Code: 9ABS304

R09

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2014/2015

PROBABILITY & STATISTICS

(Common to CE, ME, CSS & IT)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) For any two events A and B of a sample space S, prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

(b) Show that if AB = $\phi, then\, P(A) \leq P(\overline{B})$

2 The frequency function of a continuous random variable is given by: $f(x) = Y_0\, x(2-x)\ 0 \leq x \leq 2$. Find the value of Y_0, mean and variable of X.

3 The marks of 1000 students in a university are found to be normally distributed with mean 70 and s.d 5. Estimate the number of students whose marks will be:

(a) Between 60 and 75.

(b) More than 75.

(c) Less than 68.

4 The guaranteed average life of a certain type of electric bulb is 1500 hrs with a standard deviation of 120 hrs. It is decided to sample the output so as to ensure that 95% of the bulbs do not fall short of the guaranteed average by more than 2.5%. What will be the minimum sample size?

5 (a) Define estimate, estimator and estimation.

(b) In how many ways the estimation can be done and what are they? Explain in detail.

6 (a) What is meant by level of significance?

(b) 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? (Use $\alpha = 0.01$ as level of significance).

(c) In a random sample of 60 workers, the average time taken by them to get to work is 33.8 min. with a S.D. of 6.1 min. Can we reject the null hypothesis $\mu = 32.6$ min. in favour of alternative hypothesis $\mu > 32.6$ at $\alpha = 0.025$?

7 Two random samples gave the following results:

Sample	Size	Sample mean	Sum of squares of deviations from the mean
1	10	15	90
2	12	14	108

Test whether the sample came from the same normal population.

8 (a) Show that for a single service system, the Poisson arrivals and the exponential service time, the probability that exactly n calling units are in the queuing system is $P_n = (1-\rho)\rho^n$, $n \geq 0$, where ρ is the traffic intensity.

(b) Explain (M/M/1) : (∞/FCFS) Queuing model.

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