



P.E.S. College of Engineering, Mandya - 571 401
 (An Autonomous Institution affiliated to VTU, Belagavi)
Second Semester, Master of Business Administration (MBA)
Semester End Examination; May/June - 2019
Quantitative Techniques

Time: 3 hrs

Max. Marks: 100

*Note: i) Answer all FOUR full questions from PART - A and PART - B (Case study) is Compulsory.
 ii) Scientific calculators are allowed iii) Normal Distribution Table is allowed.*

PART - A

- 1 a. “Linear programming is one of the most frequently and successfully used operations research technique to managerial and business decisions”. Elucidate this statement with some examples. 10
- b. Solve the LP problem graphically, 10
 Max. $Z = 4x_1 + 4x_2$ Subject to
 i) $x_1 + 2x_2 \leq 10$ ii) $6x_1 + 6x_2 \leq 36$ iii) $x_1 \leq 6$ and $x_1, x_2 \geq 0$

OR

- 2 a. Explain briefly the methodology of OR. 10
- b. Solve the game;

	B ₁	B ₂	B ₃	B ₄
A ₁	2	-2	4	1
A ₂	6	1	12	3
A ₃	-3	2	0	6
A ₄	2	-3	7	1

- 3 a. Explain the following : 10
 i) Two person zero sum game ii) Saddle Point
 iii) Pure strategy in game iv) Mixed strategy in game
- b. Solve the game graphically:

	B ₁	B ₂	B ₃	B ₄	B ₅	B ₆
A ₁	1	3	-1	4	2	-5
A ₂	-3	5	6	1	2	0

OR

- 4 a. Explain the structure of a queuing system. 10
- b. A Television repairman finds that the time spent on his job has an exponential distribution with a mean of 30 minutes. If he repairs the sets in the order of which they came in, and if the arrival of the sets follows a Poisson distribution with an approximate average rate of 10 per 8 hours day, what is the repairman’s expected idle time? How many jobs are ahead of the average sets just brought in? 10
- 5 a. How would you deal with assignment problems where; 10
 i) The objective functions is to be maximized ii) Some assignments are prohibited

- b. Consider a problem of assigning four clerks to four tasks. The time (hours) required to complete the task is given below:

		Tasks			
		A	B	C	D
Clerks	1	4	7	5	6
	2	-	8	7	4
	3	3	-	5	3
	4	6	6	4	2

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Clerk 2 cannot be assigned task A and Clerk 3 cannot be assigned B. Find all the optimum assignment schedules.

OR

- 6 a. What is meant by unbalanced transportation problem? Explain the methods of solving such a problem.
- b. A steel company has three open hearth furnaces and five rolling mills. The transportation cost (rupees per quintal) for shipping steel from furnaces to rolling mills are given in the following table :

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	M ₁	M ₂	M ₃	M ₄	M ₅	Supply
F ₁	4	2	3	2	6	8
F ₂	5	4	5	2	1	12
F ₃	6	5	4	7	7	14
Demand	4	4	6	8	8	

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What is the optimum shipping schedule?

- 7 a. Explain the following :
- i) Mutually Exclusive Events ii) Collectively Exhaustive Event
- b. Assume that a factory has 2 machines. Past records show that machine 1 produces 30% of the items of output and machine 2 produces 70% of the items. Further 5% of the items produced by machine 1 were defective and only 1% produced by machine 2 were defective. If a defective item is drawn at random, what is the probability that the defective item was produced by machine 1 or 2?

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OR

- 8 a. List any five real world applications of Binomial distribution.
- b. The screws produced by a certain machines were checked by examining number of defective in a sample of 12. The following table shows the distribution of 128 samples according to the number of defective items they contained:

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No. of Defective in a sample of 12	0	1	2	3	4	5	6	7
No. of Sample	7	6	19	35	30	23	7	1

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Fit a binomial distribution and find the expected frequencies, if the chance of machine being defective is 0.5.

PART - B (Case study - Compulsory)

9. A plant has a large number of similar machines. The machines breakdown or failure is time required on hourly basis and the record for the past 100 observation. This is shown below:

Time between Recorded machine breakdowns (hrs)	Prob.	Repair time Required (Hrs)	Prob.
0.5	0.05	1	0.28
1	0.06	2	0.52
1.5	0.16	3	0.20
2	0.33		
2.5	0.21		
3	0.19		

For each hour that one machine is down due to being, or waiting to be repaired, the plant loses ` 70 by way of lost production. A repairman is paid at ` 20 per hour.

- Simulate this maintenance system for 15 breakdowns
- Calculate the maintenance cost for 15 breakdowns

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Random number for Breakdown: 61, 85, 16, 46, 88, 08, 82, 56, 22, 49, 44, 33, 77, 87, 54

Random number for Repair time : 87, 39, 28, 97, 69, 87, 52, 52, 15, 85, 41, 82, 98, 99, 23

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