**Karunya University**
**(Karunya Institute of Technology and Sciences)**
(Declared as Deemed to be University under Sec.3 of the UGC Act, 1965)

**End Semester Examinations - 2015-16 Even Semester - May 2016**

**14MA2008 Probability and Statistics**

**Set A**

**Time : 3 hrs**
**Total Marks: 100**

1. (a) Calculate the mean , median and mode for the following distribution

| Class: | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 |
|---|---|---|---|---|---|---|
| Frequency: | 14 | 17 | 22 | 26 | 23 | 18 |

(10 marks)

(b) Find the Quartile deviation from the following data

| Class: | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 |
|---|---|---|---|---|---|
| Frequency: | 8 | 10 | 12 | 8 | 4 |

(10 marks)

**OR**

2. (a) Calculate correlation coefficient from the following data

| X: | 10 | 14 | 18 | 22 | 26 | 30 |
|---|---|---|---|---|---|---|
| Y: | 18 | 12 | 24 | 6 | 30 | 36 |

(10 marks)

(b) Find the two lines of regression for the following data:

| X: | 25 | 28 | 35 | 32 | 31 | 36 | 29 | 38 | 34 | 32 |
|---|---|---|---|---|---|---|---|---|---|---|
| Y: | 43 | 46 | 49 | 41 | 36 | 32 | 31 | 30 | 33 | 39 |

(10 marks)

3. (a) A and B alternately throw a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, show that his chance of winning is $\frac{30}{61}$.
(10 marks)

(b) The chances of A, B and C becoming the general manager of a certain company are in the ratio 4: 2: 3. The probabilities that the bonus scheme will be introduced in the company if A, B and C become the general manager are 0.3, 0.7 and 0.8. If the bonus scheme has been introduced, what is the probability that A has been appointed as general manager?
(10 marks)

**OR**

4. (a) If a random variable X has the following probability distribution (10 marks)

| $x$ | −2 | −1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| $p(x)$ | 0.1 | k | 0.2 | 2k | 0.3 | 3k |

Find (i) the value of k (ii) Evaluate $P(X < 2)$ and $P(-2 < X < 2)$
(iii) Evaluate the mean, variance of X

(b) The joint probability mass function of (X, Y) is given by $f(x, y) = k(2x + 3y)$, $x = 0, 1, 2$; $y = 1, 2, 3$. Find (i) the value of k (ii) all the marginal and conditional probability distributions. (iii) The probability distribution of X +Y (10 marks)

5. (a) A machine manufacturing screws is known to produce 5 % defectives. In a random sample of 15 screws using binomial distribution find the probability that
   (i) Exactly there are 3 defectives.
   (ii) Not more than are 3 defectives
   (iii) Atleast 3 defectives (10 marks)

(b) Fit a Poisson distribution to the following data and find theoretical frequencies.

| X: | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| F: | 43 | 38 | 22 | 9 | 1 |

(10 marks)

**OR**

6. (a) In a test on 2000 electric bulbs it was found that the life of a particular make was normally distributed with an average life 2040 hours and SD of 60 hours. Estimate the number of bulbs likely to burn for

(i) Less than 1950 hours.
(ii) More than 2150 hours
(iii) Between 1950 hours and 2150 hours (10 marks)

(b) Fit a Binomial distribution to the following data and find theoretical frequencies.

| X: | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| F: | 5 | 18 | 28 | 12 | 7 | 6 | 4 |

(10 marks)

7. (a) In a city, a sample of 1000 people were taken, and out of them, 540 are vegetarian and the rest are non – vegetarians. Can we say that both habit of eating are equally popular? (10 marks)

(b) A simple sample of heights of 6400 English men has a mean of 170 cm and an SD of 6.4 cm, while a simple sample of heights of 1600 Americans has a mean of 172 cm and an SD of 6.3 cm. Do the data indicate that Americans are, on the average, taller than the English men? (10 marks)

**OR**

8. (a) A group of 10 rats fed on Diet A and another group of 8 rats fed on diet B recorded the following increase in weight.

| Diet A: | 5 | 6 | 8 | 1 | 12 | 4 | 3 | 9 | 6 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Diet B: | 2 | 3 | 6 | 8 | 1 | 10 | 2 | 8 | | |

Find if the variances are significantly different. (10 marks)

(b) Over a period of time, the number of aircraft accidents that occurred on the different days of a week were noted with the following result.

| Day: | Mon | Tues | Wed | Thurs | Fri | Sat | Sun |
|---|---|---|---|---|---|---|---|
| F: | 16 | 8 | 12 | 11 | 9 | 14 | 14 |

(10 marks)

9. Set up analysis of variance for the following results of a Latin Square Design. (20 marks)

| | | | |
|---|---|---|---|
| A12 | C19 | B10 | D8 |
| C18 | B12 | D6 | A7 |
| B22 | D10 | A5 | C21 |
| D12 | A7 | C27 | B17 |

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**Wishing you All the Best**

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