[Total No. of Questions - 9] [Total No. of Pri. d Pages - 4]
(2126)

16183(D) - 0 DEC 2016

B. Tech 7th Semester Examination

Operations Research (NS)

ME-415

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt any five questions, selecting at least one question each from section A, B, C & D. Section-E is compulsory.

SECTION - A

1. (a) With the help of neat diagram explain the steps in decision making. (10)

   (b) Describe the role of operations research models in decision making. (10)

2. (a) State the different types of models used in operation research. Explain any two of them in detail. (10)

   (b) State the opportunities and shortcomings of operations research. (10)

SECTION - B

3. (a) Give a general mathematical formulation of Linear Programming Problem. Explain in detail all terms. (10)

   (b) A rubber Co. is engaged in the production of three different types of tyers. These tyres are produced at company with two different capacities. In a normal 8 hours/day plant I produces 100, 200 and 200 tyres of A, B and C respectively and plant II produces 120, 120 and 400 tyres of type A, B and C respectively. The monthly demand for tyre A, B and C is 5000, 6000 and 14000 respectively. The daily cost of operation of plant I and II is Rs. 5000 and 7000 respectively. Formulate the problem. (10)

4. Solve the following LPP by dual simplex method.

   Max $Z = 5X_1 - 4X_2 + 3X_3$

   Sub to $2X_1 + X_2 - 6X_3 = 20$,

   $6X_1 + 5X_2 + 10X_3 \leq 76$

   $8X_1 - 3X_2 + 6X_3 \leq 50$,

   $X_1, X_2 X_3 \geq 0$ (20)

SECTION - C

5. A director in a management institute has the problem of assigning course to teacher with a view to maximizing education quality in his institute. He has available to him one professor, two associate professors and one teaching assistant. Four courses must be cleared and after appropriate evaluation, has arrived at the following relative ratings (100=best rating) regarding the ability of each instructor to teach each of the four courses

	course 1	course 2	course 3	course 4
Prof. 1	60	40	60	70
Prof. 2	20	60	50	70
Prof. 3	20	30	40	60
TA	30	10	30	40

   How should he assign his staff to the courses to realize his objective? (20)

6. (a) A post office has 3 windows providing the same service. It receives on an average 30 customers per hour. Arrivals are Poisson distributed and service time is exponentially distributed. Each window serves at an average 12 customers per hour.

   (i) What is the probability that a customer will be served immediately?

(ii) What is the probability that a customer will have to wait?

(iii) What is the average number of customers in the system?

(iv) What is the average total time a customer must spend in the post office? (12)

(b) What is the difference between transportation model and Assignment model (traveling salesman's problems)? (8)

SECTION - D

7. A project schedule has the following characteristics

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time	4	1	1	1	6	5	4	8	1	2	5	7

1. Construct a network. 2. Compute Es and L_F for each event. 3. Find the critical path. Also obtain the total floats of each activity. (20)

8. (a) What is CPM? What are the essential steps in CPM for project planning? (8)

(b) A small engineering project consists of Six activities. The three time extimates in number of days for each activity are given below:

Activity	1-2	2-3	3-5	5-6	1-4	4-5
t_o	2	1	0	7	3	2
t_m	5	1	6	7	3	8
t_p	8	1	18	7	3	14

(a) Calculate the values of expected time, standard deviation and variance for each activity.

(b) Draw the network diagram and mark t_e on each activity.

(c) Identify the critical path and mark on the network diagram. (12)

SECTION - E
(Compulsory Question)

9. (a) What is scientific decision making?

(b) Write the basic assumptions of linear programming.

(c) Discuss the scope of OR.

(d) What is dualty in simplex method?

(e) Explain stepping stone method.

(f) Give the statement of unbalanced transportation problem.

(g) Define earliest event time.

(h) What is an assignment problem?

(i) Under what circumstances would you consider PERT as opposed to CPM in project management.

(j) What are the situations when O.R. techniques will be applicable? (2×10=20)