

Code: R7210501

R7

B.Tech II Year I Semester (R07) Supplementary Examinations, May 2013

PROBABILITY AND STATISTICS

(Common to CSE, IT and CSS)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) (i) Define: Random experiment, sample space and probability.
(ii) A bag contains 12 balls numbered from 1 to 12. If a ball is drawn at random. What is the probability of having a ball with a number which is a multiple of either 2 or 3.
- (b) (i) State Baye's theorem.
(ii) Three urns of the same appearance have the following proportion of balls:
First urn : 2 black 1 white
Second urn : 1 black 2 white
Third urn : 2 black 2 white.
One of the urn is selected and one ball is drawn. It turns out to be white. What is the probability of drawing a white ball again, the first one not having been returned?
- 2 (a) (i) Define: Random variable, discrete probability distribution, continuous probability distribution.
(ii) A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number of defective items.
- (b) Probability density function of a random variable x is $f(x) = \begin{cases} \frac{1}{2} \sin x, & \text{for } 0 \leq x \leq \pi \\ 0 & \text{elsewhere} \end{cases}$
Find the mean, mode and median of the distribution and also find the probability between 0 and $\pi/2$.
- 3 (a) Derive mean and variance of binomial distribution.
(b) Show that mean = median = mode for normal distribution.
- 4 (a) Define sample mean. Sample variance.
(b) A population consists of six numbers 4,8,12,16,20,24. Consider all sample of size two which can be drawn without replacement from this population. Find:
(i) Population mean. (ii) The population S.D. (iii) The mean of the sampling distribution of means. (iv) The standard deviation of the sampling distribution of means.
- 5 (a) (i) Define estimation. (ii) Show that S^2 is an unbiased estimator of σ^2 .
(b) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15, 17, 10, 18, 16, 9, 7, 11, 13,14.

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- 6 (a) A die was thrown 9000 times and of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased.
- (b) It is claimed that a random sample of 49 tyres has a mean life of 15200 km this sample was drawn from a population whose mean is 15150 kms and a standard deviation of 1200 km. Test the significance at 0.05 level.
- 7 (a) Define the statistics 't' and F and write their sampling distributions.
- (b) A random sample of size 16 values from a normal population showed a mean of 53 and a sum of squares of deviation from the mean equal to 150. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% confidence limits of the mean of population.
- 8 (a) Explain the model $(m/m/1) : (\infty / \text{FIFO})$.
- (b) The rate of arrival of customers at a telephone booth follows Poisson distribution with an average of 10 minutes between two successive arrivals the duration of a phone call is assumed to follow exponential distribution with mean time of 3 minutes.
- (i) Find the probability that a new arrival has to wait to make the call.
- (ii) What is the average length of the non-empty queue?
