Code MC1.4

MCA I Semester Supplementary Examinations, February 2011
PROBABILITY & STATISTICS
(For students admitted in 2005 only)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions
All questions carry equal marks
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1. (a) A can hit a target 3 times in 5 shots, B hits target 2 times in 5 shots, C hits target 3 times in 4 shots. Find the probability of the target being hit when all of them try.
   (b) In a bolt factory machines A,B,C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from (i) Machine A (ii) Machine B (iii) Machine C.

2. (a) The probability density $f(x)$ of a continuous random variable is given by $f(x) = ce^{-|x|}, -\infty < x < \infty$. Show that $C = \frac{1}{2}$ and find that the mean and variance of the distribution. Also find the probability that the variance lies between 0 and 4.
   (b) For the continuous probability function $f(x) = kx^2e^{-x}$ when $x \geq 0$, find (i) K (ii) Mean (iii) Variance.

3. (a) A random sample of size 64 is taken from a normal population with $\mu = 51.4$ and $\sigma = 68$. What is the probability that the mean of the sample will (a) exceed 52.9 (b) fall between 50.5 and 52.3 (c) be less than 50.6.
   (b) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.

4. The mean of random sample is an unbiased estimate of the mean of the population 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 samples listed in (a) and assigning each sample a probability of 1/10. Verify that the mean of these is equal to 12. Which is equal to the mean of the population θ i.e $E(\overline{x}) = 0$ i.e prove that $\overline{x}$ is an unbiased estimate of θ.

5. (a) If we can assert with 95% confidence that the maximum error is 0.05 and P is given as 0.2. Find the size of the sample.
   (b) In a random sample of 400 adults and 600 teenagers who watched a certain television programme, 100 adults and 300 teenagers indicated that they liked it. Construct 99% confidence limits for the difference in proportions of all adults and all teenagers who watched the programme and liked it.

6. A sample analysis of examination results of 500 students was made. It was found that 220 students had failed, 170 had secured a third class, 90 were placed in second class and 20 got a first class. Do these figures commensurate with the general examination result which is in the ratio of 4:3:2:1 for the various categories respectively.

7. The marks obtained by 11 students of a class in Mathematics paper I and paper II are given below:

Paper I(x):	45	55	56	58	60	65	68	70	75	80	85
Paper II(y):	56	50	48	60	62	64	65	70	74	82	90

   Calculate the coefficient of correlation, the equations of lines of regression from the data and the regression coefficients.

8. Write a short notes on:
   (a) Components of time series
   (b) Statistical quality control methods
   (c) Control charts.

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