322714(22)

B. E. (Seventh Semester) Examination, April-May 2020

(Old Scheme)

(Computer Science Engg. Branch)

OPERATIONS RESEARCH

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) part of each questions.*

1. (a) What is objective functions?   2

   (b) Solve by Simplex method :   7

Maximize

$$Z = 3x_1 + 4x_2$$

Subject to

$$x_1 + x_2 \leq 450$$

$$2x_1 + x_2 \leq 600$$

$$x_1, x_2 \geq 0$$

(c) Find the maximum value of $Z = 5x_1 + 3x_2$ Subject

to constraints $3x_1 + 5x_2 \leq 15$, $5x_1 + 2x_2 \leq 10$,

$x_1 x_2 \geq 0$ using Graphical method.   7

(d) Solve using Big M method

Max

$$Z = 2x_1 + 5x_2$$

Subject to

$$x_1 + 4x_2 \leq 24$$

$$3x_1 + x_2 \leq 21$$

$$x_1 + x_2 \leq 9$$

$$x_1 x_2 \geq 0$$ 7

2. (a) Write down the steps for least cost method.   2

(b) Solve the following Transportation problem using :

    (i) North West Corner Rule   3

    (ii) Vogal's Approximation Rule   4

	1	2	3	4	Supply
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

(c) Solve the following transportation problem using Vogel's Approximation method then find optimal solution using MODI method.   7

	A	B	C	D	
I	19	30	50	10	7
II	70	30	40	60	9
III	40	8	70	20	18
	5	8	7	14	

(d) Solve the Assignment problem :   7

	1	2	3	4
1	15	13	14	17
2	11	12	15	13
3	13	12	10	11
4	15	17	14	16

3. (a) What are the Different Types of Inventory cost? 2

(b) A stockist has to supply 12,000 units of a product/ yr. Demand is fixed, shortage cost is infinite. Holding cost = R 0·20/unit/month, ordering cost/order is R 350. Find optimum lot size, optimum sheduling period and min total variable yearly cost. 7

(c) Demand of a book is 9000 units/yr., cost of one procurement is R 100. Hosting cost/unit is 2·40/ year replacement is instantaneous and no shortage determine.

(i) economic lot size

(ii) no. of order/year

(iii) The time between orders

(iv) Total cost/year if cost of one unit is Rs. 1. 7

(d) Calculate EOQ in units and total variable cost for following items, assuming as ordering cost of Rs. 5 and a holding cost of 10 year. 7

Item	Annual Demand	Unit Price
A	800 unit	Rs. 0.02
B	400 unit	Rs. 1.00
C	392 unit	Rs. 8.00
D	13,800 unit	Rs. 0.20

4. (a) Explain Transient and steady state of a system? 2

(b) 8 jobs are to be processed on a single machine. The processing time and due date is given. Using Earliest Due Date (EDD). Find : 7

(i) Optimal sequence

(ii) Completion time

(iii) Mean flow rate

(iv) Avg. in process Inventory

(v) Lateness, mean lateness, max lateness

Job	1	2	3	4	5	6	7	8
T_i	5	8	6	3	10	14	7	3
D_j	15	10	15	25	20	40	45	50

(c) Find sequence and total elapsed time that required to complete the following tasks on two machines : 7

Task	A	B	C	D	E	F	G	H	I
Machine-I	2	5	4	9	6	8	7	5	4
Machine-II	6	8	7	4	3	9	3	8	11

(d) Find the sequence of three machines and total elapsed time that required to complete the following tasks and also find out idle time of each machine. 7
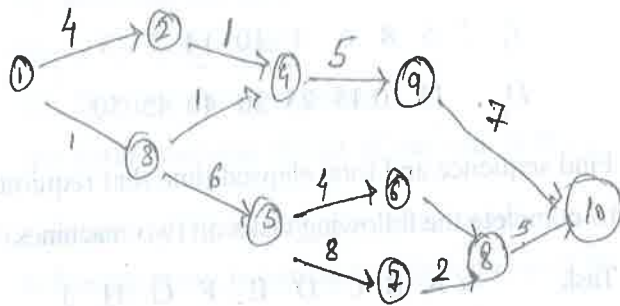
Job	Time for turning (min)	Time for threading (min)	Time for Knorling (min)
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

5. (a) Explain looping in a network. 2

(b) Find critical path for following schedule : 7
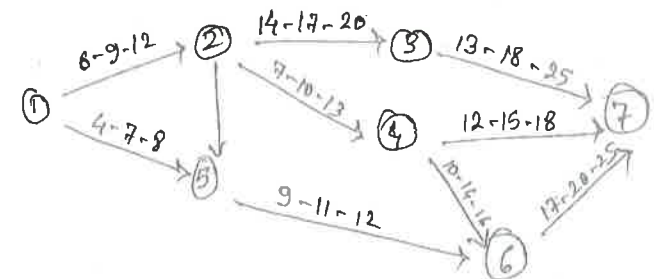

(c) A project has following schedule time : 7

Job	Duration
1-2	15
1-3	15

2-3	3
2-5	5
3-4	8
3-6	12
4-5	1
4-6	14
5-6	3
6-7	14

(i) Draw an arrow diagram representing the project.

(ii) Find total float for each activity.

(iii) Find critical path and total project duration.

(d) Given a network. Determine variance and expected time for each network when t_o, t_m & t_p are given in sequence for each activity. 7