Code: **BA1T5**

I MBA-I Semester-Regular Examinations FEBRUARY 2014

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) The student body of a large university consists of 60% female students. A random sample of 8 students is selected. What is the probability that among the students in the sample at least 7 are female?

b) The average number of calls received by a switchboard in a 30-minute period is 15. What is the probability that between 10:00 and 10:30 the switchboard will receive fewer than 7 calls?

c) Describe briefly the least cost method to find the initial basic feasible solution of transportation problem

d) For a Binomial Distribution, $p = 0.6$ and $n = 8$, Find $P(r < 3)$.

e) Explain briefly if there is any relationship between type-I error and the level of significance?

f) Define i) feasible solution and
       ii) optimal solution.

g) Briefly explain Hungarian assignment method.

SECTION – B

Answer the following: **5 x 10 = 50 M**

2. a) For what values of k the equations $x + y + z = 1$,
       $2x + y + 4z = k$, $4x + y + 10z = k^2$ have a solution and solve them completely in each case.

OR

b) Find the frequency table, calculate median and mode:

Daily Exp (Rs)	0-10	10-20	20-30	30-40	40-50	50-60
No. of families	12	18	30	20	15	5

3. a) According to Bureau of labour statistics, the average weekly
pay for a production worker was $441.50. Assume that
available data indicate the production worker wages are
normally distributed with a standard deviation of $90.
i) What is the probability that a worker earned more than $ 400.
ii) How much did the production worker have to earn to
be in the top 20% of wage earned?
iii) What is the probability that a worker earned less than $300.

OR

b) Because refunds are paid more quickly on tax returns that are
filed electronically, the Commissioner of the internal revenue
service was wondering whether refunds due on returns filed by
mail were smaller than those due on returns filed electronically.
Looking only at returns claiming refunds, a sample of 17 filed by
mail had an average refund of $563 and a standard deviation of $378.
The average refund on a sample of 13 electronically filed returns was
$958 and the sample standard deviation was $619. At a significance
level of 0.01, do these data support the Commissioner's speculation?

4. a) A GMAC MBA new- matriculant's survey provided the
following data for 2018 students.

		Applied to more than 1 school	
		Yes	No
	23 and under	207	201
Age Group	24-26	299	379
	27-30	185	268
	34-35	66	193
	36 and over	51	169

i) For a randomly selected MBA student, prepare a joint probability
table for the experiment consisting of observing the students age and
whether the student applied to one or more schools.

ii) What is the probability that a randomly selected applicant is 23 or under?

OR

b) Seagate Foods, Inc., is redesigning the checkout lanes in its supermarkets throughout the country and is considering two designs. Tests on customer checkout times conducted at two stores where the two new systems have been installed result in the following summary of the data.

$$\begin{array}{ll} \text{System A} & \text{System B} \\ n_1 = 100 & n_2 = 80 \\ \overline{x}_1 = 4.1 \text{ min} & \overline{x}_2 = 3.4 \text{min} \\ \sigma_1 = 2.2 \text{ min} & \sigma_2 = 1.5 \text{min} \end{array}$$

Test at the 0.05 level of significance to determine whether the populations mean checkout times of the two systems differ.

5. a) Solve the following LPP:

$$\begin{array}{ll} \text{Maximise} & Z = 20X_1 + 30X_2 \ ; \\ \text{Subject to} & 4X_1 + 3X_2 \leq 40; \\ & 2X_1 + 5X_2 \leq 28; \\ & 8X_1 + 2X_2 \leq 36 \\ \text{and} & X_1, X_2 \geq 0. \end{array}$$

OR

b) A departmental head has four subordinates and four tasks to be performed. The subordinates differ in efficiency and the tasks differ intrinsic difficulty. His estimates of the times that each man would take to perform each task are given below in matrix:

	Tasks			
Subordinate	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

Find the optimal assignments of tasks to subordinates so that the time is minimum.

6. a) A company has three factories at Amethi, Baghpat and Gwalior having production capacity of 5000, 6000 and 2500 tonnes

respectively. Four distribution centres at Allahabad, Bombay, Calcutta and Delhi requiring 6000 tonnes, 4000 tonnes, 2000 tonnes and 1500 tonnes respectively of the product. The transportation costs per tonne from different factories to different centers are given below:

Factories	Distribution Centers			
	Allahabad	Bombay	Calcutta	Delhi
Amethi	3	2	7	6
Baghpat	7	5	2	3
Gwalior	2	5	4	5

Find the transportation cost and the schedule of transportation.

OR

b) Find the optimal strategies for A and B in the following game. Also obtain the value of the game.

		B's strategy		
		b_1	b_2	b_3
	a_1	9	8	-7
A's strategy	a_2	3	-6	4
	a_3	6	7	-7

SECTION – C

7. Case Study   **1 x 10 = 10 M**

A television co. has three major departments to manufacture two of it's models A & B. The monthly capacities are given as follows:

	Per Unit time requirement		Hours available
	Model A	Model B	this month
Department I	4.0	2.0	1600
Department II	2.5	1.0	1200
Department III	4.5	1.5	1600

The marginal profit per unit from model A is Rs. 400 & that of model B is Rs.100. Assume that the company can sell any quantity of either product due to favorable market conditions. Formulate this as a linear programming problem and solve by graphic method for optimum output for both the models, the highest possible profit for this month & the slack time in the three departments.