**SHAHJALAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**Sub: Statistics, Course No. STA 213 (for FET)**

**Course Name: Statistics**

**Credit: 03; Full Marks: 70; Time: 3 hours**

[N.B. All questions bear equal marks. Answer any four questions]

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| 1. | (a) | Define and distinguish between (i) Population and Sample (ii) variable and attribute. Also define frequency distribution, and write short note on graphical representation of data. |
|  | (b) | Define median and mode. Discuss in which situation we use median and mode as a measure of central tendency. |
|  | (c) | What do you mean by scatteredness of a data set? Describe the use of coefficient of variation over standard deviation. Show that the variance of first n-natural number is . |
| 2. | (a) | What is central tendency? What are different measures of central tendency? Which measure do you consider the best and why? |
|  | (b) | 61 76 56 58 68 64 58 45 43 72  86 57 65 63 65 73 66 59 33 49  34 71 66 66 55 35 31 29 27 25  22 28 67 75 66  (i) Construct a frequency distribution from the above data by choosing appropriate length of class interval.  (ii) Calculate mean, median and mode from the frequency distribution. |
|  | (c) | For a set of n observations, prove that  (i) Sum of deviation from mean is zero  (ii) Sum of squares of deviation of a set of observations is minimum when the deviations are taken from arithmetic mean. |
| 3. | (a) | What is a measure of dispersion and why do you need such a measure at all? What are the important measures of dispersion? Discuss their relative merits and demerits. |
|  | (b) | Calculate coefficient of variation from the following frequency distribution:  Class Interval: 0-10 10-20 20-30 30-40 40-50 50-60  Frequency : 5 8 12 17 10 8 |
|  | (c) | If and S denote the mean and standard deviation respectively for m non-negative quantities x1, x2, ......., xm, then show that |
| 4. | (a) | Define correlation and correlation coefficient. |
|  | (b) | Show that correlation coefficient is independent of change of origin and scale. Also show that correlation coefficient is the geometric mean of regression coefficients. |
|  | (c) | Obtain the coefficient of correlation of the following data and comment on it.  Income: 140 130 132 128 120 105 112 121 136  Expenditure: 142 120 135 120 110 100 110 120 130 |
| 5. | (a) | Explain the principle of least-square method. Set up a simple linear regression model stating the assumptions involved and estimate the parameters by least-square method. |
|  | (b) | The data on height (in cm) (X) and weight (in kg) (Y) of 10 boys are given below:  X: 140 138 130 128 125 124 127 128 136 147  Y: 35 32 28 27 23 22 20 26 32 40  (i) Fit a regression line of weight on height. Comment on the result.  (ii) Estimate the weight when height would be 170 cm. |
| 6. | (a) | Define classical probability. What are the limitations of classical probability? What do you mean by conditional probability? |
|  | (b) | A fair coin is tossed three times. Write down the sample space and find the probability that (i) exactly two head occurs, (ii) exactly one tail occurs, and (iii) all three shows the same. |
|  | (c) | Define discrete random variable and continuous random variable. A coin is tossed two times in which the probability of head is twice as the probability of tail. If the number of head is random variable, say X, find the probability function of X. |
| 7. | (a) | Distinguish between probability mass function and probability density function. |
|  | (b) | Define binomial distribution. What it is called so binomial? Under what condition binomial distribution tends to Poisson distribution? |
|  | (c) | Find the binomial distribution for which the mean is 4 and standard deviation is . |
|  | (d) | Define normal distribution. Describe the uses of normal distribution. |

…Good Luck…

**Sub: Statistics, Course No. STA-202 (for CSE)**

**Course Name: Basic Statistics and Probability**

**Credit: 04; Full Marks: 70; Time: 3 hours**

[N.B. All questions bear equal marks. Answer any four questions]

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| 1. | (a) | Explain the concepts (i) Population and Sample (ii) Primary and secondary data |
|  | (b) | What do you mean by presentation of statistical data? What are the various methods of presenting statistical data? |
|  | (c) | 61 76 56 58 68 64 58 45 43 72  86 57 65 63 65 73 66 59 33 49  34 71 66 66 55 35 31 29 27 25  22 28 67 75 66  (ii) Construct a frequency distribution from the above data by choosing appropriate length of class interval.  (iii) Calculate mean, median and mode from the frequency distribution. |
| 2. | (a) | What do you mean by dispersion? Discuss briefly the various measures of dispersion? Which measure do you like best and why? |
|  | (b) | Calculate mean, standard deviation, and coefficient of variation from the following frequency distribution:  Class Interval: 0-10 10-20 20-30 30-40 40-50 50-60  Frequency : 5 8 12 17 10 8 |
|  | (c) | Define skewness and kurtosis of a distribution. How do you measure such criteria? |
| 3. | (a) | Define correlation and correlation coefficient. |
|  | (b) | Show that correlation coefficient is independent of change of origin and scale. Also show that correlation coefficient is the geometric mean of regression coefficients. |
|  | (c) | Obtain the coefficient of correlation of the following data and comment on it.  Income: 1400 1300 1320 1280 1200 1050 1127 1218 1360  Expenditure: 1425 1200 1350 1200 1100 1000 1100 1200 1300 |
| 4. | (a) | Explain the principle of least-square method. Set up a simple linear regression model stating the assumptions involved and estimate the parameters by least-square method. |
|  | (b) | The data on height (in cm) (X) and weight (in kg) (Y) of 10 boys are given below:  X: 140 138 130 128 125 124 127 128 136 147  Y: 35 32 28 27 23 22 20 26 32 40  (i) Fit a regression line of weight on height. Comment on the result.  (ii) Estimate the weight when height would be 170 cm. |
| 5. | (a) | Define the following terms with suitable examples: (i) Sample space (ii) Mutually exclusive events (iii) Probability of an event (iv) Random variable (v) Mathematical expectation of a random variable |
|  | (b) | State and prove the multiplicative law of probability for any two events. |
|  | (c) | When two events are said to be independent? Let A and B be two possible outcomes of an experiment and suppose P(A) = 0.4, P(AUB)=0.7 and P(B) = p.  (i) For what choice of p are A and B mutually exclusive (ii) for what choice of p are A and B independent. |
| 6. | (a) | Distinguish between probability function and probability density function. Define binomial distribution. Cite two examples in real life where this distribution can be successfully employed. What are the conditions that a binomial variate must satisfy? |
|  | (b) | Derive the p.d.f. of binomial distribution. Obtain the mean and variance of this distribution and show that the mean is greater than the variance. |
|  | (c) | Suppose in a large population, 16% of the members are left-handed. In a random sample of size 10, find (i) the probability of two or more persons will be left-handed (ii) between two and four persons will be left-handed. |
| 7. | (a) | Explain the concepts of Markov chain and Markov process. |
|  | (b) | What is a queuing system? Explain the basic characteristics of a queuing system. |
|  | (c) | Suppose, in a railway station, there is only one reservation counter. Customers arrive at the rate of 32 persons per hour and the clerk can handle 40 persons per hour. If the arrival and services follow Poisson Process, find (i) the average number of customers in the system. (ii) how long in an arriving customer expected to wait before starting service? (iii) the probability of at least one customer in the system. |

…Good Luck…

**Term Test -2**

B.Sc. (Honours) 2nd Year 2nd Semester Examination, 2012

Sub: Statistics, Course No. STA 213 (for FET Dept)

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| 1. | (a) | Explain the concepts (i) Population and Sample (ii) Primary and secondary data |
|  | (b) | What do you mean by presentation of statistical data? What are the various methods of presenting statistical data? |
|  | (c) | 61 76 56 58 68 64 58 45 43 72  86 57 65 63 65 73 66 59 33 49  34 71 66 66 55 35 31 29 27 25  22 28 67 75 66  (i) Construct a frequency distribution from the above data by choosing appropriate length of class interval.  (ii) Calculate mean, median and mode from the frequency distribution. |
| 2. | (a) | What are the measures of dispersion? Why do you need such a measure at all? |
|  | (b) | Define co-efficient of variation. Is it considered superior to standard deviation? Give reasons. Find co-efficient of variation of first n natural numbers. |
|  | (c) | Two workers on the same job show the following results over a period of time:  Completion of Work Worker A Worker B  Mean time 32 27  Standard Deviation 8 6  Which worker appears to be consistent? |

SHAHJALAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

Sub: Statistics, Course No. STA 205e (for PSS Dept)

Course Name: Statistics for Social and Political Research II

Credit: 03; Full Marks: 70; Time: 3 hours

[N.B. All questions bear equal marks. Answer any FIVE questions taking at least TWO from each Group]

**GROUP - A**

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| 1. | (a) | Define correlation. How do you measure the direction and strength of correlation between two variables? |
|  | (b) | What is scatter diagram? Interpret the following value of r through scatter diagram:  r=0, r=+1, and r=-1. |
|  | (c) | The values of X and Y are given below:   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X: | 40 | 38 | 30 | 28 | 25 | 24 | 27 | 28 | 36 | 23 | | Y: | 35 | 32 | 28 | 27 | 23 | 22 | 20 | 26 | 32 | 24 |   Find the coefficient of correlation and hence comment on the result. |
| 2. | (a) | What is time series? What are the uses of time series in economic analysis? |
|  | (b) | What are the components of time series? Mention the methods for measuring trend. Describe the moving average method. |
|  | (c) | Determine the trend of the following series by least squares or 3-year moving average method:   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Year | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | | Production | 100 | 110 | 115 | 110 | 120 | 130 | 125 | 127 | 130 | 135 | 140 | 145 | |
| 3. | (a) | Define the terms: (i) Probability of an event (ii) Random variable (iii) Mathematical expectation of a random variable(iv) Probability function and probability density function |
|  | (b) | State and prove the multiplicative law of probability for any two events. |
|  | (c) | When two events are said to be independent? Let A and B be two possible outcomes of an experiment and suppose P(A) = 0.4, P(AUB)=0.7 and P(B) = p.  (i) For what choice of p are A and B mutually exclusive (ii) for what choice of p are A and B independent. |
| 4. | (a) | Define random variable with examples. Distinguish between discrete random variable and continuous random variable. |
|  | (b) | Distinguish between probability mass function and probability density function. Mention their properties. |
|  | (c) | Suppose X is a discrete random variable with probability function:  X: 0 1 2  P(X): k 2k k  Find (i) the value of k, (ii) P(X=1) and P(X>0). |
|  |  | **GROUP - B** |
| 5. | (a) | Define binomial distribution. What are the conditions that a binomial variate must satisfy?. |
|  | (b) | Suppose the mean and standard deviation of binomial distribution is 75 and 5. Determine the probability function of binomial distribution. |
|  | (c) | Suppose in a large population, 40% of the members are left-handed. In a random sample of size 10, find (i) the probability of two or more persons will be left-handed (ii) between two and four persons will be left-handed. |
| 6. | (a) | What are the conditions that a Binomial variate tends to Poisson variate?  Find the mean and variance of Poisson distribution. |
|  | (b) | In a production company of computer chips, 2% of the produced items were found defective. Out of 500 produced chips, find the probability that (i) there will be no defective (ii) there will be more than 2 defective items. |
|  | (c) | What is a standard normal variate? State the important features of normal distribution. |
| 7. | (a) | Explain the concepts (i) statistical hypothesis (ii) size of the test (iii) critical region (iv) power of the test (v) test statistic. |
|  | (b) | Mention the steps of performing test of a hypothesis. |
|  | (c) | Discuss how would you test the following hypothesis: |
| 8. | (a) | Explain the concept of census and sample survey? Why sample survey is preferred over census? |
|  | (b) | What is sampling? What are the popular methods of probability sampling? Distinguish between stratified random sampling and cluster sampling. |
|  | (c) | What do you mean by primary and secondary data? Describe in brief the steps involved in the construction of a questionnaire. |

…Good Luck…