2207M069

MBA (Business Analytics)
Subject: Optimization Analytics
Subject Code: MAN-807
Semester: Second
July 2022
Theory (External): 70 Marks
Time: 03 Hours

Instructions to the Students

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 2 marks.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries 10 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

Roll Number

SECTION –A (SHORT/OBJECTIVE TYPE QUESTIONS)
(10x2=20 Marks)

A. An objective function is given by
$Z(X_1,X_2) = 3X_1 + 9X_2$
The constraints are:
$x_1+x_2 \leq 8$; $x_1+2x_2 \leq 4$; $x_1 \geq 0$; $x_2 \geq 0$
What will be the maximum value of the objective function?
   a. 12
   b. Zero
   c. 24
   d. 18

B. In a transportation problem with 4 supply points and 5 demand points, how many numbers of constraints are required in its formulation?
   a. 20
   b. 1
   c. 0
   d. 9

C. What does Maximum flow problem involve?
   a. finding a flow between source and sink that is maximum
   b. finding a flow between source and sink that is minimum
   c. finding the shortest path between source and sink
   d. computing a minimum spanning tree

D. The Bellman's principle of optimality is related to:
   a. Linear programming problem
   b. Transportation problem
   c. Dynamic programming problem
   d. Assignment problem

E. Jobs arrive at a facility at an average rate of 5 in an 8-hour shift. The arrival of the jobs follows Poisson distribution. The average service time of a job on the facility is 40 minutes. The service time

   a. The company continues with the existing process.
   b. The company conducts research P, which costs Rs. 20000, has 75% probability of success and can get the profit of Rs. 5000.
   c. The company conducts research Q which costs Rs. 10000, has 50% probability of success and can get the profit of Rs. 25000.
   d. The company pay Rs. 10000 as royalty for a new product and can get profit of Rs. 20000.

The company can carry out only one out of the two types of research P and Q because of certain limitations. Draw a decision tree diagram and find the best strategy for XYZ Ltd.

7. Player X is paid Rs. 10 if two cons turn both Heads and Rs. 2 if both cons turn both Tails. Player Y is paid Rs. 4 when the two cons do not match. If you had the choice of becoming player X or player Y, which one would you like to be and what will be your strategy? Solve the problem using equal gains or probability.
8. What do you understand by linear Programming? What are the limitations of LPP. Give example to support your argument.

===END OF PAPER===

Activity (i-j)	Normal Time (days)	Crash Time (days)	Normal Cost In Rs	Crash Cost In Rs
1-2	4	3	600	800
1-3	2	2	400	400
1-4	5	5	750	900
2-3	7	4	400	600
2-5	7	6	800	1000
3-5	2	1	500	650
4-5	5	4	600	850

Indirect cost per day for the project is Rs. 200/-

i) Draw the activity network of the project

ii) Find the normal duration and cost of the project

iii) Using the above information crash the activity step by step until all paths are critical, and

iv) Find the optimum duration and the Total cost after crashing.

5. How is a simulation technique better than mathematical models in solving problems of business and industry. Discuss taking suitable example.

6. XYZ Ltd. Wants to update/change its existing manufacturing prices for product A. it wants to strengthen its R&D cell and conduct research for finding a better product of manufacturing which can get them higher profits. At present, the company is earning a profit of Rs. 20000 after paying for material, labour and overheads. XYZ Ltd. Has the following four alternatives:

follows exponential distribution. Idle time (in hours) at the facility per shift will be

a. 5/7
b. 14/3
c. 7/5
d. 10/3

F. A PERT network has 9 activities on its critical path. The standard deviation of each activity on the critical path is 3. The standard deviation of the critical path is.

a. 3
b. 9
c. 81
d. 27

G. The payoff value for which each player in a game always selects the same strategy is called the

a. saddle point
b. equilibrium point
c. both (a) and (b)
d. none of these

H. When the sum of gains of one player is equal to the sum of losses to another player in a game, this situation is known as:

a. biased game
b. zero-sum game
c. fair game
d. all of these

I. In the critical Path Method (CPM), the cost-time slope of an activity is given by

a. (Crash Cost – Normal Cost) / Crash Time
b. Normal Cost/ (Crash Time – Normal Time)
c. Crash Cost/ (Crash Time – Normal Time)
d. (Crash Cost – Normal Cost) / (Normal Time – Crash Time)

J. Which one of the following is NOT a technique of inventory control?

a. ABC analysis
b. FNS analysis
c. GOLF analysis
d. FTMN analysis

SECTION –B (ESSAY TYPE QUESTIONS)
(5x10= 50 Marks)

1.

a. Using graphical method:

Minimize : $f = 3x_1 + 2x_2$

Subject to $8X_1 + X_2 \geq 8$

$2X_1 + X_2 \geq 6$

$X_1 + 3X_2 \geq 6$

$X_1 + 6X_2 \geq 8$

$X_1 \geq 0, X_2 \geq$

b. What do you understand from sensitivity analysis in an LPP? What is the advantage of carrying out sensitivity analysis?

2. Solve the given transportation problem, using Vogel's approximation method:

Source					Supply
1	10	0	20	11	15
2	12	7	9	20	25
3	0	14	16	18	5
Demand	5	15	15	10	

3. A general Insurance company handles the vehicle accident claims and employs three officers for this purpose. The policy holders make on an average 24 claims during 8 hours working day and it follows the Poisson's distribution. The officers attending the claims of policy holders spend on an average 30 minutes per claim and this follows the exponential distribution. Claims of the policy holders are processed on first come first served basis. How many hours does the claim officers spend with the policy holder per day?
4. The following table gives the activities in a construction project and other relevant in formation: