Code: 9FBS101

MCA I Semester Supplementary Examinations August 2014
PROBABILITY & STATISTICS
(For students admitted in 2009, 2010, 2011, 2012 & 2013 only)

Time: 3 hours   Max. Marks: 60

Answer any FIVE questions
All questions carry equal marks

1. (a) A book containing 100 pages is opened at random. Find the probability that on the page: (i) A doublet is found,   (ii) A number whose sum of the digits is 10.
    (b) (i) Define conditional probability.
         (ii) Companies B_1, B_2, B_3 produce 30%, 45% and 25% of the cars respectively. It is known that 2%, 3% and 2% of the cars produced from B_1,B_2, and B_3 are defective then what is the probability that a car purchased is defective.

2. (a) (i) Define random variable.
         (ii) A random variable x has the following probability function:

x	0	1	2	3	4	5	6	7	8
p(x)	$\frac{k}{45}$	$\frac{k}{15}$	$\frac{k}{9}$	$\frac{k}{5}$	$\frac{2k}{45}$	$\frac{6k}{45}$	$\frac{7k}{45}$	$\frac{8k}{45}$	$\frac{4k}{45}$

Then determine: (i) k (ii) mean   (iii) variance and (iv) standard deviation.
    (b) A trouble shooting capability of an IC chip in a circuit is a random variable x whose distribution function is given by:
$$F(x) = \begin{cases} 0, & \text{for } x \leq 3 \\ 1 - \frac{9}{x^2} & \text{for } x > 3, \end{cases}$$

where x denote the number of years. Find the probability that the IC chip will work properly.
(i) Less than 8 years   (ii) Beyond 8 years
(iii) Anywhere from 5 to 7   (iv) Anywhere from 2 to 5 years.

3. (a) Derive mean and variance of the binomial distribution.
    (b) The marks obtained in mathematics by 1000 students are normally distributed with mean 78% and standard deviation 11%.
         Determine:
         (i) How many students got marks above 90%?
         (ii) What were the highest marks obtained by the lowest 10% of the students?
         (iii) Within what limits did the middle of 90% of the students lie?

4. (a) A population consists of six numbers 4, 8, 12, 16, 20 & 24. Consider all samples of size two which can be drawn without replacement from this population.
         Find:
         (i) The population mean.
         (ii) The population S.D.
         (iii) The mean of the sampling distribution of means.
         (iv) The S.D. of the sampling distribution of means.
    (b) Write the properties of χ^2- distribution.

5. (a) A random sample of size 81 was taken whose variance is 20.25 and mean is 32. Construct 98% confidence interval.

   (b) Determine 99% confidence interval for the mean of contents of soft drink bottles if contents of 7 such soft drink bottles are 10.2, 10.4, 9.8, 10, 9.8, 10.2, 9.6 ml.

6. (a) Write about null hypothesis and testing of null hypothesis.

   (b) The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5 inches?

7. (a) Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results:

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	28

   Test whether the two horses have the same running capacity.

   (b) The following figures show the distribution of digits in numbers chosen at random from a telephone directory:

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

   Test whether the digits may be taken to occur equally frequently in the directory.

8. (a) Explain the method of least squares.

   (b) Calculate the Pearson's coefficient of correlation between the variables x and y.

X	11.1	10.3	12.0	13.7	14.2	14.8	15.1	15.3	17.3	18.5
Y	10.9	14.2	13.8	13.2	19.3	17.4	21.5	19.0	16.4	21.1

   *****