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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Second Semester - Master of Business Administration (MBA)
Semester End Examination; June - 2016
Quantitative Techniques - II

Time: 3 hrs   *Max. Marks: 100*

Note: Answer any **FOUR** full questions from **PART- A** and **PART - B** is compulsory.

PART - A

1 a. Explain the basic rules of probability with examples.   10

  b. A machine is producing 4% defectives. What is the probability of getting at least four defectives
     in a sample of 50 according to (i) Binomial distribution (ii) Poisson distribution?   10

OR

2 a. Explain the concept of conditional probability and Bayers Theorem.   10

  b. Fit a Poisson distribution for the following data and find the theoretical frequencies,   10

X:	0	1	2	3	4
Y:	123	59	14	3	1

3 a. Explain the classification of models in OR.   10

  b. Solve the game by graphical method. The pay off matrix is given as,   10

		P2	
		P	Q
	A	2	4
P1	B	2	3
	C	3	2
	D	-2	6

OR

4 a. Discuss the scope and limitations of Operations Research.   10

  b. Solve the following game :   10

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

5 a. Explain the concept of unbound and infeasible solution to LPP with graphical representation.   10

b. A firm can produce 3 types of woolen clothes A, B and C. There colored wash are required. One unit of A needs 2 units of red and 3 units of blue wool. Similarly B needs 3 red, 2 green and 2 blue units of wool. C needs 5 green and 15 blue units of wool. It is known that A, B and C generate ` 3, 5 and 4 revenues respectively. Total availability is 30 units of red, 60 units blue and 40 units green wool. Formulate LPP.   10

OR

6 a. Explain the applications of LPP in business.   10

b. Solve the following LPP graphically,

Maximize : $z = 4x_1 – 2x_2$

STC: $x_1 + x_2 \leq 14$

$3x_1 + 2x_2 \geq 36$

$2x_1 + x_2 \leq 24$

$x_1, x_2 \geq 0$ 10

7 a. Explain the Hungarian method of solving assignment models.   10

b. For the following transportation problem find IBFS by VAM and check for optimality.

Plant	W_1	W_2	W_3	Supply
A	4	6	11	76
B	16	24	9	81
C	10	18	20	77
Demand	72	102	40	

10

OR

8 a. The following matrix provides the unit revenue details of assigning workers to specific jobs. Find the optional assignment.

	J_1	J_2	J_3	J_4	J_5
W_1	4	6	2	8	4
W_2	4	7	5	6	5
W_3	2	8	9	4	5
W_4	5	8	3	8	8

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b. The Taj service station has central stores where services mechanics arrive to take spare parts for the jobs they work upon. The mechanics wait in queue if necessary and are served on a 1st come 1st serve basis. The store is manned by one attendant who can attend 8 mechanics in an hour on an average. The arrival rate of the mechanics averages 6 per hour. Assuming that the pattern of mechanics arrivals is Poisson distributed and the service time is exponentially distributed. Determine waiting time in the system, and queues and expected customers in the system as well as queue.   10

PART - B

9.   **Case Study: (Compulsory)**

A machinery maintenance organization has 3 plans of executing maintenance, one-man, two-men or three-man crew. The following table provides the times and probability details.

One man		Two man		Three man	
Probability	Time	Probability	Time	Probability	Time
0.2	2 hrs	0.15	0.9 hrs	0.25	0.4 hrs
0.3	2.5 hrs	0.25	1.2 hrs	0.35	0.6 hrs
0.3	3 hrs	0.45	1.75 hrs	0.15	1.25 hrs
0.2	3.5 hrs	0.15	2.5 hrs	0.25	2.00 hrs

20

Simulate and determine which crew is most economical if labor cost is ` 45 per hour and over head expenses is ` 30 per hour per crew.

Random numbers can be taken as,

21, 17, 59, 55, 34, 16, 34, 10, 72, 93 - One Man

95, 27, 54, 27, 91, 47, 11, 87, 11, 73 - Two men

35, 96, 84, 87, 87, 95, 47, 84, 94, 24 - three men.

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