rules devised by Fulkerson **[6]**

b) Estimated time for the jobs of a project are given below: **[12]**

Job	A	B	C	D	E	F	G	H	I	J	K	L
Time (Weeks)	13	5	8	10	9	7	7	12	8	9	4	17

The constraints governing the job are

A & B are start jobs; A controls C, D & E; B controls F & J; G depends on C; H depends on D; E & F controls I & K; K follows J; L is also controlled by K; G,H,I & L are the last jobs. Draw the network, determine float for each activity, project duration and the critical path.

OR

Q10) Consider the project having following activities and their time estimates: **[18]**

Job	A	B	C	D	E	F	G	H	I	J	K	L	M
Optimistic Time	3	4	5	9	4	3	5	1	2	7	4	8	6
Most likely Time	4	8	6	15	6	4	6	3	4	8	5	9	7
Pessimistic Time	5	10	8	10	8	5	8	4	5	10	6	13	8
Immediate Predecessors	--	--	B	A, C	B	D, E	D, E	D, E	G	F,I	G	H	J,K, L

i) Draw the network for the project

ii) Compute the expected project completion time

iii) What should be the due date to have 0.9 probability of completion

iv) Find the E & L values for all events

▲ ▲ ▲