MASTER OF COMPUTER APPLICATIONS (CBCS 2018 COURSE)
M.C.A. Sem-V : WINTER : 2021
SUBJECT: OPTIMIZATION TECHNIQUES

Day : Wednesday   Time : 02:00 PM-05:00 PM
Date : 12-01-2022   **W-20590-2021**   Max. Marks: 60

N.B.
1) Q.No. 4 from Section I is **COMPULSORY**.
2) Answer **ANY TWO** questions from Q.No.1,2,3 in Section – I.
3) Answer **ANY TWO** questions from Q.No.5,6,7 in Section – II.
4) All questions carry **EQUAL** marks.
5) Answer to both the sections should be written in **SAME** answer book.
6) Draw a labeled diagram **WHEREVER** necessary.

SECTION – I

Q.1 Two different kinds of food A and B, are being considered to form a weekly diet. **(12)** The minimum weekly requirements for fats, carbohydrates and protein are 18,24 and 16 units respectively of these ingredients and one kg. of food A has 4,16 and 8 units respectively and one kg. of food B has 12, 4 and 16 units respectively. The price of food A is Rs. 4 per kg. and that of food B is Rs. 3 per kg. construct the problem to minimize the cost and solve by graphical method.

Q.2 Solve the following transportation problem for minimization using VAM **(12)**

	D_1	D_2	D_3	D_4	Availability
S_1	8	6	10	9	56
S_2	4	3	15	18	75
S_3	18	5	3	7	42
Demand	28	32	45	68	

Q.3 Solve the following assignment problem **(12)**

	Job				
	1	2	3	4	5
1	5	11	10	12	4
2	2	4	6	3	5
3	3	12	5	14	6
4	6	14	4	11	7
5	7	9	8	12	5

Q.4 Write short notes on **ANY TWO** of the following: **(12)**
a) Limitations of simulation
b) Terms used in Decision Theory
c) Operation Research Model

SECTIONI - II

Q.5 In a bank every 15 minutes one customer arrives for cashing cheque. The staff in **(12)** the only payment counter takes 10 minutes for serving a customer on an average find,
i) The average queue length.
ii) Increase in arrival rate for justify a second counter (when the waiting time of a customer is at least 15 min. the management will increase one more counter).

Q.6 Use the simplex method to solve the following LP problem (12)
Maximize $Z = 3x_1 + 5x_2 + 4x_3$
Subject to constraints

$$2x_1 + 3x_2 \leq 8$$
$$2x_2 + 5x_3 \leq 10$$
$$3x_1 + 2x_2 + 4x_3 \leq 15$$

such that $x_1, x_2, x_3 \geq 0$

Q.7 A small project is composed of 7 activities whose time estimates are listed in the (12) table given below. Activities are identified by their beginning (i) and ending (j) node number.

ACTIVITY (i-j)	ESTIMATED DURATION (WEEKS)		
	OPTIMISTIC TIME (a)	MOST LIKELY TIME (m)	PESSIMISTIC TIME (b)
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 diagram of activities in the project.
b) Find the expected duration and variance for each activity. What is the expected project length?
c) Calculate the variance and standard duration of the project length. What is the probability that the project will be completed?
   i)   at least four weeks earlier than expected time
   ii)   no. more than 4 weeks later than expected time.

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