

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD - 402 103
End Semester Examination, May 2018**

Branch: M. Tech. (SE / CTM)

Semester: II

**Subject with Subject Code: Research Methodology
[CVSE-E5-A / CVCTM-E5-A]**

Marks: 60

Date: 23 / 05 / 2018

Time: 3 Hrs.

Instructions to the Students:

1. Each question carries 12 marks.
2. Attempt any five of the following questions.
3. Assume suitable data, if required, stating clearly the assumptions made

Q.No.1 Attempt any two of the following questions:

(6x2=12)

- a) What is the importance of literature review in academic reports? How do you arrive at the scope of work by literature review carried out on the topic Urban Infrastructures Systems?
- b) Explain primary and secondary data, clearly stating their importance in research. Distinguish between null and alternative hypothesis.
- c) What is sampling? A geologist weighs a rock several times on a sensitive scale. Each time, the scale gives a slightly different reading. Under what conditions can these readings be thought of as a simple random sample? What is the population?

Q.No. 2 Attempt any two of the following questions:

(6x2=12)

- a) A surveyor is measuring the perimeter of a rectangular plot. He measures two adjacent sides to be 50.11 ± 0.05 m and 75.21 ± 0.08 m. These measurements are independent. Estimate the perimeter of the plot and find the uncertainty in the estimate.
- b.) A book contains 100 misprints distributed randomly throughout its 100 pages. What is the probability that a page observed at random contains at least two misprints? Assume Poisson distribution.
- c) What do you understand by Coefficient of Correlation? Enlist eight properties of Coefficient of Correlation.

Q.No. 3 Attempt the following questions:

(6x2=12)

- a) The following are data on Advertising Expenditure and Sales in a company.
- | | | | | | | |
|--|------|----|----|----|----|----|
| Advertising Expenditure (in Rupees Thousand) | : 18 | 19 | 20 | 21 | 22 | 23 |
| Sales (Rupees in lakhs) | : 17 | 17 | 18 | 19 | 19 | 19 |
- Determine the correlation coefficient between them and interpret the result.

- b) Write in brief about the following:
- Interpretation of results of the research
 - Importance of Chi-square test in engineering research

Q.No. 4 Attempt the following questions:

(6x2=12)

- a) A statistics class for engineers consists of 25 industrial, 10 mechanical, 10 electrical and 8 civil engineering students. If a person is randomly selected by the instructor to answer a question, find the probability that the student chosen is (i) an industrial engineering major and (ii) a civil engineering or an electrical engineering major.
- b) The following are the details of plinth areas of ownership apartment flats offered by 3 housing companies A, B, C. Use analysis of variance to determine whether there is any significant difference in the plinth areas of the apartment flats.

Housing Company	Plinth area of apartment flats			
A	1500	1430	1550	1450
B	1450	1550	1600	1480
C	1550	1420	1450	1430

Q.No. 5 Attempt any two of the following questions:

(6x2=12)

- a) Explain the difference between research methods and research methodology.
- b) An engineer plans to compute a 90% confidence interval for the mean diameter of steel rods. He will measure the diameters of a large sample of rods, compute $\bar{X}$ and s , and then compute the interval $\bar{X} \pm 1.645s/\sqrt{n}$. State True or false with justification. The probability that the population mean diameter will be in this interval is 90%.

c.) The results of a particular examination are given below in a summary form:

Result	Percentage of candidates
Passed with distinction	15
Passed	75
Failed	20

It is known that a candidate gets failed if he obtains less than 40 marks, out of 100 while he/she must obtain at least 75 marks in order to pass with distinction. Determine the mean and standard deviation of the distribution of marks assuming this to be normal.

Q.No. 6 Attempt any two of the following questions:

(6x2=12)

- a) Emphasis on the four qualities of a good research.
- b) In an experiment to determine the effect of catalyst on the yield of a certain reaction, the mean yields for reactions run with each of four catalysts were $X_1 = 89.88$, $X_2 = 89.51$, $X_3 = 86.98$, and $X_4 = 85.79$. Assume that five runs were made with each catalyst.
- If $MSE = 3.85$, compute the value of the F statistic for testing the null hypothesis that all four catalysts have the same mean yield. Can this null hypothesis be rejected at the 5% level?
 - Use the Tukey-Kramer method to determine which pairs of catalysts, if any, may be concluded to differ at the 5% level.
- c) When it is operating properly, a chemical plant has a mean daily production of at least 740 tons. The output is measured on a simple random sample of 60 days. The sample had a mean of 715 tons/day and a standard deviation of 24 tons/day. Let μ represent the mean daily output of the plant. An engineer tests $H_0: \mu \geq 740$ versus $H_1: \mu < 740$.
- Find the P -value.
 - Do you believe it is plausible that the plant is operating properly or are you convinced that the plant is not operating properly? Explain your reasoning.

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