**MATHEMATICS AND STATISTICS (ES 1043)**

**Question Bank_Statistics**

| Q.1 | Attempt the following |
|---|---|
| 1 | The data set below gives the waiting time (in minutes) of several people having the oil changed in their car at an auto mechanics shop. 22, 18,25,21,28,26,20,28,20<br>Mean = _____ , Median = _____ , Mode = _____ |
| 2 | Suppose a researcher is concerned with a nominal scale that identifies users versus nonusers of bank credit cards. The measure of central tendency appropriate to this scale is the<br>A) mean B) median C) mode D) average E) range. |
| 3 | The variance<br>A) is a poor index of the degree of dispersion.<br>B) has a major drawback because it reflects a unit of measurement that has been squared.<br>C) is the squared root of the standard deviation.<br>D) is the average deviation squared. |
| 4 | In statistics out of 100, marks of 21 students in final exams are as 90, 95, 95, 94, 90, 85, 84, 83, 85, 81, 92, 93, 82, 78, 79, 81, 80, 82, 85, 76, 85 then mode of data is<br>A)85 B) 95 C) 90 D)81 |
| 5 | The standard deviation of a sample of 100 observations equals 64. The variance of the sample equals<br>a) 8 b) 10 c) 6,400 d) 4,096 e) None of the above answers is correct. |
| 6 | Which of the following is not a measure of dispersion?<br>a. the range b. the 50th percentile c. the standard deviation<br>d. the inter quartile range e. the variance |
| 7 | The measure of dispersion that is influenced most by extreme values is<br>a. the variance b. the standard deviation c. the range<br>d. the inter quartile range e. None of the above answers is correct. |
| 8 | The mean of 100 observations is 50 and their standard deviation is 5. The sum of all squares of all the observations is<br>(A) 50000 (B) 250000 (C) 252500 (D) 255000 |
| 9 | Data collected for muscle pain due to arthritis is of which type?<br>A) Nominal B) Interval C) Ratio D) Ordinal |
| 10 | The mean of the distribution is $13$ , median is $16$ and standard deviation is $4.36$ , the distribution is<br>A) positively skewed B) Skewed C) negatively skewed D) asymptotic |
| 11 | Suppose a researcher is concerned with a nominal scale that identifies users versus nonusers of bank credit cards. The measure of central tendency appropriate to this scale is the<br>A) mean B) median C) mode D) average E) range. |
| 12 | Which of the following describes categorical set of data<br>A) Variability B) Shape C) Percentage D) Centre |
| 13 | Which of the following statistical measure is not a representative in Box Plot?<br>A) Range B) Median C) Mean D) Quartiles |
| 14 | Which of the following is Interval type variable<br>A) Weight B) Temperature in Kelvin<br>C) Color of hairs D) Temperature in Fahrenheit |
| 15 | A random variable $X$ has expectation $2.5$ , then the expectation of $\frac{2X+5}{5}$ is<br>A) 2 B) 5 C) 2.5 D) 10 |
| 16 | Mode is a best measure of central tendency for --------- variable<br>A) Interval B) Nominal C) Ordinal D) Ratio |

17 The mean of a distribution is 23, the median is 24, and the mode is 25.5. It is most likely that this distribution is:

A) Positively Skewed B) Symmetric C) Negatively Skewed D) Asymptotic

18 Which of the following is not a probability mass function of a discrete random variable?

A)

| $X$ | 0 | 1 | 2 |
|---|---|---|---|
| $p(X=x)$ | $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{1}{4}$ |

B)

| $X$ | $-1$ | 0 | 1 | 2 |
|---|---|---|---|---|
| $p(X=x)$ | 0.3 | 0.2 | 0.4 | 0.1 |

C) $p(X=x)=\frac{1}{2^x},\ x=1,2,3,\cdots\infty$

D)

| $X$ | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| $p(X=x)$ | 0.2 | 0.1 | 0.5 | 0.1 | 0.2 |

19 Which of the following describes a categorical data?

A) Frequency B) Centre C) Shape D) Percentage E) Proportion of each category

20 Which of the following graphical representation is used for numerical variable?

A) Bar Diagram B) Histogram C) Pie Chart D)Box Plot

Q.2 Attempt the following

1 If $X$ is a random variable the difference between heads and tails obtained when a fair coin is tossed 3 times. What are the possible values of $X$ and its probability mass function? Also write the distribution function of $X$ .

2 A fair dice is rolled twice. Find the possible values of random variable $X$ and its associated probability mass function, where $X$ is the maximum of the values appearing in 2 rolls.

3 A random variable $X$ takes values $-3, -1, 2, 5$ with respective probabilities $\frac{2k-3}{10}, \frac{k+1}{10}, \frac{k-1}{10}$ and $\frac{k-2}{10}$ . Determine the distribution of $X$ .

| | |
|---|---|
| 4 | A random variable $X$ has probability mass function (pmf) shown in the following tabular form. Find the value of unknown $k$. Hence write pmf and cdfof $X$. Draw graphs of pmf and cdf. Also find i) $p(1 \le X < 3)$ ii) $p(1 < X \le 3)$<br>iii) $p(X < 1)$ iv) $p(X > 5)$ |
| 5 | Determine $k$ such that the following functions are p.m.f.s<br>i) $P(x) = k\,x, \quad x = 1, 2, 3, \ldots, 10$ ii) $P(x) = k\dfrac{2^x}{x!}, \quad x = 0, 1, 2, 3$<br>iii) $P(x) = k(2x^2 + 3x + 1), x = 0, 1, 2, 3$ |
| 6 | A random variable has mean 2 and standard deviation $\dfrac{1}{2}$. Find<br>i) $E(2X - 1)$ ii) $Var(X + 2)$ iii) $sd\left(\dfrac{3X - 1}{-4}\right)$ |
| 7 | A sample space of size 3 is selected at random from a box containing 12 items of which 3 are defective. Let X denote the number of defective items in the sample. Write the probability mass function and distribution function of X. Find the expected number of defective items. |
| 8 | A player tosses two fair coins. The player wins \$2 if two heads occur, and \$1 if one head occur. On the other hand, the player losses \$3 if no heads occur. Find the expected gain of the player. Is the game Favorable to the player? |