

**322714(22)**

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**B. E. (Seventh Semester) Examination,**

**April-May 2016**

**(Old Scheme)**

**(CSE Engg. Branch)**

**OPERATIONS RESEARCH**

*Time Allowed : Three hours*

*Maximum Marks : 80*

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*Minimum Pass Marks : 28*

*Note : Attempt all questions. Part (a) of each question is compulsory and carries 2 marks and attempt two parts from (b), (c) and (d) and carry 7 marks each. Assume suitable data and figure as required.*

**Unit-I**

1. (a) Point out the limitations of OR. 2

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(b) Find the maximum value of  $z = 5x_1 + 3x_2$  subject to

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**PTC**

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

$x_1, x_2 \geq 0$  using graphical method.

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(c) Using simplex method to solve the problem. Maximize

$z = 2x_1 + 5x_2$  subject to constraints  $x_1 + 4x_2 \leq 24$ ,

$3x_1 + x_2 \leq 21$ ,  $x_1 + x_2 \leq 9$ ,  $x_1, x_2 \geq 0$ .

(d) Using Big-M method Maximize  $z = 3x_1 - x_2$ , subject

to  $2x_1 + x_2 \leq 2$ ,  $x_1 + 3x_2 \geq 3$ ,  $x_2 \leq 4$ ,

$x_1, x_2 \geq 0$ .

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### Unit-II

2. (a) What is transportation problem?

(b) Obtain initial basic feasible solution for the following transportation problem.

11	13	17	14
16	18	14	10
21	24	13	10

Supply

250

300

400

Demand 200 225 275 250

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Using (i) North west corner method

3½

(ii) Vogel's approximation method

3½

(c) Solve the following transportation problem. Find IBFS using Vogel's and then use MODI method to find the optimum solution.

19	30	50	10	7
70	30	40	60	9
40	8	70	20	18
5	8	7	14	

(d) Determine the optimum assignment schedule for the table :

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10	5	9	18	11
13	19	6	12	14
3	2	4	4	5
18	9	12	17	15
11	6	14	19	10

### Unit-III

3. (a) What are the different types of inventory cost?

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(b) A stockist has to supply 12,000 units of a product/yr. Demand is fixed, shortage cost is infinite. Holding cost = ₹ 0.20/unit/month ordering cost/order is ₹ 350. Find optimum lot size, optimum scheduling period and min. total variable yearly cost.

(c) Demand of a book is 9000 units/yr. cost of one procurement is ₹ 100. Holding cost/unit is 2.40/year replacement is instantaneous and no shortage determine : **CSVТУonline.com**

- (i) economic lot size
- (ii) no. of orders/year
- (iii) the time between orders
- (iv) the total cost/year if the cost of one unit is Re 1.

(d) A newspaper boy buys papers for 5 paise each and sells them for 6 paise each. He cannot return unsold newspaper. Daily demand  $R$  for newspapers follows the distribution. **CSVТУonline.com**

$R$	:	10	11	12	13	14	15	16
$P_R$	:	0.05	0.15	0.40	0.20	0.10	0.05	0.05

If each days demand is independent of previous days, how many paper should be ordered each day.

## Unit-IV

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). 7

Find the : **CSVТУonline.com**

- (i) optimal sequence
- (ii) completion time
- (iii) mean flow time
- (iv) Avg. in process inventory
- (v) lateness, mean lateness
- (vi) max. lateness

Job	1	2	3	4	5	6	7	8
$I_i$	5	8	6	3	10	14	7	3
$D_i$	15	10	15	25	20	40	45	50

- (c) Given 5 jobs 2 be processed on 3 machines in the order A, B, C processing time : 7

Job	Machine A	Machine B	Machine C
1	3	4	7
2	8	5	9
3	7	1	5

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4	5	2	6
5	4	3	10

Determine optimum sequence and minimum elapsed time.  
Also find idle time for A, B and C.

(d) Use graphical method to minimize the time to processes following job. Calculate the total elapsed time.  
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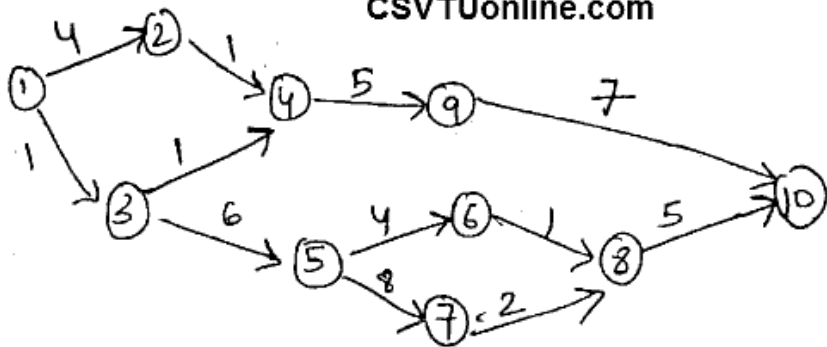
Job 1	Sequence	A	B	C	D	E
	Time	6	8	4	12	4
Job 2	Sequence	B	C	A	D	E
	Time	10	8	6	4	12

Unit-V

5. (a) Explain looping in a network.

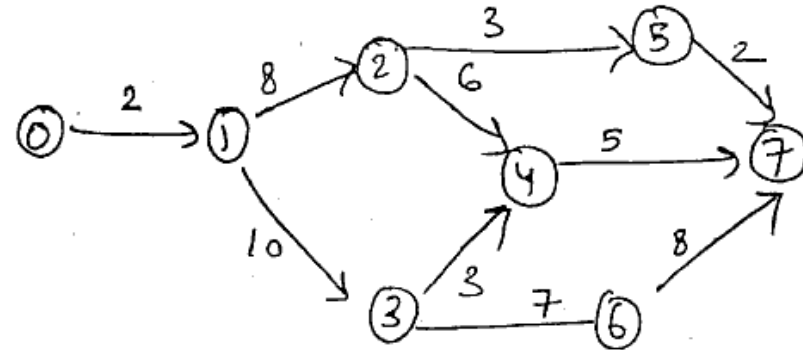
(b) Find critical path for following schedule.

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(c) For the given schedule determine total, free independent and interfering float and identify the critical path.  
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(d) Given a network. Given  $t_o$ ,  $b_m$  and  $t_p$ . Determine variance and expected time for each network.

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