Registration No. :

# First Semester Regular Examination – 2014

## QUANTITATIVE TECHNIQUES

### BRANCH : MBA

QUESTION CODE : H 461

Full Marks – 70

Time – 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
*The figures in the right-hand margin indicate marks.*

1.  Answer the following questions :                              2×10

    (a)  What does the non-negativity restriction mean ?

    (b)  Define iso-profit line.

    (c)  What is balanced transportation problem ?

    (d)  What is queing theory ?

    (e)  Define transition matrix.

    (f)  What is monte-caslo simulation ?

    (g)  Explain the meaning of saddle point.

    (h)  What is EMV ?

    (i)  Write two estimates used in the context of PERT.

    (j)  Why is the critical path of such importance in large project scheduling ?

2. Using Vogel's Approximation Method (VLAM), find the initial solution for the problem given below : 10

| Plants | Warehouses | | | Supply |
|--------|------|------|------|--------|
| | $W_1$ | $W_2$ | $W_3$ | |
| $P_1$ | 8 | 6 | 10 | 300 |
| $P_2$ | 12 | 16 | 10 | 400 |
| $P_3$ | 14 | 10 | 12 | 300 |
| Demand | 450 | 350 | 200 | 1000 |

3. What is an unbalanced assignment problem ? How is the Hungarian Assignment Method applied in respect of such a problem ? 10

4. Can there be a two-person Zero-sum gone which has a value of Zero ? If so, write the pay off matrix and find out the optimal strategies of the players. 10

5. A company manufactures 30 units per day. The sale of these items depends upon demand which has the following distribution :

| Sales (Units) | 27 | 28 | 29 | 30 | 31 | 32 |
|---------------|------|------|------|------|------|------|
| Probability | 0.10 | 0.15 | 0.20 | 0.35 | 0.15 | .05 |

The production cost and sales price of each unit are Rs. 40 and Rs. 50 respectively. Any unsold product is to be disposed off at a loss of Rs.15 per unit. There is a penalty of Rs. 5/- per unit if the demand is not met. Using the following random numbers, estimate the total profit / loss for the company for the next 10 days.

10, 99, 65, 99, 95, 01, 79, 11, 16, 20

If the company decides to produce 29 units per day, what is the advantage or disadvantage of the company ? 10

6. On an average 5 customers reach a barbers shop every hour. Determine the probability that exactly 2 customers will reach in a 30 minutes period, assuming that the arrivals follow poisson distribution. 10

7. One-half of Bhubaneswar city lives in the city and one-half in the suburbs. The initial condition of this system can be described as $Q(0) = [0.5, 05]$. There is an 80% chance that a suburban will remain in the suburbs and a 20% chance that he or she will move to the city within next year. A city dweller has a 50-50 chance of staying in the city or moving to the suburbs. The transition matrix of this process is as follows :

|  | Suburbs | City |
|---|---|---|
| Suburbs | 0.8 | 0.2 |
| Today | | |
| City | 0.5 | 0.5 |

$$= P$$

Determine the population distribution after one, two three and four years in both the city and the suburb. 10

8. What are the major comparative characteristics of the PERT model and the CPM model ? What are their limitations, if any ? Discuss. 10

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