Let revealing of identification, appeal to evaluator and for equations written eg. 42+8=50, will be treated as malpractice. Important Note: Kon completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.

2

Seventh Semester B.E. Degree Examination, Dec.2013/Jan.2014

Operations Research

Pime: 3 hrs.

Max. Marks

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- a. Old hens can be brought at Rs.50/- each and young hens can be brought at Rs.100/- each. The old hens lay 3 eggs/week and young hen's 5/week. Each egg cost 2 Rs. A hen cost Rs.5/week at feed, if a person has only Rs.2000 to spend for hens formulate the problem to decide how thany of each kind of hens should be buy? And he cannot house more than 40 hens, formulate the problem a LPP model. (10 Marks)
 - b. Solve the following LPP by Graphical method,

$$Z_{\text{max}} = 3x_1 + 4x_2$$

Subject to constraints,

$$5x_1 + 4x_2 \le 200$$

$$3x_1 + 5x_2 \le 150$$

$$5x_1 + 4x_2 \ge 100$$

$$8x_1 + 4x_2 \ge 80$$

(10 Marks)

a. Solve the following LPP using Simplex methods

$$Z_{\text{max}} = 10x_1 + 5x_2$$

Subject to constraints,

$$4x_1 + 5x_2 \le 100$$

$$5x_1 + 2x_2 \le 80$$

$$x_{1} & x_{2} \ge 0$$

(08 Marks)

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b. Solve the given problem by using Big.M.

$$Z_{\min} = 50003x_2$$

Subject to constraints,

$$2x_1 + 4x_2 \le 12$$

$$2x_1 + 2x_2 = 10$$

$$5x_1 + 2x_2 \ge 10$$

$$x_1 \& x_2 \ge 0$$

(12 Marks)

3 a. Find the optimality for given problem and initial solution by using VAM method. (10 Marks)

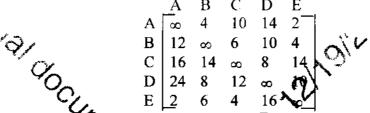
Origin | W₁ | W₂ | W₄ | Supply

Origin	Wi	W 2	W 3	W 4	Suppiy
Destinations					
$\mathbf{F_1}$	2	2	2	1	3
F ₂	10	8	5	4	7
F ₃	7	6	6	8	5
Demand	4	3	4	4	

b. A AML company has 5 tasks and 5 persons to perform. Determine the optimal assignment and to minimize the total cost. (10 Marks)

Jobs	Machines					
1002	Α	В	С	D	Ε	
P	6	7	5	9	4	
Q	7	5	10	9	6	
R	5	4	3	6	5	
S	8	3	5	6	4	
T	4	7	5	6	6	

a. A traveling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and return to his starting point find the least cost route. (10 Marks)



What is integer programming? Why it is needed and write the branch and bound algorithm. (10 Marks)

PART – B

The following table gives the activities in a construction project and other related 5 information:

	Activity	t ₀	t _m	tp
	1 2 •	20	30	46
~ \(\lambda \)	$\mathbf{Y} - 3$	Br	12	21
`X`	2-3	\ \frac{1}{2} \	9	7
0/1	2 – 4	2	3	4(
	3 – 4	1	2	*3
	4 – 5	12	18	24

- i) Draw a pert network
- ii) Calculate project duration
- iii) Find the critical path.
- iv) Find the probability that the project will be completed within 50 days. (14 Marks)
- b. Define the following: i) Normal time ii) Crash time
- (06 Marks)
- fine: i) Fair game ii) Pure strategy iii) Mixed strategy /

Solve the game by graphically method.

$$\begin{bmatrix}
1 & -3 \\
3 & 5 \\
-1 & 6 \\
4 & 1
\end{bmatrix}$$

(07 Marks)

Write the characteristics of waiting lines.

(05 Marks)

b. At what average rate must a clerk at super market work in order to ensure a probability of 0.9 that the customer will not have to wait longer than 12 minutes? It is assumed that there is only one counter to which customer arrive in a Poisson fashion at an average rate of 15/hr. The length of service by the clerk has an exponential distribution.

In a hair dress by saloon with one barber, the customer arrived follows Poisson distribution at an average rate of one every 45 minutes. The service time is exponentially distributed with a mean of 30 mm.

i) Average number of customer in a saloon.

ii) Average waiting time of customer before service.

iii) Average idle time of barber.

i) Idle time

ii) Total elapsed time

(04 Marks)

b. Write the assumption underlying the sequencing problem.

(04 Marks)

c. Find the sequence that minimizes the total elapsed time, idle time and normal time.

υ _ς ,	Machine	Jobs					
		Α	В	С	Ŕ	E	
4/2	M_1	6	8	ス	10	6	
120	M_2	3	2	0	16	4	
<i>S</i>	M_3	4	/ \$,6	7	8	
		والقنور	. , ,				

(12 Marks)

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