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10ME74

Seventh Semester B.E. Degree Examination, June/July 2015
Operations Research

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Use of statistical tables is permitted.

PART - A

- 1 a. List and briefly explain the various phases of O.R. study and state the limitations of O.R. models. (10 Marks)
b. The XYZ Company has been a producer of electronic circuits for Television sets and certain printed circuit boards for Radios. The company has decided to expand into full scale production and marketing of AM and AM - FM radios. (10 Marks)
2 a. Obtain the Dual problem of the following Primal problem (04 Marks)
b. Use BIG - M method to solve the following LPP (16 Marks)
3 a. The owner of a machine shop has four machines available to assign the jobs for the day. (10 Marks)

Table with 4 rows and 6 columns (A, B, C, D, E) containing numerical values.

- b. Solve the following Travelling, Salesman problem given by the following data C12 = 20, C13 = 4, C14 = 10, C23 = 5, C34 = 6, C25 = 10, C35 = 6, C45 = 20 when Cij = Cji and Cij value is not given, then there is no route between Cities i and j. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



- 4 a. List and briefly explain the methods of Integer programming problem. (06 Marks)  
 b. Solve the following I.P.P.  
 Max.  $Z = x_1 + x_2$   
 Subject to  $3x_1 + 2x_2 \leq 12$   
 $x_2 \leq 2$   
 $x_1, x_2 \geq 0$  and integers. (14 Marks)

**PART – B**

- 5 a. A project consists of the following activities with their duration in days and the precedence relationship.

Activity	A	B	C	D	E	F	G	H	I
Precedence	-	A	A	B, C	A	D, E	C	F, G	H
Duration (days)	10	12	5	7	9	10	8	10	9

- i) Draw the network for the above information ii) Identify the critical path and duration iii) Calculate EST, EFT, LST, LFT, TF. (10 Marks)  
 b. A project schedule has the following characteristics :

Activity	1-2	2-3	2-4	3-5	4-5	4-6	5-7	6-7	7-8	7-9	8-10	9-10
$t_m$	2	2	3	4	3	5	5	7	4	6	2	5
$t_o$	1	1	1	3	2	3	4	6	2	4	1	3
$t_p$	3	3	5	5	4	7	6	8	6	8	3	7

- i) Draw a project work, identify the critical path and its expected duration and variance.  
 ii) What is the probability of completing the project in 30 day schedule time?  
 iii) What due data has 90% chance of being met? (10 Marks)

- 6 a. Briefly explain characteristics of the Queuing system and classification of queuing models using KENDAL and LEE notations. (10 Marks)  
 b. Arrivals at a Telephone booth are considered to be Poisson distribution at an average time of 8min between one arrival and the next. The length of the phone call is distributed exponentially with a mean of 4min. Determine  
 i) Expected fraction of the day that the phone will be in use ii) Expected number of units in the queue iii) What is the probability that an arrival will have to wait more than 6min in queue for service? iv) What is the probability that more than 5 units are in the system? (10 Marks)

- a. Define and briefly explain the following terms with respect to GAME theory.  
 i) PURE STRATEGY ii) SADDLE POINT iii) VALUE OF GAME iv) TWO PERSON ZERO SUM GAME v) PAY – OFF. (10 Marks)  
 b. Solve the following TWO PERSON ZERO SUM GAME by Graphical Method. (10 Marks)

		B				
		I	II	III	IV	V
A	1	-5	5	0	-1	8
	2	8	-4	-1	6	-5



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- 8 a. When passing is not allowed, solve the following problem giving an optimal solution.

(10 Marks)

		Machine				
		M <sub>1</sub>	M <sub>2</sub>	M <sub>3</sub>	M <sub>4</sub>	M <sub>5</sub>
JOB	A	9	7	4	5	11
	B	8	8	6	7	12
	C	7	6	7	8	10
	D	10	5	5	4	8

- b. Find the sequence that minimized the total time required in performing the job on 3 machines in the order CBA.

(10 Marks)

		Machine		
JOB	A	B	C	
1	8	3	8	
2	7	4	3	
3	6	5	7	
4	9	2	2	
5	10	1	5	
6	9	6	1	

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