Code No: 821AD

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations, July/August - 2021
PROBABILITY AND STATISTICS

Time: 3 Hours   Max.Marks:75

Answer any five questions
All questions carry equal marks
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1.a) Two digits are selected at random from the digits 1 through 9.
   i) If the sum is odd, what is the probability that 2 is one of the digit selected.
   ii) If 2 is one of the digits selected, what is the probability that the sum is odd?

  b) A fair coin is tossed until a head or five tails occurs. Find the expected number of tosses of the coin.   [8+7]

2.a) State and prove Boole's inequalities

  b) A, B, C in order toss a coin. The first one to toss head wins the game. What are the probabilities of winning, assuming that the game may continue indefinitely?   [7+8]

3.a) A continuous random variable X has the probability density function

$$f(x) = \begin{cases} 2x, & if \quad 0 \le x \le 1 \\ 0, & otherwise \end{cases}$$

   Find the cumulative distribution function for X. Also find $P\left(\frac{1}{4} < X \le \frac{3}{4}\right)$ and $P\left(X < \frac{1}{2}\right)$

  b) Find the probability of getting 1 or 4 or 5 or 6 in throwing a die 5 to 7 times among 9 trials using normal distribution.   [8+7]

4. Show that for normal distribution the quartile deviation, mean deviation and standard deviation are approximately 10:12:15.   [15]

5.a) Determine the mean and standard deviation of the sampling distribution of means of 300 random samples each of size 36 are drawn from a population of size 1500 which is normally distributed with mean 22.4 and standard deviation 0.048, if sampling is done i) with replacement and ii) without replacement.

  b) Construct 95% confidence interval for the true proportion of computer literates if 47 out of 150 persons from rural areas are computer literates.   [8+7]

6.a) A normal population has a mean 0.1 and a standard deviation of 2.1. Find the probability that the mean of simple sample of 900 members will be negative.

b) In a study conducted for 500 days, only on 4 days it was recorded that 'lead' content in a famous river exceeded 200mg/cm. Construct an upper 99% confidence limit for the probability that the 'lead' content in the river will exceed 200mg/cm on any one day. [7+8]

7.a) A briefcase manufacturing company claims that 80% of executives carried briefcases produced by them. Verify its claims if in a random sample of 900 executives, 675 used the company's briefcases. Use 5% level of significance.

b) Explain, stating clearly the assumptions involved, the t-test for testing the significance of the difference between the two sample means. [7+8]

8. The tangent of the angle between two regression lines is 0.6 and if $\sigma_x = \frac{1}{2}\sigma_y$, find the correlation coefficient between x and y. [15]

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