

Code No: 842AD
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA II Semester Examinations, October / November - 2020
OPERATIONS RESEARCH
Time: 2 Hours
Max.Marks:75

Answer any five questions
All questions carry equal marks

- Old hens can be brought at Rs 20 each and young ones at Rs. 50 each. The old hens lay 3 eggs per week and the young ones lay 5 eggs per week, each egg being worth of Rs. 1.50 ps. A hen (young or old) costs Rs. 1.50 per week to feed; I have only Rs. 800 to spend for hens. How many of each kind should I buy to give a profit of at least Rs.60/- per week, assuming that I cannot house more than 20 hens? Formulate and solve by simplex Method. [15]
- ABC agency transports material from one place to the other on commission basis. The following are the estimated commissions per unit of material to be transported from the plants P_1 , P_2 and P_3 to market centers M_1 , M_2 and M_3 . Optimize the commissions to be earned by the agency (note that there is no route available to transport from P_2 to M_1) [15]

	M_1	M_2	M_3	Supply
P_1	6	9	8	120
P_2	-	4	2	80
P_3	11	5	4	80
Demand	150	70	60	280

- There are six jobs, each of which must go through machines A, B and C. Processing time (in hours) are given in the following table

Job	1	2	3	4	5	6
Machine A	12	10	9	14	7	9
Machine B	7	6	6	5	4	4
Machine C	6	5	6	4	2	4

Order of the processing of each job is ACB. Find the sequence and the total time elapsed also find idle time for each machine. [15]

- A computer has a 1000 number of electronic tube, that is subject to mortality as given below:

Period	Age of failure	Probability of failure
1	0-100	0.10
2	101-200	0.26
3	201-300	0.35
4	301-400	0.22
5	401-500	0.07

If the tubes are group replaced, the cost of replacement is Rs. 15 per tube. Group replacement can be done at fixed intervals in the night shift when the computer is not normally used. Replacement of individuals tubes which fails in services costs Rs. 60 per tube. How frequently should the tubes be replaced? [15]

5. In a bank cheques are cashed at a single teller counter. Customers arrive at the counter in a Poisson manner at an average rate of 30 customers per hour. The teller takes on an average a minute and a half to cash cheque. The service time has been shown to be exponentially distributed.
- Calculate the % of time the teller is busy and
 - Also calculate the average time a customer is expected to wait. [15]
6. Dr. Raju's out – patient clinic can accommodate six people only in the waiting hall, the patients who arrive when hall is full, balk away. The patients arrive in poisson fashion at an average rate of 3 per hour and spend an average of 15 minutes in Doctor's chamber which is exponentially distributed. Find
- The probability that a patient can get directly into the doctor's chamber upon his arrival
 - Expected number of patients waiting for treatment.
 - The probability that there are more than 5 patients.
 - The time a patient can expect to spend in the clinic [15]
7. The demand of an item is uniform at a rate of 20 units per month. The fixed cost is Rs. 10 each time a production run is made. The production cost is Rs 1 per item and the inventory carrying cost is Rs. 0.25 per item per month. If the shortage cost is Rs. 1.25 per item per month, determine how often to make a production run and of what size should it be? [15]
8. Solve the following LPP by dynamic programming Method:
- Max $Z = 2x_1 + 5x_2$
Subject to constraint
 $2x_1 + x_2 \leq 430$
 $2x_2 \leq 460$
 $x_1, x_2 \geq 0$. [15]

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