

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: P&IE**

**SEMESTER : IV
SESSION : SP/2025**

SUBJECT: PE221 QUANTITATIVE TECHNIQUES

TIME: 3 HOURS

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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|--|----|----|
| Q.1(a) Draw boxplot using the data given below. Identify if there exist any outlier(s). [5] | 1 | 3 |
| Q.1(b) Using the same data develop a histogram having at least 5 divisions. Can you conclude any form of the data by interpreting the two graphs? [4+1=5] | | |
| Data: 27 22 25 23 28 31 39 42 19 4
43 20 9 16 16 31 42 1 57
20 14 35 25 5 36 96 | | |
| Q.2 Write short notes on any FOUR of the following topics. 2.5x4=10 | 2 | 2 |
| a) Cluster Sampling, b) Quota Sampling, c) Non-sampling error, d) Systematic random Sampling, e) Orthogonal Arrays | | |
| Q.3 The following data shows the years of experience of drivers and the corresponding cost of accidental insurance for the year 2025-26. Develop regression equations and calculate regression co-efficients using the data and estimate the expected cost of insurance, if the experience of a driver is 11 years. [10] | 3 | 4 |

Years of experience	20	12	15	7	5	6	8	2	19	18	14
Cost of insurance (in INR)	4785	4835	4845	4895	4900	4915	4895	4955	4805	4800	4810

- Q.4 A study was conducted (table shown below) in the state of Jharkhand to check if there exists any direct relationship between the education level and employment status. Develop hypothesis to check the research question stated above and test the hypothesis with 98% confidence level using proper type of testing methodology. [1+9=10] 4 4

		Employment status	
		Employed	Unemployed
Education Status	High School	10	30
	Graduation	80	50
	Masters	20	5
	PhD	10	2

- Q.5 An experiment was conducted to compare 3 energy drinks in terms of endurance in 6 sports persons (each person drinks each energy drink). The response is time to exhaustion on a treadmill. Use appropriate type of ANOVA to determine whether the 3 energy drinks differ in their effects on endurance, or the difference in endurance is due to the individual variation. (use 95% confidence level) [10] 5 4

Person	Energy drink1	Energy drink2	Energy drink3
1	42	48	62
2	36	34	48
3	54	56	75
4	44	46	52
5	28	32	44
6	45	50	65

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