Code No: X0521

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
PROBABILITY AND STATISTICS
(Common to CSE, IT)

Time: 3 hours **Max. Marks: 80**

Answer any five questions
All questions carry equal marks

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1.a) State and prove addition theorem on probability. A bag contains 4 red, 6 black and 7 green balls. A ball is drawn at random. Find the probability that it is either a red or a black ball.

b) In a certain college 25% of boys and 10% of girls are studying Mathematics. The girls constitute 60% of the student population.
i) What is the probability that the Mathematics is being studied?
ii) If a student is selected at random and is found to be studying Mathematics, find the probability that the student is a girl. [8+8]

2.a) Define random variable, discrete random variable, continuous random variable and probability distribution function with an example of each.

b) A random variable X has the following probability distribution:

X:	0	1	2	3	4	5	6	7	8
P(X):	a	3a	5a	7a	9a	11a	13a	15a	17a

i) Find the value of a
ii) Evaluate $P(X<3), P(X\geq 3), P(2\leq X\leq 5)$. [8+8]

3.a) Derive central moments of Poisson distribution. Fit a Poisson distribution to the following data:

x:	0	1	2	3	4	5
f:	142	156	69	27	5	1

b) Find the mean and standard deviation of Normal distribution in which 7% of items are under 35 and 89% are under 63. [8+8]

4.a) Explain sampling distribution and sampling distribution of a statistic.

b) Samples of size 2 are taken from the population 1, 2, 3, 4, 5, 6 with replacement. Find the mean and standard deviation of the sampling distribution of means. [8+8]

5.a) Prove that for a random sample of size n, $X_1, X_2, ...X_n$ taken from an infinite population $s^2 = \frac{1}{n}\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2$ is not unbiased estimator of the parameter σ^2.

b) In tossing a coin 400 times, 160 heads and 240 tails were obtained. Find a confidence interval for the proportion of head. Does this appear to be a fair coin? [8+8]

6.a) The means of two large samples of sizes 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches?

b) Explain the types of errors in sampling and differentiate two-tailed test from one-tailed test. [8+8]

7.a) A random blood sample for test of fasting sugar for 10 boys gave the following data in ms/dl.

70, 120, 110, 101, 88, 83, 95, 107, 100, 98

Does this support the assumption of population mean of 100 mg/dl?

b) Two samples are drawn from two normal populations. From the following data, test whether the two samples have the same variances at 5% level of significance. [8+8]

Sample A:	60	65	71	74	76	82	85	87	---	----
Sample B:	64	66	67	85	78	88	86	85	63	91

8.a) Prove that $Var(n) = \frac{\lambda\mu}{(\mu-\lambda)^2}$, where n is the number of customers in the system.

b) At a service centre, customers arrive at the rate of 10 per hour and are served at the rate of 15 per hour. If their arrival follows Poisson distribution and service is exponentially distributed, find the average length and average waiting time in the system. [8+8]

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