

Code: BA1T5

I MBA-I Semester-Regular Examinations - DECEMBER 2015**QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS**

Duration: 3hours

Max. Marks: 70

SECTION-A**1. Answer any FIVE of the following: 5 x 2 = 10 M**

- a) Given that Z is a standard normal random variable, what is the value of Z if the area to the left of Z is 0.0559?
- b) What are the basic properties of Binomial distribution?
- c) A random sample of 16 students selected from the student body of a large university had an average age of 25 years and a standard deviation of 2 years. Find the appropriate test statistic if the average age of all the students at the university is 24.
- d) Briefly explain the process of solving an unbalanced transportation problem.
- e) What is degeneracy? Why can degeneracy arise in the solution of a transportation problem?
- f) Define Type-I and Type-II errors.
- g) What are shadow prices? How does the concept relate to the dual of an LPP?
- h) State pure strategies, mixed strategies in game theory.

SECTION – B**Answer the following:****5 x 10 = 50 M**

2. a) Test for consistency and solve the following simultaneous equations

$$x + y + z = 2,$$

$$2x - 3y + z = 5,$$

$$x - 3y + 5z = 2$$

$$2x + 3y + z = 4$$

(OR)

- b) Find the missing frequencies of the following data for which the mean is Rs.22 and mode is Rs.23:

Daily Exp (Rs):	0-10	10-20	20-30	30-40	40-50
No. of families:	12	18	?	10	?

3. a) Two research laboratories have independently produced drugs that provide relief to arthritis sufferers. The first drug was tested on a group of 90 arthritis sufferers and produced an average of 8.5 hours relief, and a sample standard deviation of 1.8 hours. The second drug was tested on 80 arthritis sufferers producing an average of 7.9 hours of relief and standard deviation of 2.1 hours. At the 0.05 level of significance, does the second drug provide a significant shorter period relief?

(OR)

- b) The starting salaries of individuals with an MBA degree are normally distributed with a mean of \$40,000 and a standard deviation of \$5,000. (i) What is the probability that a randomly selected individual with an MBA degree will get a starting salary of at least \$30,000? (ii) What percentage of MBA's will have starting salaries of \$34,000 to \$46,000?

4. a) In survey of MBA students, the following data were obtained on "students' first reason for application to the school in which they matriculated"

Enrollment Status	School quality	school cost or convenience	others
Full time	421	393	76
Part Time	400	593	46

- i) Develop a joint probability table for this data.
ii) If a student goes full time, what is the probability that school quality is the first reason for choosing a school?
iii) If a student goes part time, what is the probability that school cost is the first reason for choosing a school?

(OR)

b) In January 2003, the MBA graduates spent an average of 77 hours logged on to the internet while at work. Assume the times are normally distributed and that the standard deviation is 20 hours.

i) What is the probability a randomly selected graduate spent fewer than 50 hours logged on to the internet?

ii) What is the percentage of graduates spent more than 100 hours logged on to the internet?

iii) A person is classified as a heavy user if he or she is in the upper 20% of usage. How many hours must a graduate have logged on to the internet to be considered a heavy user?

5. a) Solve the following LPP:

$$\text{Minimize } Z = 10x_1 + 20x_2$$

subject to,

$$3x_1 + 2x_2 \geq 18,$$

$$x_1 + 3x_2 \geq 8,$$

$$2x_1 - x_2 \leq 6$$

and $x_1, x_2 \geq 0$.

(OR)

b) A production supervisor is considering how he should assign the four jobs that are to be performed to four of the workers. He wants to assign the jobs to the workers such that the aggregate time to perform the jobs is the least. Based on previous experience, he has the information on the time taken by the four workers in performing these jobs as given below:

	Job			
Worker	A	B	C	D
1	45	40	51	67
2	57	42	69	55
3	49	52	48	64
4	41	45	60	55

Use Hungarian method of assignment and suggest optimal assignment strategy. Also find optimal value of the assignment.

6. a) A company has three plants at locations A, B and C which supply to warehouses located at D, E, F, G and H. Monthly plant capacities are 800, 500 and 900 respectively and requirements are 400, 400, 500, 400 and 800 units respectively. Unit transportation costs are given below:

Plant/Warehouse	D	E	F	G	H
A	5	8	6	6	5
B	4	7	7	6	5
C	8	4	6	6	4

Use least cost method and find the total transportation cost.

(OR)

- b) You are given the pay – off matrix of a zero – sum game, determine the optimal strategies for the players and the value of the game:

B's Strategy	A's Strategy			
	a ₁	a ₂	a ₃	a ₄
b ₁	5	-4	5	8
b ₂	6	2	0	-5
b ₃	7	12	8	7
b ₄	2	8	-6	5

SECTION – C

7. Case Study

1 x 10 = 10 M

George Johnson recently inherited a large sum of money; he wants to use a portion of this money to set up a trust fund for his two children. The trust fund has two investment options: (1) a bond fund and (2) a stock fund. The projected returns over the life of the investments are 6% for the bond fund and 10% for the stock fund. Whatever portion of the inheritance he finally decides to commit to the trust fund. He wants to invest at least 30% of the amount in the bond fund. In addition, he wants to select a mix that will enable him to obtain a total return of at least 7.5%. Formulate a linear programming model that can be used to determine the percentage that should be allocated to each of the possible investment alternatives. Solve the problem using the graphical method