

JK Lakshmipat University, Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term, Makeup Examination, December 2025

B. Tech., Odd Semester, 2025-26

Roll No.

AS1117: Probability and Statistics

Time: 2.5 hours

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on the question paper.
2. You may use a non-programmable calculator.
3. Specify if you find any ambiguity in the questions. Justify and solve the question after removing that ambiguity.
4. Build suitable hypothesis before testing the claims, wherever applicable.

- Q. 1** At the City Palace Museum, Jaipur, an average of 15 visitors arrive every 30 minutes. Assuming the number of visitors follows a Poisson distribution, what is the probability that at least 10 visitors arrive in a 30-minute interval? (CO1,3) **1.0**
- Q. 2** A civil engineer wants to establish that the average time to construct a new two-storey building is more than 7 months. (CO4)
- a) Formulate the null and alternative hypotheses. **1.0**
 - b) Based on data from 52 recently constructed buildings, an audit agency took a sample of 32 buildings and found that the average construction time was 7.6563 months with a standard deviation of 5.2216 months. Test the hypothesis at 0.05 level of significance. **2.0**
- Q. 3** The heights of a random sample of 50 college students have a mean of 174.5 centimeters and a standard deviation of 6.9 centimeters. (CO1,3)
- a) Construct a 98% confidence interval for the mean height of all college students. **1.5**
 - b) What can we assert with 98% confidence about the maximum error if we estimate the mean height of all college students to be 174.5 centimeters? **1.5**
- Q. 4** Indian Railways wants to improve its train service between Delhi and Mumbai and tracks its train schedules at Jaipur Junction. From the data, 60% of trains are Superfast, 25% are Express, and 15% are Shatabdi or Rajdhani trains. Based on historical data, 5% of Superfast trains, 18% of Express trains, and 9% of the Shatabdi and Rajdhani trains are delayed due to weather or signal issues. (CO1,2,3)
- a) For a randomly selected train running between Delhi and Mumbai, what is the probability that it arrives on time at Jaipur Junction? **1.5**
 - b) If a train arrives late, what is the probability that it is a Shatabdi or a Rajdhani train? **1.5**
- Q. 5** The scores of a class of 9 students in a midterm exam (x) and the final examination (y) are as follows: (CO2,5)
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|-----|----|----|----|----|----|----|----|----|----|
| x | 77 | 50 | 71 | 72 | 81 | 94 | 96 | 99 | 67 |
| y | 82 | 66 | 78 | 34 | 47 | 85 | 99 | 99 | 68 |
- 4.0**
- a) Estimate the line of best fit to predict the final examination score from the midterm score.
 - b) Using the line of best fit, estimate the final examination score of a student who scored 85 in the midterm exam.

- Q. 6** For the given data on GDP (in trillion USD) and CO₂ emissions (in billion tons) for China between 2014 and 2023, compute the Karl Pearson's correlation coefficient (r) between GDP and the CO₂ Emissions. Also, interpret the direction and strength of the relationship. (CO2,5)
4.0

GDP	10.5	11.1	11.9	12.5	13.1	13.9	14.3	15.0	16.5	17.7
CO₂ Emissions	9.6	9.8	9.9	10.0	10.2	10.3	10.2	10.1	10.0	9.8

- Q. 7** Ten engineering colleges in Delhi were surveyed. The sample contained 250 electrical engineers, 80 being women; 175 computer science engineers, 40 being women. Compute a 90% confidence interval for the difference between the proportions of women in these two fields of engineering. Is there a significant difference between the two proportions? (CO1,2,4)
6.0

- Q. 8** Below are HIC measures (Head Injury Criterion) of the severity of head injuries collected from 10 crash test dummies placed in different types of Light motor vehicles (LMVs). Perform a one-way analysis of variance (ANOVA) at the 0.05 significance level to test the claim that the mean HIC values are the same across the given vehicle types. (CO1,2,4)
6.0

<i>Vehicle Type</i>	<i>HIC Values</i>
Hatchbacks	29, 41, 37, 54, 37, 50, 38, 50, 48, 47
Sedans	25, 50, 47, 50, 39, 26, 37, 51, 30, 35
SUVs / MUVs	34, 22, 34, 70, 22, 17, 61, 43, 51, 33