Seat No. : _____

# JD-105

**January-2025**

## M.B.A.– I, Sem.-I

## Quantitative Analysis (QA)

**Time : 2:30 Hours]** **[Max. Marks : 70**

**Instructions :** (1) This paper contains **five** questions.
(2) **All** questions are compulsory.
(3) Question No. **2**, **3**, **4** have internal options.
(4) Figures in the right side in parenthesis indicate marks.
(5) Use of statistical tables and scientific calculator is allowed.

1. A research company has designed three different systems to clean up oil spills. The following table contains the results, measured by how much surface area (in square meters) is cleared in 1 hour. The data were found by testing each method in several trials. Are the three systems equally effective ? Use the 0.05 level of significance. **14**

(F Value = 3.89)

| | | | | | | |
|---|---|---|---|---|---|---|
| **System A** | 55 | 60 | 63 | 56 | 59 | 55 |
| **System B** | 57 | 53 | 64 | 49 | 62 | |
| **System C** | 66 | 52 | 61 | 57 | | |

2. (A) A multinational bank issuing Master Card is monitoring the use of credit card account holders in the context of their spending habits. A market survey shows that the average monthly spending of its regular card users is normally distributed with mean ₹ 2,800 and standard deviation ₹ 900. The customers are classified into four categories according to pattern of spending : **7**

(a) Category 1 spends less than ₹ 2,000

(b) Category 2 spends ₹ 2,000 or more but less than ₹ 3,000

(c) Category 3 spends ₹ 3,000 or more but less than ₹ 4,000

(d) Category 4 spends ₹ 4,000 or more

What proportion (probability) of customers would you expect to fall into each category ?

(B) A random sample of size 20 is taken, resulting in a sample mean of 16.45 and a sample standard deviation of 3.59. At level of significance of 0.05, test the hypothesis that Ho : $\mu = 16$ H1 : $\mu \neq 16$. **7**

**OR**

2. (A) Compute Mean and Standard Deviation from following table : **7**

| **Class** | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|---|
| **Freq.** | 4 | 12 | 18 | 28 | 19 | 14 | 5 |

(B) Write a detailed note on sampling techniques. **7**

3. Out of three, attempt any **two** :

(A) Construct a histogram and O-gives chart. **7**

(Graph paper not required)

| **Class** | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|---|
| **Freq.** | 4 | 12 | 18 | 28 | 19 | 14 | 5 |

(B) An economist believes that during the period of high economic growth, the US dollar appreciates with the probability 0.70, in moderate growth it appreciates with probability 0.40, in period of low growth it appreciates with probability 0.20. It is known that the probabilities of high growth, moderate growth and low growth are 0.30, 0.50 and 0.20. Use your Knowledge of Bayes' theorem to calculate revised probabilities. **7**

(C) Solve the following probability problems : **7**

(1) if n = 20 and p = .30, find P($x > 8$).

(2) if n = 20 and p = .70, find P($x < 12$).

(3) if n = 20 and p = .90, find P($x \leq 12$).

(4) if n = 15 and p = .40, find P($4 \leq x \leq 9$).

**OR**

3. (A) Write a detailed note on measures of central tendency. **7**

(B) Write a detailed note on steps of hypothesis testing. **7**

4. (A) Use the following data to determine the equation of the least square regression line, also calculate r-square : **7**

| | | | | | | |
|---|---|---|---|---|---|---|
| **X** | 5 | 7 | 3 | 16 | 12 | 9 |
| **Y** | 8 | 9 | 11 | 27 | 15 | 13 |

(B) According to Reuters, a survey undertaken by the National Center for Health Statistics revealed that about 25% of U.S. households have only a cell phone (no land line). According to the FCC, 65% of U.S. households have high-speed Internet. Suppose of U.S. households having only a cell phone, 80% have high-speed Internet. A U.S. household is randomly selected.

What is the probability that the household has only a cell phone and has high-speed Internet ? **7**

What is the probability that the household has only a cell phone or has high-speed Internet ?

What is the probability that the household has only a cell phone and does not have high-speed Internet ?

What is the probability that the household does not have just a cell phone and does not have high-speed Internet ? (**Hint :** Prob. Matrix)

**OR**

4. To see whether silicon chip sales are independent of where the U.S. economy is in the business cycle, data have been collected on the weekly sales of Zippy Chippy, a Silicon Valley firm, and on whether the U.S. economy was rising to a cycle peak, at a cycle peak, falling to a cycle trough, or at a cycle trough. The results are : **14**

(a) State the null and alternative hypotheses.

(b) Calculate the sample $\chi^2$ value.

(c) At the 0.10 significance level, what is your conclusion ? ($\chi^2$ Table = 10.645)

| **Economy** | **Weekly Chip Sales** | | | |
|---|---|---|---|---|
| | **High** | **Medium** | **Low** | **Total** |
| At Peak | 20 | 7 | 3 | 30 |
| At Through | 30 | 40 | 30 | 100 |
| Rising | 20 | 8 | 2 | 30 |
| Falling | 30 | 5 | 5 | 40 |
| **Total** | 100 | 60 | 40 | 200 |

5. Answer the following : (Any **Four**) **14**

(1) Null and Alternate Hypothesis

(2) Types of Probability

(3) Scatter diagram

(4) Measurement Scale

(5) EPPI and EVPI