B.TECH SEM – VII (2007 COURSE) (MECHANICAL ENGG.) :
WINTER - 2017
SUBJECT: ELECTIVE – I OPERATION RESEARCH

Day : **Monday**
Date : **22/01/2018**

Time : **02.30 PM TO 05.30 PM**
Max. Marks : 80.

W-2017-2599

N.B.:

1) Q. No. 1 and Q. No. 5 are **COMPULSORY.** Out of the remaining attempt any **TWO** questions from each section.
2) Both the sections should be written in **SEPARATE** answer books.
3) Figures to the **RIGHT** indicate full marks.
4) Assume suitable data, if necessary.
5) Draw neat labeled diagrams **WHEREVER** necessary.

SECTION-I

Q.1 **a)** Give any four comprehensive definitions of OR **(04)**

b) Define slack, surplus and artificial variables **(05)**

c) For square assignment problem, how many constraints are there in LP form? How many decision variables are there? What are the values of decision variables? While solving assignment problem by simplex how many total variables are involved? **(05)**

Q.2 **a)** Explain in brief the Methodology of OR. **(06)**

b) Explain the Steps in Decision Making. **(07)**

Q.3 Maximize : $Z = x_1 + 2x_2 + 3x_3 - x_4$ **(13)**

Subject to : $x_1 + 2x_2 + 3x_3 = 15$

$2x_1 + x_2 + 5x_3 = 20$

$x_1 + 2x_2 + x_3 + x_4 = 10$

$x_1, x_2, x_3, x_4 \geq 0$

Q.4 Solve the following Transportation problem involving three sources and four destinations. The cell entries represent the cost of transportation per unit. **(13)**

Sources	1	2	3	4	Supply
1	3	1	7	4	300
2	2	6	5	9	400
3	8	3	3	2	500
Demand	250	350	400	200	1200

P.T.O.

SECTION-II

Q.5 **a)** Explain The different types float. **(04)**

b) Explain Kendall's notation for representing queuing model **(05)**

c) Explain the different mathematical steps in Monte Carlo method **(05)**

Q.6 A small project consists of 13 activities. Their precedence relationship and duration in days is as follows: **(13)**

Activity	Predecessor	Duration(Days)
A	---	6
B	A	4
C	B	7
D	A	2
E	D	4
F	E	10
G	---	2
H	G	10
I	J,H	6
J	----	13
K	A	9
L	C,K	3
M	I,L	5

i) Construct the project network

ii) Find the critical path

iii) Find total completion time of project.

Q.7 **a)** Explain the Steps in Decision Making. **(06)**

b) Solve the following Game. **(07)**

		Player B	
		B_1	B_2
Player A	A_1	30	2
	A_2	4	14
	A_3	6	9

Q.8 A cosmetics manufacturing company is interested in selecting the advertising media for the product and the frequency of advertising in each media. The data collected over the past two years regarding the frequency of advertising in three media of newspaper, radio and television and the related sales of the product give the following results: **(13)**

Expected sales in thousands of rupees

Frequency/ week	Television	Radio	Newspaper
1	220	150	100
2	275	250	175
3	325	300	225
4	350	320	250

The cost of advertising in newspaper is Rs. 500 per appearance, while in radio and in television, it is Rs. 1000 and Rs. 2000 respectively. The budget provides Rs. 4500 per week for advertisement. The problem is of determining the optimal combination of advertisement media and advertising frequency.