Code: 06MC104

MCA I Semester Supplementary Examinations August 2014

PROBABILITY & STATISTICS

(For 2008 admitted students only)

Time: 3 hours Max. Marks: 60

Answer any FIVE questions
All questions carry equal marks
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1 (a) A and B throw alternatively with a pair of dice one who first throws a total of nine wins. What are their respective chances of winning if A starts the game?
(b) Define conditional probability. State and prove Baye's theorem.

2 (a) (i) Define descrete distributive function.
(ii) Given that $f(x) = {}^{k}/_{2x}$, is a probability distribution for a random variable X that can take on the values x = 0, 1, 2, 3 and 4. Find k, mean and variance of x.
(b) (i) Define continuous distributive function.
(ii) The cumulative distribution function for a continuous random variable X is $F(x) = \begin{cases} 1 - e^{-2x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$ then find density function $f(x)$, mean and variance.

3 (a) It has been found that 2% of the tools produced by a certain machine are defective. What is the probability that in a shipment of 400 such tools:
(i) 3% or more
(ii) 2% or less will prove defective.
(b) List the properties of normal distribution.

4 (a) Find the mean and standard deviation of sampling distribution of variances for the population 2, 3, 4, 5 by drawing samples of size two
(i) with replacement
(ii) without replacement.
(b) What is the effect on standard error, if a sample is taken from an infinite population of sample size increased from 400 to 900?

5 (a) Prove that for a random sample of size n, $x_1, x_2 - - - - x_n$ taken from an infinite population $S^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2$ is not an unbiased estimator of the parameter σ^2 but $\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$ is unbiased.
(b) A random sample of size 100 is taken from a population with $\sigma = 5.1$. Given that the sample mean is $\bar{x} = 21.6$, construct a 95% confidence interval for the population mean μ.

6 (a) In 64 randomly selected hours of production, the mean and the standard deviation of the number of acceptance pieces produced by an automatic stamping machine are $x = 1.038$ and $\sigma = 0.146$
(b) In an investigation on the machine performance the following results are obtained.

	No. of units inspected	No. of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at $\alpha = 0.05$.

7 (a) Explain student – distribution, its properties and applications.
(b) The mean life time of a sample of 25 fluorescent light bulbs produced by a company is computed to be 157 hours with a S.D of 120 hours. The company claims that the average life of the bulbs produced by the company is 1600 hours using the level of significance of 0.05. Is the claim acceptable?

8 (a) Write characteristics of (m/m/1): (∞/FIFO) model.
(b) What is queuing problem?

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