Code: 9FBS101

MCA - I Semester Supplementary Examinations, August/September 2012
**PROBABILITY AND STATISTICS**
(For students admitted in 2009, 2010 & 2011 only)

Time: 3 hours                                                         Max Marks: 60

Answer any FIVE questions
All questions carry equal marks
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1  (a)  State and prove the addition theorem of probability for n-events.
   (b)  Box A contains 5 red and 3 white marbles and box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of same colour?

2  (a)  If X and Y are two discrete random variables, then show that E(x+y) = E(x) + E(y) provided E(x) and E(y) exist.
   (b)  Let X denote the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the expectation and variance.

3  (a)  If X is a Poisson variate such that $P(x = 0) = P(x = 1)$, find $P(x = 0)$ and using recurrence formula find the probabilities at $x = 1,2,3,4 \ and \ 5$.
   (b)  Derive the mode and median of the normal distribution.

4       If the population is 3, 6, 9, 15, 27.
   (a)  List all possible samples of size 3 that can be taken without replacement from the finite population.
   (b)  Calculate the mean of each of the sampling distribution of means.
   (c)  Find the standard deviation of sampling distribution of means.

5  (a)  Suppose that we observe a random variable having the binomial distribution and get X successes in n trials.
        (i) Show that $\frac{x}{n}$ is an unbiased estimate of the binomial parameter P.
        (ii) Show that $\frac{x+1}{n+2}$ is not an unbiased estimate of the binomial parameter P.
   (b)  Find 95% confidence limits for the mean of a normality distributed population from which the following samples was taken 15,17,10,18,16,9,7,11,13,14.

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6  (a)  In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers?

   (b)  A sample of 105 iron bars whose mean length is 10 ft. is drawn. Is it drawn from a population whose mean is 12 ft. and standard deviation is 4 ft.

7       Given the following contingency table for hair colour and eye colour find the value of $\chi^2$. Is there good association between the two?

|            |       | Hair Colour | | | |
|            |       | Fair | Brown | Black | Total |
|---|---|---|---|---|---|
|            | Blue  | 15 | 5  | 20 | 40 |
| Eye Colour | Grey  | 20 | 10 | 20 | 50 |
|            | Brown | 25 | 15 | 20 | 60 |
|            | Total | 60 | 30 | 60 | 150 |

8       The following table shows the age X and systolic blood pressure Y of 12 women.
   (a)  Find the correlation coefficient between X and Y.
   (b)  Determine the least square regression equation of Y on X.

| Age X | 56 | 42 | 72 | 36 | 63 | 47 | 55 | 49 | 38 | 42 | 68 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Blood pressure | 147 | 125 | 160 | 118 | 149 | 128 | 150 | 145 | 115 | 140 | 150 |

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