Code No: RT32031 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, November - 2017

OPERATIONS RESEARCH

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1 a) What are slack, surplus and artificial variables and explain the purpose of them [4M]
b) What is a degenerate transportation problem and how do you resolve it? [4M]
c) What are the different types of failure of an item? [4M]
d) Explain pure strategy and mixed strategy [3M]
e) Explain ABC analysis [4M]
f) When is simulation required? [3M]

PART -B

2 a) Use Big M method to solve [10M]

Max $Z = 2x_1+x_2+3x_3$

$x_1+x_2+2x_3 \leq 5$

$2x_1+3x_2+4x_3 = 12$

$x_1,x_2,x_3 \geq 0$

b) Explain fundamental principle of duality [6M]

3 a) Solve the following transportation problem [8M]

		to					
		D1	D2	D3	D4	D5	availability
from	A	5	8	6	6	3	800
	B	4	3	7	6	6	500
	C	8	4	6	6	4	900
	requirements	400	400	500	400	800	

b) Six jobs go first on machine A, then on machine B and lastly on machine C. The order of the completion of jobs has no significance. The following table gives the machine time for the six jobs and the three machines. [8M]

	Processing time (In hours)		
Jobs	Machine A	Machine B	Machine C
1	8	3	8
2	3	4	7
3	7	5	6
4	2	2	9
5	5	1	10
6	1	6	9

Find the sequence of the jobs that minimizes elapsed time to complete the jobs. Find also the idle time of machines A, B, C?

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4 a) The purchase price of a machine is Rs 52,000. The installation charges amount to Rs 14,400 and its scrap value is only Rs 6,400. The maintenance cost in various years is given below [8M]

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	3000	4000	6000	8400	11600	16000	19000

After how many years should the machine be replaced? Assume that the machine replacement can be done at the year end.

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

5 a) Write about the rules of dominance [8M]

b) Solve the following game [8M]

		B		
	-5	3	1	20
A	5	5	4	6
	-4	-2	0	-5

6 a) A company has a demand of 12000 units per year for an item and it can produce 2000 units per month. The cost of one setup is Rs 400 and the holding cost per unit per month is Rs 0.15. Find the optimum lot size and the total cost per year, assuming the cost of one unit Rs 4. Also find the maximum inventory, manufacturing time and total time. [8M]

b) Discuss about stochastic inventory models [8M]

7 a) Use dynamic programming method to solve the problem. [10M]
Maximize $2x_1 + 3x_2 + 4x_3$
Subject to $x_1 + 4x_2 + 5x_3 \leq 12$
x_1, x_2, x_3 are non negative integers.

b) Explain briefly about simulation languages [6M]

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