

B.Tech II Year II Semester (R09) Supplementary Examinations May/June 2017

PROBABILITY & STATISTICS

(Common to CE, ME, CSS & IT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the probability that: (i) 3 boys are selected. (ii) Exactly 2 girls are selected.
(b) In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is manufactured from: (i) Machine A, (ii) Machine B. (iii) Machine C.
- 2 Let X denotes the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the: (i) Discrete probability distribution.
(ii) Expectation.
(iii) Variance.
(iv) Standard deviation.
- 3 (a) In 256 sets of 12 tosses of a coin, in how many cases one can expect 8 heads and 4 tails.
(b) If X is a normal variate with mean 30 and standard deviation 5, find the probabilities that:
(i) $26 \leq X \leq 40$
(ii) $X \geq 45$.
- 4 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.
- 5 A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs.487 with a standard deviation Rs.48. With what degree of confidence can we assert that the average weekly salary of all teachers in the metropolitan area is between 472 to 502?
- 6 A manufacturer claimed that at least 95% of the equipment which he supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 were faulty. Test his claim at 5% level of significance.
- 7 A pair of dice is thrown 360 times and the frequency of each sum is indicated below:

Sum:	2	3	4	5	6	7	8	9	10	11	12
Frequency	8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair on the basis of the Chi-square test at 0.05 level of significance?
- 8 A toll gate is operated on a frequency where cars arrive according to a Poisson distribution with mean frequency of 1.2 cars per minute. The time of completing payment follows an exponential distribution with mean of 20 seconds. Find: (i) The ideal time of the counter. (ii) Average number of cars in the system. (iii) Average number of cars in the queue. (iv) Average time that a car spends in the system. (v) Average time that a car spends in the queue. (vi) The probability that a car spends more than 30 seconds in the system.
