Code No: **R32261** **R10** **Set No. 1**

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

MINE SYSTEMS ENGINEERING

(Mining Engineering)

Time: 3 hours **Maximum Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) Write down the dual of the following LPP and solve it by Simplex method: [8M]
Maximize:

$6x_1+8x_2$ subjected to

$5x_1+2x_2<=20$

$x_1+2x_2<=10$

$x_1, x_2>=0$

b) Explain applicability of Operations Research Methodology in mining with examples? [7M]

2 a) A firm produces four products. There are tour operators who are cap[able of any of these four products. The processing time varies from operator to operator. The firm recordsn8 hours a day and allows 30 minutes for lunch. The processing time in minutes and the profit for each of the product are given below : [8M]

Operator	Product			
	A	B	C	D
1	15	9	10	6
2	10	6	9	6
3	25	15	15	9
4	15	9	10	10
Profit (Rs. Per unit)	8	6	5	4

Find the optimum assignment of product to operators?

b) Explain about the unbalanced transportation problem and degeneracy? [7M]

3 a) We have five jobs, each of which must go through the two machines A and Bin the order AB. Processing times in hours are given in the table below: [8M]

Job (i) :	1	2	3	4	5
Machine A(A_i):	5	1	9	3	10
Machine B(B_i):	2	6	7	8	4

Determine a sequence for the five jobs that will minimize the elapsed time ?

b) A computer contains 10000 resistors. When any resistor fails, it is replaced. The cost of replacing a resistor individually is Re 1 only. If all the resistors are replaced at the same time, the cost per resistor would be reduced to 35 paise. The percentage of surviving resistors say S(t) at the end of month t and the probability of failure P(t) during the month T are as follows: [7M]

T	0	1	2	3	4	5	6
s(t)	100	97	90	70	30	15	0
P(t)	-	0.03	0.07	0.20	0.40	0.15	0.15

What is the optimal replacement plan?

4 Two players A and B are playing a game with five rupees, ten rupees, and a twenty rupees note. Each player selects a note without the knowledge of the other. If the sum of the notes selected is even, A gets B's note and if the sum is odd B gets A's note. Find the best strategy for each player and the value of the game? [15M]

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5 At a certain filling station, customers arrive in a Poisson process with an average time of 12 per hour. The time intervals between services follow exponential distribution and as such the mean time taken to service a unit is 2 minutes. Evaluate: [15M]
- i) The probability that there is no customer at the counter?
- ii) The probability that there are more than two customers at the counter?
- iii) The probability that there is no customer to be served?
- iv) The probability that a customer is being served, but nobody is waiting?
- v) The expected number of customers in the waiting line?
- vi) The expected time a customer spends in the system?

6 a) For one of the boughtout items, the following are the relevant data : [10M]
ordering cost = Rs. 500, Holding cost = 40%, cost per item = Rs. 100,
annual demand = 1000

The purchase manager placed five orders of equal quantity in one year, in order to avail the discount of 5% on the cost of items. Work out the gain or loss to the organization due to his ordering policy for this item?

b) Briefly write about Deterministic models? [5M]

7 a) Use dynamic programming to solve the Linear Programming Problem: [8M]
Maximize $z = x_1 + 9x_2$
Subject to the constraints:
$2x_1 + x_2 \leq 25$,
$x_2 \leq 11$,
$x_1, x_2 \geq 0$

b) Use bellman`s principle of optimality to solve the problem: [7M]
Min $Z = y_1 + y_2 + \ldots\ldots + y_n$
Subject to the constraints
$y_1.y_2\ldots\ldots y_n = d;\ y_j \geq 0;\ j=1, 2,\ldots,n$

8 a) A company manufactures around 200 mopeds. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 196 mopeds to 204 mopeds, whose probability distribution is as given below : [10M]

Production per day :	196	197	198	199	200	201	202	203	204
Probability :	0.05	0.09	0.12	0.14	0.20	0.15	0.11	0.08	0.06

The finished mopeds are transported in a specially designed three-storied lorry that can accommodate only 200 mopeds. Using the given 15 random numbers, viz., 82, 89, 78, 24, 53, 61, 18, 45, 04, 23, 50, 77, 27, 54, 10. Simulate the process to find out :
- i) What will be the average number of mopeds waiting in the factory? &
- ii) What will be the average number of empty spaces on the lorry?

b) Briefly write about the stages of Simulation? [5M]

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