

Total No. of Questions : 10]

SEAT No. :

P3551

[Total No. of Pages : 4

[4959] - 1236

B.E. Automobile Engineering
(b) Operation Research
(2012 Pattern) (Elective-IV)

Time : 2 1/2 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of Logarithmic tables, Slide rule, Electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

Q1) Solve the following LPP by Simplex Method **[10]**

Max $Z=5X_1+8X_2$ subjected to the following constraints.

$$2X_1+X_2 \leq 400$$

$$4X_1+X_2 \leq 600 \quad X_1, X_2 \geq 0$$

OR

Q2) Solve the following assignment problem to minimize the total cost of production. **[10]**

Jobs	Machines			
	A	B	C	D
I	5	7	11	6
II	8	5	9	6
III	4	7	10	7
IV	10	4	8	3

P.T.O.

Q3) Determine an initial basic feasible solution to the following transportation problem using **[10]**

- a) Vogel's Approximation Method
- b) North-West Corner Method

	X	Y	Z	Availability
A	1	4	6	60
B	9	7	10	70
C	4	5	11	80
Demand	50	80	80	

Also state which method gives the better solution.

OR

Q4) a) Define Operation Research? Also discuss the scope of OR **[6]**

b) Why Transportation Model is used in industries? **[4]**

Q5) a) A small maintenance project consist of following 12 jobs. Draw the network of the project. Summarize CPM calculations in tabular form calculating the three types of floats for jobs and hence determine the critical path. **[12]**

Activity	Duration	Activity	Duration
1-2	2	5-8	5
2-3	7	6-7	8
3-4	3	6-10	4
2-4	3	7-9	4
3-5	5	8-9	1
4-6	3	9-10	7

b) Enlist the different types of the floats. Explain each one in short. **[4]**

OR

- Q6) a)** There are six jobs each of which must go through two machines A and B in the order AB. Processing times are given below. Determine a sequence for six jobs that will minimize the elapsed time and also calculate ideal time. **[10]**

Job	I	II	III	IV	V	VI
Time for A (Min)	7	4	2	5	9	8
Time for B (Min)	3	8	6	6	4	1

- b) Explain the graphical procedure for processing of two jobs through M machines. **[6]**

- Q7) a)** Explain the general structure of the following Queuing service system.**[6]**

- i) Single service facility
- ii) Multiple parallel facilities with single queue
- iii) Multiple parallel facilities with multiple queues

- b) Find the sequence that minimizes the total idle time of machine B.**[10]**

Job	I	II	III	IV	V	VI
Time for A (Hrs)	4	8	3	5	9	6
Time for B (Hrs)	7	6	4	3	2	5

OR

- Q8) a)** What are the various Game Theory methods? Explain any two methods in detail. **[10]**

- b) Define the following: **[16]**

- i) Player
- ii) Strategy
- iii) Saddle Point
- iv) Maximin & Minimax

- Q9) a)** A firm is thinking of replacing a particular machine whose cost price is Rs.6,100. The scrap value of the machine is Rs.100. The maintenance costs are found to be as follows. **[10]**

Year	1	2	3	4	5	6	7	8
Maintenance cost	100	250	400	600	900	1,200	1,600	2,000

Determine when machine should get replaced?

- b)** Explain how the theory of replacement is used in following problems. **[8]**
- i) Replacement of items that fail completely
 - ii) Replacement of items whose maintenance cost varies with time.

OR

- Q10)** Machine A costs Rs.45,000 and the operating costs are estimated as Rs. 1,000 for the first year increasing by Rs.10,000 per year in second and subsequent years. Machine B costs Rs.50,000 and operating costs are Rs.2,000 for the first year increasing by Rs.4,000 in the second year and subsequent years. If we now have a machine of type A, should we replace it by B. If so when? Assume both machines have no resale value and future costs are not discounted. **[18]**

