

SVKM'S NMIMS

Shobhaben Pratapbhai Patel / School of Pharmacy & Technology Management

Programme: M. Pharm + MBA (Pharmaceutics/PQA/PT/IP)

Year: II

Semester: III

Academic Year: 2019-20

Marks: 50

Subject: Operations Research

Time: 10.00 am to 12.00 noon

Duration: 2 hrs.

Date: 06 December 2019

No. of Pages : 02

FINAL EXAMINATION

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

- 1) Question No. 1 is compulsory (Section I)
- 2) Out of remaining questions, attempt any 3 questions (Section II)
- 3) In all 4 questions to be attempted
- 4) Answer to each new question to be started on a fresh page
- 5) Figures in brackets on the right hand side indicate full marks
- 6) Assume suitable data if necessary.

Section I (20 Marks)

Q1(a). Solve the given problem below by following Simplex Approach. Also compare the solution through graphical method. (15 Marks)

Maximise 'Z' = 4x1 + 3x2

Subject to constraints

2x1 + x2 <= 30

x1 + x2 <= 24

Where, x1, x2 => 0

Q1(b) A firm manufactures 2 types of products A & B and sells them at a profit of Rs. 8 on type A & Rs. 12 on type B. Each product is processed on 2 machines G & H. Type A requires 4 minute of processing time on G and 8 minutes on H. Type B requires 12 minute on G & 3 minute on H. The machine G is available for not more than 6 hrs. 50 mins, while machine H is available for 9 hrs during any working day. Formulate the problem as LPP. (5 Marks)

Section II (30 Marks)

Q2 –A company produces 2 types of cowboy hats. Each hat of the first type requires twice as much labour time as the second type. The company can produce a total of 500 hats a day. The market limits the daily sales of first and second types to 150 and 250 hats. Assuming that the profits per hat are Rs. 8 per type A and Rs. 5 per type B, formulate the problem as Linear Programming model in order to determine the number of hats to be produced of each type so as to maximize the profit. Also optimize the problem through graphical method. (10 Marks)

Q3. – Consider a situation where the mean arrival rate is 3 customer every 6 minutes and the mean service time is 1.5 minutes. Calculate the average number of customers in the system, the average queue length and the time taken by a customer in the system and the average time a customer waits before being served. Also explain the relevance of queuing theory and its application in Pharma Industry specific scenarios. (10 Marks)

Q4. Optimize the allocation or assignment of the jobs to appropriate personnel thereby minimizing the total cost of getting all jobs done. (10 Marks)

Job	P1	P2	P3	P4
J1	10	12	19	11
J2	5	10	7	8
J3	12	14	13	11
J4	8	15	11	9

Q5. –You are required to formulate the solution for the following transportation problems by following any TWO approaches i.e. North West Corner Rule, Least Cost Method and Vogel Approximation or Penalty Method. Calculate the optimized combination with total least cost of meeting demand with supply. (10 Marks)

Supply	Customer1	Customer2	Customer3	Supply
Warehouse1	6	8	10	150
Warehouse2	7	11	11	175
Warehouse 3	4	5	12	275
Demand	200	100	300	