**UPES**
UNIVERSITY OF TOMORROW

## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
### End Semester Examination, May 2023

Course: Advanced Statistics        Semester: II
Program: BBA ABD        Time: 03 hrs.
Course Code: DSQT2004        Max. Marks: 100

**Instructions: Attempt all questions**

### SECTION A    (10Qx2M=20Marks)

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Multiple choice questions | | |
| (i) | In a survey people are choosed from class friends or neighbor's for the purpose of knowing their preference for a certain brand of soft drink, is an example of <br> a) Convenience Sampling <br> b) Judgement Sampling <br> c) Cluster Sampling <br> d) Stratified Sampling | 2 | CO1 |
| (ii) | In Cluster sampling, population is divided into cluster or groups which are …….. in nature <br> a) Homogeneous <br> b) Heterogeneous <br> c) Both a & b <br> d) None of the above | 2 | CO1 |
| (iii) | Sampling is advantageous as it <br> a) Helps in reducing the volume of data. <br> b) Saves time, money and energy in data collection. <br> c) Helps in achieving higher degree of accuracy if population to be studied are homogeneous in nature <br> d) All the above | 2 | CO1 |
| (iv) | Partial correlation is used to measure: <br> a) The correlation between the third variable and the dependent variable <br> b) The association between more than two variables <br> c) The association between a dependent variable and multiple independent variables <br> d) The association between two variables while controlling for a third variable | 2 | CO1 |
| (v) | The rank correlation coefficient is always........................... | 2 | CO1 |

| | | | |
|---|---|---|---|
| | a) + 1<br>b) − 1<br>c) 0<br>d) d. Between + 1 and − 1 | | |
| (vi) | Which of the following is an example of a continuous probability distribution?<br>a) The Poisson distribution<br>b) The Binomial distribution<br>c) The Normal distribution<br>d) d. The Bernoulli distribution | 2 | CO1 |
| (vi) | Which of the following is an example of a discrete random variable?<br>a) The height of a person.<br>b) The temperature of a room.<br>c) The number of heads obtained in two coin tosses.<br>d) d. The weight of a fruit. | 2 | CO1 |
| (viii) | Six men and five women apply for an executive position in a small company. Two of the applicants are selected for an interview. Let X denote the number of women in the interview pool. We have found the probability mass function of X.<br><br>

| X=x | 0 | 1 | 2 |
|---|---|---|---|
| P(x) | 2/11 | 5/11 | 4/11 |

<br>The value of expectation of X will be.<br>a) 1<br>b) 0<br>c) 13/11<br>d) None of the above | 2 | CO1 |
| (ix) | The weights used in a quantity index are _____.<br>a) Quantity<br>b) Values<br>c) Price<br>d) None of the above | 2 | CO1 |
| (x) | Fisher's method of calculating the index number is based on the _____.<br><br>a) Geometric mean<br>b) Arithmetic mean<br>c) Harmonic mean<br>d) None of the above | 2 | CO1 |
| | **SECTION B (4Qx5M= 20)**<br>**Write short notes** | | |
| Q2 | Define scatter diagram. | 5 | CO2 |
| Q3 | Define Edgeworth-Marshall price index number. | 5 | CO2 |
| Q4 | Discuss any one non probability sampling method. | 5 | CO2 |
| Q5 | Define addition law of expectation. | 5 | CO2 |

| SECTION-C (3Qx10M=30 Marks) | | | |
|---|---|---|---|
| Q6 | A fair die is thrown. Prepare a probability distribution and find out the expected value of its outcomes. | 10 | CO3 |
| Q7 | Given below are the price and quantity data for two years relating to three commodities. | 10 | CO3 |

| Commodity | $p_0$ | $q_0$ | $p_1$ | $q_1$ |
|---|---|---|---|---|
| X | 10 | 40 | 15 | 60 |
| Y | 15 | 80 | 20 | 100 |
| Z | 20 | 20 | 25 | 40 |

Q7 (cont.): Calculate the Passche price index number for the above given data.

| Q8 | Write an equation that "best fits" the data in the table shown below. | 10 | CO3 |
|---|---|---|---|

| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Y | 1.5 | 3.8 | 6.7 | 9 | 11.2 | 13.6 | 16 |

| SECTION-D (2Qx15M= 30 Marks) | | | |
|---|---|---|---|
| Q9 | From the following data obtain $r_{12.3}$ | 15 | CO4 |

| $X_1$ | 20 | 15 | 25 | 26 | 28 | 40 | 38 |
|---|---|---|---|---|---|---|---|
| $X_2$ | 12 | 13 | 16 | 15 | 23 | 15 | 28 |
| $X_3$ | 13 | 15 | 12 | 16 | 14 | 18 | 14 |

| Q10 | ABC Manufacturing Company had produced a herbal tooth powder five years back and was marketing the same in rural Punjab. The company is about 20 years old and is producing various toiletry products in Punjab. It had a name in the rural markets of Punjab. The herbal Powder was launched only five years back and had shown a compound annual growth rate of 18 per cent. The CEO of the company, Mr Avtar Singh, was thinking of introducing the herbal tooth powder in the urban areas of Punjab.<br><br>Mr Singh got a preliminary research done with regard to the tooth powder market. The results of this research indicated that generally, people in urban areas preferred toothpaste instead of tooth powder. This was more so in case of young people below the age of 20 years. Mr Singh had a meeting with senior officials of the company and decided to get a research study conducted from a marketing research company with the following objectives:<br><br>• To estimate the proportion of population that used tooth powder. | 15 | CO4 |

- To understand the demographic and psychographic profile of people who used tooth powder.
- To understand the reasons for not using tooth powder.
- To get an understanding of the media habits of both the users and non-users of tooth powder.

The research team in the marketing research company defined the users of tooth powder as those who had bought tooth powder in the last six months. In order to select the users of tooth powder they conducted a preliminary study. A sample of 500 respondents was taken from Amritsar, Jalandhar, Ludhiana and Patiala. The results of the study indicated that out of the 500 respondents selected randomly, 20 per cent were below the age of 20. Out of the remaining 400 respondents, 30 per cent refused to participate in the study. Out of the remaining sample 60 per cent did not use tooth powder, 30 per cent bought it only once in a year or two and only 10 per cent of the respondents bough: it at least once in six months. The cost of sampling 500 respondents was Rs. 40,000/-.

The company wanted to select 200 users from both Amritsar and Ludhiana, whereas 100 respondents were to be selected from Jalandhar and Patiala each. The remaining 300 users were to be selected from the remaining urban semi-urban towns of Punjab. In brief, the marketing research company wanted a total sample of 900. It was argue
that a large sample should be taken from larger cities.

A total budget of Rs. 4,00,000/- was allocated for the research, out of which Rs. 2,50,000/- was for the purpose of field work. One of the members of the research team indicated that the total budget for the field work would not be sufficient to get the desired number of users of tooth powder. He suggested that chemist shops and 'General Kirana Stores.

A) Will the money allocated for the fieldwork be sufficient to get the desired size of the sample from various towns of Punjab as mentioned in the case?
B) If the amount is not sufficient, how many users can be contacted with the given budget?