BACHELOR OF COMPUTER APPLICATIONS (C.B.C.S.) (2014 COURSE)
B.C.A. Sem-VI : WINTER : 2021
SUBJECT: OPERATIONS RESEARCH

Day : Thursday
Date : 13-01-2022

W-11060-2021

Time : 02:00 PM-05:00 PM
Max. Marks: 100

N.B.

1) Attempt any **FOUR** questions from Section – I and any **TWO** questions from Section – II.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in the **SAME** answer book.
4) Use of non-programmable calculator is allowed.
5) Graph paper will be provided if necessary.

SECTION – I

Q.1 Explain various models of Operations Research. **(15)**

Q.2 Solve the following using graphical method: **(15)**

Min $Z = x_1 + x_2$

Subject to $5x_1 + 10x_2 \leq 50$

$x_1 + x_2 \geq 1$

$x_2 \leq 4$

and $x_1, x_2 \geq 0$

Q.3 The cost of transporting material from supply points A, B, C and D to demand points E, F, G, H and J are given in the following table. **(15)**

		To					
		E	F	G	H	J	
From	A	8	10	12	17	15	100
	B	15	13	18	11	9	10
	C	14	20	6	10	13	170
	D	13	19	7	5	12	280
		90	20	50	210	190	

Find the Optimum Solution.

Q.4 Solve the following assignment problem: **(15)**

		Jobs				
		I	II	III	IV	V
Machines	A	5	11	10	12	4
	B	2	4	6	3	5
	C	3	12	5	14	6
	D	6	14	4	11	7
	E	7	9	8	12	5

Q.5 Illustrate Laplace Criterion in detail. **(15)**

P.T.O.

Q.6 A project consists of activities A, B, C, D, E, F, G, H and I with conditions given in the following table: **(15)**

Activity	Predecessor	Estimated Time (Weeks)		Activity	Predecessor	Estimated Time (Weeks)
A	-	3		F	C	9
B	-	5		G	D, E	8
C	-	4		H	B	7
D	A	2		I	H, F	9
E	B	3		-	-	-

Draw the network diagram for the Project.

Q.7 Write short notes on the following: **(15)**

a) Expected Opportunity Loss (E.O.L)

b) Floats

c) Limitations of Operations Research

SECTION – II

Q.8 On an average, 72 patients per 24 hour-day require the service of an emergency clinic and on an average a patient requires 10 min of active attention. The facility can handle only one emergency at a time. Assuming that it costs the clinic ₹ 100 per patient treated to obtain an average servicing time of 10 patients and that each min of decrease in this average time would cost ₹ 10 per patient treated, how much would have to be budgeted by the clinic to decrease the average size of the queue from one and one third patients to half a patient. **(20)**

Q.9 Solve the following LPP using the simplex method: **(20)**

Min $Z = x_1 + x_2 + 3x_3$

Subject to $3x_1 + 2x_2 + x_3 \leq 3$

$2x_1 + x_2 + 2x_3 \leq 2$

and $x_1, x_2, x_3 \geq 0$

Q.10 Consider the following project whose details are as follows: **(20)**

Activity	**t_0**	**t_m**	**t_p**		**Activity**	**t_0**	**t_m**	**t_p**
(1- 2)	2	6	15		(4-5)	4	6	14
(1- 6)	3	7	14		(6-7)	4	9	27
(2- 3)	5	10	30		(5-8)	2	5	7
(2- 4)	3	5	9		(7-8)	3	19	25
(3- 5)	4	11	17		-	-	-	-

Draw the network diagram. Find the critical path and the variance of expected duration of the project.

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