Name of Student: …………………………Date: ..…………………..

Student ID No. …………………… Course/Class …......…Branch……….

Midterm Examination – 2014
STATISTICS (STAT-101)

Time: 1 Hour **MM: 25**

Section-I

Part -I

Answer all the questions on the same question paper.

<u>State whether the following statements are True or False</u>. *(5 marks, 1 Mark Each)*

1. The <mark>weights</mark> of supermodels are Categorical Data. False

2. Temperature of a cup of coffee is discrete variable. False

3. Standard Deviation of standard normal variate is zero. False

4. A discrete probability distribution assigns a probability to each value of the random variable. True

5. Mean and variance for Poisson distribution are equal. True

Part-II (Multiple Choice Questions)   *(5 marks, 1 Mark Each)*

1. A statistical data consists of names or labels is called
    a. Quantitative data
    b. Categorical
    c. Qualitative data
    d. b and c both

2. A line graph that depicts cumulative frequencies is called a
    a. Histogram
    b. Ogive
    c. Pie-chart
    d. Scatter Diagram

3. The sum of deviations about the mean is always:
    a. Zero
    b. Range
    c. Positive
    d. Negative

4. The events A and B are mutually exclusive, if P(A)=0.7, P(B)=0.2 and
    $P(A \cap B) = 0.4$, then P(A or B) will be
    a. 0.10
    b. 0.9
    c. 0.15
    d. 0.41

5. Which of the following statements is/are true regarding the normal
    distribution curve?
    a. it is symmetrical
    b. it is bell-shaped
    c. its mean, median and mode are located at the same point
    d. all of the above statements are true

MCQ	1	2	3	4	5
Answers					

Section-II

SHORT ANSWER TYPE QUESTIONS   (10 marks, 2 Marks Each)

1. What is the difference between parameter and statistic?

Answer.
    A numerical measurement describing some characteristic of a population is called parameter while a numerical measurement describing some characteristic of a sample is called statistic.

2. If the mean of a normal distribution is 85 and its standard deviation is 3.5, then find the z-score of the data value 90.25.

Solution:

$$z = \frac{90.25 - 85}{3.5} = \boxed{1.5}$$

3. The mean of a sample contains 6 values is equal 5, The values are :
3,8,6,5,7, X .Find the missing value X.

Solution:

$$\text{Mean} = \bar{X} = \frac{3+8+6+5+7+x}{6}$$

$$5 = \frac{29+x}{6} \; ; 30 = 29 + x \; ; \; x = 1$$

4. Calculate the relative frequency and cumulative frequency and percent frequency

Solution :

Degrees	Frequency	Relative Frequency	Percent Frequency
None	2	0.08	8
Bachelor	11	0.44	44
Master	7	0.28	28
Doctorate	5	0.20	20
Total	25	1.00	100

5. A person tosses a coin three times and records whether it comes up heads or tails.

      a) What is the probability of tossing exactly two heads in three tosses?
      b) What is the probability of tossing at least one head in three tosses?

Solution:

The set of all possible outcomes $= 8 = 2^3$

    {HHH, TTT, HHT, TTH, HTH, THT, HTT, THH}

a)
    P(2 heads) = 3/8 = .375
    binomial formula (Table) can be used also: $0.375 = \frac{3!}{(3-2)!2!} * 0.5^2 * 0.5^1$

b) P(at least 1 head) = 1- P(no Heads) = 7/8 = .875
    binomial formula (Table) can be used also

    P(no Heads)= $\frac{3!}{(3-0)!0!} * 0.5^0 * 0.5^3$ =0.125

    P(at least 1 head) = 1-0.125 = 0.875

Section-III

Attempt any one of the following Essay Type Questions   (5 Marks)

Q 2. Consider the following three data sets A, B and C.

A = {9,10,11,7,13}

B = {10,10,10,10,10} and

C = {1,1,10,19,19}

Find
a. Calculate the mean of each data set.
b. Calculate the standard deviation of each data set.

Solution:

a. mean of Data set A = (9+10+11+7+13)/5 = 10

mean of Data set B = (10+10+10+10+10)/5 = 10

mean of Data set C = (1+1+10+19+19)/5 = 10

b.

Standard Deviation Data set A

$= \sqrt{[\ (\ (9\text{-}10)^2+(10\text{-}10)^2+(11\text{-}10)^2+(7\text{-}10)^2+(13\text{-}10)^2\ )/5\ ]} = 2$

Standard Deviation Data set B

$= \sqrt{[\ (\ (10\text{-}10)^2+(10\text{-}10)^2+(10\text{-}10)^2+(10\text{-}10)^2+(10\text{-}10)^2\ )/5\ ]} = 0$

Standard Deviation Data set C

$= \sqrt{[\ (\ (1\text{-}10)^2+(1\text{-}10)^2+(10\text{-}10)^2+(19\text{-}10)^2+(19\text{-}10)^2\ )/5\ ]} = 8.05$

Or

Q1'. Find the mean and variance of the number of points obtained in a throw of a fair die.

Solution :

Let x denote the number of points obtained in a throw. Then, probability distribution of x is –

X	1	2	3	4	5	6
P(X=x)	1/6	1/6	1/6	1/6	1/6	1/6

Mean: $\mu = E[X] = \sum_x x \cdot P(x) = 1\left(\frac{1}{6}\right) + 2\left(\frac{1}{6}\right) + 3\left(\frac{1}{6}\right) + 4\left(\frac{1}{6}\right) + 5\left(\frac{1}{6}\right) + 6\left(\frac{1}{6}\right) = \frac{21}{6} = 3.5$

Variance: $\sigma^2 = Var[X] = \sum_x (x - \mu)^2 \cdot P(x) = (1-3.5)^2\left(\frac{1}{6}\right) + (2-3.5)^2\left(\frac{1}{6}\right) + ... + (6-3.5)^2\left(\frac{1}{6}\right) = 2.9167$

OR

$E[X^2] = \sum_x x^2 \cdot P(x) = 1^2\left(\frac{1}{6}\right) + 2^2\left(\frac{1}{6}\right) + 3^2\left(\frac{1}{6}\right) + 4^2\left(\frac{1}{6}\right) + 5^2\left(\frac{1}{6}\right) + 6^2\left(\frac{1}{6}\right) = \frac{91}{6} = 15.1667$

Variance: $\sigma^2 = Var[X] = E[X^2] - E[X]^2 = 15.1667 - 3.5^2 = 15.1667 - 12.25 = 2.9167$