Code: R42243 **R10** **Set No. 1**

IV B.Tech II Semester Supplementary Examinations, July - 2014

OPERATION RESEARCH

(Automobile Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions

All Questions carry equal marks

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1. a) Write the classification of OR models.
   b) A company produces 2 types of hats. Every hat A require twice as much labour time as the second hat B. If the company produces only hat B then it can produce a total of 500 hats a day. The market limits daily sales of the hat A and hat B to 150 and 250 hats. The profits on hat A and hat B are Rs.8 and Rs.5 respectively. Solve using Simplex method to get the optimal solution.

2. A marketing manager has 5 salesmen and there are 5 sales districts. Considering the capabilities of the salesmen and the nature of districts, the estimates made by the marketing manager for the sales per month (in 1000 rupees) for each salesmen in each district would be as follows.

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

   Find the assignment of salesmen to the districts that will result in the maximum sales.

3. The following failure rates have been observed for a certain type of light bulb.

End of week	1	2	3	4	5	6	7
Probability failure to date	0.05	0.15	0.25	0.46	0.68	0.88	1.00

   The replacement of an individual bulb on failure cost Rs 1.25. The cost of group replacement is 80 paise per bulb. Determine the better one among the individual and group replacement policies.

Code: R42243 **R10** **Set No. 1**

4. Using the principle of dominance, solve the following game.

		Player B		
Player A	3	-2	4
	-1	4	2
	2	2	6

5. a) Explain briefly the main characteristics of a Queueing system
   b) Describe the fundamental components of a queueing process and give suitable examples.

6. Discuss the probabilistic inventory model with instantaneous demand and no-setup cost.

7. Minimize $Z=Y_1^2+Y_2^2+Y_3^2$
   Subject to $Y_1+Y_2+Y_3 \geq 15$
   $Y_1, Y_2, Y_3 \geq 0$

8. Discuss simulation techniques with suitable examples. What are their advantages and disadvantages?

Code: R42243 **R10** **Set No. 2**

IV B.Tech II Semester Supplementary Examinations, July - 2014

OPERATION RESEARCH

(Automobile Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions

All Questions carry equal marks

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1. Use two phase simplex method to solve the following LPP.
   Maximize $Z=5x_1-2x_2+3x_3$
   Subject to $2x_1+2x_2-x_3 \geq 2$
   $3x_1-4x_2 \leq 3$
   $x_2+3x_3 \leq 5$
   $x_1, x_2 x_3 \geq 0$

2. A machine operator has to perform three operations turning, threading and knurling on a number of different jobs. The time required to perform these operations (in minutes) for each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to turn out all the jobs. Also find the minimum elapsed time.

Job	1	2	3	4	5	6
Turning	3	12	5	2	9	11
Threading	8	6	4	6	3	1
Knurling	13	14	9	12	8	13

3. Let the value of money be assumed to be 10% per year. Assuming machine A is replaced after every 3 years machine B is replaced after every 6 years. The yearly costs of both the machines are given below. Determine which machine should be purchased.

Code: R42243 **R10** **Set No. 2**

4. a) State the rules for detecting a saddle point.
   b) Solve the following game and determine the value of the game

		B	
A		4	-4
		-4	4

5. a) Consider a workstation that can complete an average request in 10 minutes. The time to complete a request is exponentially distributed. Over a period of 30 minutes, 117,000 requests were made. How long did it take to complete the average request? What is the average number of queued requests?
   b) How do you represent a Queuing Model? Write the classification of queueing models.

6. A manufacturer's requirement for an item is 2000 units per year. Ordering costs are Rs. 100 per order and inventory costs are 16 per cent per year per unit of average inventory. Calculate the economic order quantity. If the price quoted is Rs. 10 each for quantities below 1000 units, Rs. 9.5 for quantities between 1000 and below 2000, and Rs.9.30 for lots of 2000 or more, compute total ordering cost when in lots of (i) 500 (ii) 1000 (iii) 2000 units.

7. Use dynamic programming to solve
   Maximum $Z=Y_1.Y_2.Y_3$
   Subject to constraints $Y_1+Y_2+Y_3=5$ and $Y_1, Y_2, Y3 \geq 0$

8. a) How can simulation be applied for inventory problems? Explain it with an example.
   b) Distinguish between mathematical models and simulation models.

Code: R42243 **R10** **Set No. 3**

IV B.Tech II Semester Supplementary Examinations, July - 2014

OPERATION RESEARCH

(Automobile Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions

All Questions carry equal marks

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1. Use penalty method to solve the following LPP.
   Minimize $Z = 4x_1+3x_2+x_3$
   Subject to $x_1+2x_2+4x_3 \geq 12$
   $3x_1+2x_2+x_3 \geq 8$
   $x_1, x_2, x_3 \geq 0$

2. A company has six jobs A to F. All the jobs have to go through two machines M_I and M_{II}. The time required for the jobs on each machine in hours is given below. Find the optimum sequence that minimizes the total elapsed time.

Job	A	B	C	D	E	F
Machine I	1	4	6	3	5	2
Machine II	3	6	8	8	1	5

3. A machine owner finds from his past records that the costs per year of maintaining a machine whose purchase price is Rs.6000 are as given below.

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	1200	1400	1800	2300	2800	3400	4000
Resale price	3000	1500	750	375	200	200	200	200

Determine at what age a replacement is due

Code: R42243 **R10** **Set No. 3**

4. Solve the game graphically 2x3 game graphically.

	Player B		
Player A	1	3	11
	8	5	2

5. Show that for a single service station, Poisons arrivals and exponential service time, the probability that exactly an calling units are in queue system is $P_n = (1-\rho)\rho^n$,$n \geq 0$(ρ is the traffic intensity).Also find the expected line length.

6. a) What is EOQ? Derive the mathematical expression for it.
   b) Define inventory. What are the advantages and disadvantages of having inventories?

7. a) Write the characteristics of Dynamic programming problem.
   b) Explain Bellman's principle of optimality.

8. How can simulation be applied to solve Queuing problems? Explain it with an example.

Code: R42243 **R10** **Set No. 4**

IV B.Tech II Semester Supplementary Examinations, July - 2014

OPERATION RESEARCH

(Automobile Engineering)

Time : 3 hours **Max. Marks: 75**

Answer any Five Questions
All Questions carry equal marks
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1. a) Write the applications of operation research models.
   b) Find the dual of the following linear programming problem.
   Max $Z=3x_1-x_2+x_3$
   Subject to $4x_1- x_2 \leq 8$
   $8x_1+ x_2+ 3x_2 \geq 12$
   $5x_1- 6x_2 \leq 13$
   $x_1, x_2, x_3 \geq 0$

2. a) Find the initial basic feasible solution for the following transportation problem by VAM.

		Destination				
		D_1	D_2	D_3	D_4	Supply
Origin	O_1	11	13	17	14	250
	O_2	16	18	14	10	300
	O_3	21	24	13	10	400
	Demand	200	225	275	250	950

   b) Describe the method of processing n jobs through two machines.

3. The cost of a machine is Rs. 61000 and its scrap value is 1000. The maintenance cost found from the past experience is as follows:

Year maintenance	1	2	3	4	5	6	7	8
Cost in rupees	1000	2500	4000	6000	9000	12000	16000	20000

   When should the machine be replaced?

Code: R42243 **R10** **Set No. 4**

4. a) Explain Maxi-Min and Mini-Max principle used in game theory.
   b) Solve the following payoff matrix; determine the optimal strategies and the value of the game.

		B
A	5	1
	3	4

5. a) Show that 'n' number of arrivals in a queue in time't' follows the poisons distribution, stating the assumptions clearly.
   b) What are the limitations of Queueing model?

6. A company uses annually 24000 units of raw material which costs Rs. 1.25 per unit. Placing each order costs Rs. 22.50 and the carrying cost is 5.4% per year of the average inventory. Find the economic lot size and the total inventory cost (including cost of material). Should the company accept the offer made by the supplier of a discount of 5% on the cost price on a single order of 24000 units.

7. Use dynamic programming to solve the following LPP.
   Max $Z=3x_1+5x_2$
   Subject to the constraints $x_1 \leq 4$
   $x_2 \leq 6$
   $3x_1+2x_2 \leq 18$
   $x_1, x_2 \leq 0$

8. a) Write the characteristics of simulation languages.
   b) Name some applications of simulation.