

BACHELOR OF COMPUTER APPLICATIONS (C.B.C.S.) (2014 COURSE)

B.C.A. Sem-VI : WINTER- 2022

SUBJECT : OPERATIONS RESEARCH

Day : Saturday

Time : 02:00 PM-05:00 PM

Date : 24-12-2022

W-11060-2022

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 the applications of Operation Research in real life situations. (15)

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

$$\text{Max } Z = 3x_1 + 2x_2$$

$$\text{Subject to } x_1 - x_2 \leq 1$$

$$x_1 + x_2 \geq 3$$

$$\text{and } x_1, x_2 \geq 0$$

Q.3 Solve the following transportation problem: (15)

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	D <sub>5</sub>	D <sub>6</sub>	Available
O <sub>1</sub>	9	12	9	6	9	10	5
O <sub>2</sub>	7	3	7	7	5	5	6
O <sub>3</sub>	6	5	9	11	3	11	2
O <sub>4</sub>	6	8	11	2	2	10	9
Required	4	4	6	2	4	4	

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

	I	II	III	IV
A	5	3	1	8
B	7	9	2	6
C	6	4	5	7
D	5	7	7	6

Q.5 Illustrate Maximum and Maximax criteria in detail. (15)

Q.6 Consider the following project and draw the network diagram. (15)

Activity	Immediate Predecessor	Activity	Immediate Predecessor
A	-	H	D, E, F
B	-	I	D
C	-	J	G
D	A	K	G
E	B, C	L	H, J
F	A	M	K
G	C	N	I, L

P.T.O.

- Q.7** Write short notes on the following: (15)
- Decision tree
  - Total float
  - Least cost method

**SECTION – II**

- Q.8** The arrival of customers at a telephone booth is considered to be following a Poisson pattern, with an average time of 10 min between one arrival and the next. The duration of phone calls is assumed to be distributed exponentially, with a mean of 3 min. Find the probability that a person arriving at the booth will have to wait. (20)

- Q.9** Solve the following LPPs using the simplex method: (20)
- Max  $Z = 5x_1 + 3x_2$   
 Subject to  $3x_1 + 5x_2 \leq 15$   
 $5x_1 + 2x_2 \leq 10$   
 and  $x_1, x_2 \geq 0$

- 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)	3	6	15		(4-5)	3	6	15
(1-6)	2	5	14		(6-7)	3	9	27
(2-3)	6	12	30		(5-8)	1	4	7
(2-4)	2	5	8		(7-8)	4	19	28
(3-5)	5	11	17					

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

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