EE762

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NEW SCHEME

Seventh Semester B.E. Degree Examination, Dec.06/Jan. 07
Electrical and Electronics Engineering
Operations Research

Time: 3 hrs.] [Max. Marks:100

Note: ***1. Answer any FIVE questions.***
2. Use of tables of area under normal curve is permitted.

1 a. Define the term 'Operations Research' and write brief notes on applications of operation research. **(06 Marks)**

b. A firm has an advertising budget of Rs. 7,20,000. It wishes to allocate this budget to two media; magazines and television, so that total exposure is maximum. Each page of advertising is estimated to result in 60,000 exposures, where as each spot on television is estimated to result in 1,20,000 exposures. Each page of magazine advertising costs Rs. 9,000 and each spot on television cost Rs. 12,000. An additional condition that the firm has specified is that at least two pages of magazine advertising are used and at least three spots on television. Determine the optimal media – mix for the firm by formulating the problem as LPP and solving it by graphical method. **(14 Marks)**

2 Consider the following LPP

Minimize, $Z = 2x_1 + x_2$.

Subjected to :

$$4x_1 + 3x_2 \geq 7$$
$$x_1 + 2x_2 \leq 4$$
$$3x_1 + x_2 = 3$$
$$x_1, x_2 \geq 0$$

Solve this LPP by two phase simplex method. Is the solution degenerate, why? **(20 Marks)**

3 a. The owner of a small machine shop has machines available to assign to Jobs for the day. Five Jobs are offered with expected profit for each machinist to each Job as follows :

Jobs → M/C ↓	A	B	C	D	E
1	62	78	50	101	82
2	71	84	61	73	59
3	87	92	111	71	81
4	48	64	87	77	80

Find using assignment method the optimal assignment of machinists to Jobs that will result in a maximum profit. Which Job should be declined? **(12 Marks)**

b. Find initial basic solution for the following transportation problem by Vogel's Approximation method. **(08 Marks)**

		Showroom					
		S_1	S_2	S_3	S_4	S_5	Availability
Factory	F_1	4	2	3	2	6	8
	F_2	5	4	5	2	1	12
	F_3	6	5	4	7	3	14
Requirements		4	4	6	8	8	

4 a. Solve the following Traveling Salesman problem. **(12 Marks)**

		To				
		A_1	A_2	A_3	A_4	A_5
From	A_1	–	2	5	7	1
	A_2	6	–	3	8	2
	A_3	8	7	–	4	7
	A_4	12	4	6	–	5
	A_5	1	3	2	8	–

b. With usual notation's derive an expression for EOQ (Economic Order Quantity) **(08 Marks)**

5 A small project is composed of seven activities whose time estimates are listed below along with the activities.

Activity (i – J)	Estimated Duration in Weeks		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

a. Draw the network and find expected duration and variance for each activity.
b. Determine expected project length and standard deviation of the project length.
c. What are the slack values associated with different events?
d. What is the probability that the project will be completed at least two weeks earlier than expected time?
e. If the project due is 18 weeks, what is the probability of not meeting the due date. **(20 Marks)**

6 a. List the characteristics of a queue that are used in the analysis of queuing systems. Explain about any two in detail. **(05 Marks)**

Contd... 3

b. Customers arrive at an office window being managed by a single individual, according to poisson input with a mean rate of 30 per hour. The time to serve a customer has an exponential distribution with a mean of 90 seconds. Determine,

i) The average waiting time of a customer in the system and also average number of customers expected in the system.

ii) Fraction of the day the server is busy.

iii) The probability of having move than 10 customers in the system and also the probability that a customer has to wait more than 3 minutes in the queue and complete his service. **(15 Marks)**

7 a. What is group replacement policy? How it is different from single replacement? **(05 Marks)**

b. Certain equipment has an initial price of Rs. 5,000/-. Its maintenance costs are Rs. 800/- for the initial 5 years and then increase by Rs. 200/- per year from 6^{th} year onwards. If the money worth is 10% per year, determine the optimum replacement policy for the equipment. **(15 Marks)**

8 a. Find the range of values for 'Q', which will render the entry of (2, 3) cell a saddle point for the game. **(05 Marks)**

		B		
		I	II	III
A	I	2	4	-5
	II	9	Q	5
	III	4	12	-6

b. A and B play a game in which each has three coins, a 5 P, 10 P, 20 P. Each selects a coin without the knowledge of the others choice. If the sum of the coins is an odd amount, A wins B's coin, if the sum is even then B will win A's coin. Prepare the pay off matrix and find the strategy for each player. **(15 Marks)**

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