

Code: 06MC104

MCA I Semester Supplementary Examinations, October/November 2013

PROBABILITY AND STATISTICS

Time: 3 hours

Max Marks: 60

Answer any FIVE questions
All questions carry equal marks

- 1 (a) A and B throw alternatively with a pair of ordinary 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 $\frac{30}{61}$.
- (b) What is conditional event? In a certain college, 40% of men and 10% of women are taller than 1.8 meters. Further more in the college 60% of students are women. If a student is selected at random and is taller than 1.8 meters, find the probability that the selected student is a woman.
- 2 (a) (i) List the properties of probability density function $f(x)$.
(ii) 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 variate lies between 0 and 4.
- (b) (i) List the properties of $F(x)$.
(ii) The probability density function of a random variable X is given by $f(x) = \begin{cases} kx(x-1), & \text{for } 1 \leq x \leq 4 \\ 0, & \text{otherwise} \end{cases}$ Given that $P(1 \leq x \leq 3) = \frac{28}{3}$. Find the value of k.
- 3 (a) Determine mean and variance of binomial distribution.
(b) Prove that the Poisson distribution is the limiting case of the binomial distribution.
- 4 (a) Write a short note on sampling.
(b) 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:
(i) exceed 52.9. (ii) fall between 50.5 and 52.3. (iii) be less than 50.6.
- 5 (a) A sample of size 10 was taken from a population S.D of sample is 0.3. Find the maximum error with 99% confidence.
(b) Show that S^2 is an unbiased estimator of the parameter σ^2 .

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- 6 (a) A sample of 900 members has mean of 3.4 cms and S.D 2.61 cms. Is the sample from a large population of mean 3.25 cm and S.D 2.61 cms? If the population is normal and its mean is unknown find the 95% fiducial limits of true mean.
(b) Write about null hypothesis and testing of null hypothesis.
- 7 (a) Explain χ^2 –distribution, its properties and applications.
(b) The time taken by workers in performing a job by method I and method II is given below.

Method I	20	16	26	27	23	22	-
Method II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?

- 8 (a) Explain (m/m/1): (∞ /FCFS) Queuing model.
(b) (i) Derive $E(m/m > 0) = \frac{\mu}{\mu - \lambda}$.
(ii) Average queue length $L_q = \frac{\lambda^2}{\mu - (\mu - \lambda)}$.
