

**2024/TDC (CBCS)/EVEN/SEM/
STSSEC-401T (A/B)/081**

TDC (CBCS) Even Semester Exam., 2024

STATISTICS

(4th Semester)

Course No. : STSSEC-401T

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

Candidates have to answer *either* from
Option—A or Option—B

OPTION—A

Course No. : STSSEC-401T (A)

(Statistical Techniques for Research Methods)

UNIT—I

1. Answer any three questions : 1×3=3

- (a) What are research objectives?
- (b) What is a research problem?
- (c) What is research approach?
- (d) Why is motivation required in the context of research?

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2. Answer any one question : 2
- (a) Name two types of research.
- (b) Define a research problem with examples.
3. Answer any one question : 5
- (a) What is exploratory research? What are its characteristics?
- (b) What are the different steps of causal research? Explain with examples.

UNIT—II

4. Answer any three questions : 1×3=3
- (a) What is a research hypothesis?
- (b) What is the meaning of literature in the context of research?
- (c) What is pilot survey?
- (d) What is a questionnaire?
5. Answer any one question : 2
- (a) Write two points of difference between research question and research hypothesis.
- (b) Write two uses of pilot survey.

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6. Answer any one question : 5
- (a) What is the need of literature review in the context of research objective? Explain your answer.
- (b) What are the implications of pilot survey on the main survey?

UNIT—III

7. Answer any three questions : 1×3=3
- (a) What do you mean by target population?
- (b) What is sampling frame?
- (c) What is non-sampling error?
- (d) What do you mean by non-response?
8. Answer any one question : 2
- (a) Name different types of errors in sample survey.
- (b) Name two different methods of data collection.
9. Answer any one question : 5
- (a) Explain the interview method of collecting primary data.
- (b) Explain how the issue of non-response can be addressed in case of survey.

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UNIT—IV

10. Answer any *three* questions : 1×3=3

- (a) What is data cleaning?
- (b) Define null hypothesis.
- (c) What are degrees of freedom?
- (d) Name a software used for data processing.

11. Answer any *one* question : 2

- (a) What are the assumptions of Students' t-test?
- (b) Define weighted mean.

12. Answer any *one* question : 5

- (a) Write some points of difference between parametric and non-parametric tests.
- (b) Explain how you can compare the performance of two educational institutes based on different research parameters.

UNIT—V

13. Answer any *three* questions : 1×3=3

- (a) Define unemployment.

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(5)

(b) What shall the title of a questionnaire reflect?

(c) What is hypothetical population?

(d) What is a demographic survey?

14. Answer any *one* question : 2

- (a) What is the modern form of a 'mailed questionnaire'?
- (b) What shall be the starting point of a questionnaire?

15. Answer any *one* question : 5

- (a) Develop a questionnaire to collect information from students about the academic environment of their institution.
- (b) Once data is collected through a questionnaire; what are the steps one shall follow to reach to result of the survey?

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OPTION—B

Course No. : STSSEC-401T (B)

(Statistical Data Analysis Using R)

UNIT—I

1. Answer any *three* questions : 1×3=3

- (a) What is R-programming?
- (b) R-programming was created by whom?
- (c) How to download and install R?
- (d) Write R-code to draw box plot.

2. Answer any *one* question : 2

- (a) Write down any four disadvantages of using R.
- (b) Explain arithmetic operators used in R.

3. Answer any *one* question : 5

- (a) Write down the code for drawing ogive (less than type) for the following data :

CI	:	0-10	10-20	20-30	30-40
Frequency	:	5	7	12	15

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(7)

- (b) Write R-code to draw bar diagram, pie diagram and histogram for the following data :

CI	:	20-40	40-60	60-80
Frequency	:	7	11	15

UNIT—II

4. Answer any *three* questions : 1×3=3

- (a) Write R-code to find maximum value in a data set.
- (b) What is the utility of using summary() command in R?
- (c) Write R-command to find mean.
- (d) For positively skewed curve, write down the relationship between mean, median and mode.

5. Answer any *one* question : 2

- (a) Write down the command to compute median from the following data :

2, 8, 10, 12, 15, 17, 25

- (b) Write a note on kurtosis.

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6. Answer any *one* question : 5
- (a) Calculate mean, median, quartile, 75th percentile, variance and standard deviation from the following data (write R-code) :
22, 15, 17, 25, 17, 25, 30
- (b) Write R-code to find skewness and kurtosis for the following data :
7, 19, 15, 21, 25, 37, 40

UNIT—III

7. Answer any *three* questions : 1×3=3
- (a) What is the use of `dbinom()` command in R?
- (b) Write the command for fitting polynomial of degree 2.
- (c) Write any two advantages of using R.
- (d) Which command is used to fit exponential curve?

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8. Answer any *one* question : 2
- (a) Write the command for fitting polynomial of degree 2 curve to the following data :
- | | | | | | |
|-----|---|---|----|----|----|
| x | : | 1 | 3 | 5 | 7 |
| y | : | 7 | 12 | 13 | 20 |
- (b) Fit exponential curve assuming hypothetical values of x and y (at least 5).
9. Answer any *one* question : 5

- (a) Write a note on data structure of R.
- (b) Write R-code to fit Poisson distribution for the following data :
- | | | | | | | | | |
|-----|---|-----|-----|----|----|---|---|---|
| x | : | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| f | : | 103 | 143 | 98 | 42 | 8 | 4 | 2 |

UNIT—IV

10. Answer any *three* questions : 1×3=3
- (a) Fill in the blank :
Correlation coefficient lies between _____.
- (b) Write the command for performing t -test for single mean.

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(c) Write the command for performing *F*-test.

(d) Which command is used to perform regression?

11. Answer any one question : 2

(a) Write the command for computing correlation coefficient (Spearman) for the following data :

x : 1 3 7 5 12 21
 y : 8 5 3 2 7 9

(b) Fit simple linear regression to the following data :

y : 5 7 11 13 15
 x : 2 5 10 3 9

12. Answer any one question : 5

(a) The marks scored by 10 students of a particular class are found to be 73, 57, 42, 93, 42, 72, 71, 82, 32, 47. Write R-code to test that the average marks scored by the students are greater than 70. Write null and alternative hypothesis as well.

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(b) Two random samples drawn from two normal populations are

Sample I : 7 5 2 7 12

Sample II : 10 12 15 3 2

Write R-code for testing whether population have same variance.

UNIT—V

13. Answer any three questions : 1×3=3

(a) What is *p*-value?

(b) Write the decision rule for *p*-value at 5% level of significance.

(c) Write R-code to generate random number from binomial distribution.

(d) Write the use of length() command in R.

14. Answer any one question : 2

(a) Generate 20 random numbers from uniform distribution.

(b) Generate 10 random numbers from normal distribution with mean = 0 and standard deviation = 1.

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15. Answer any one question :

5

(a) Generate 50 random numbers from $N(3, 2.5)$ distribution and perform one-sample t -test in R.

(b) Write R-code for performing one-way ANOVA to the following data :

School—I	School—II	School—III
85	67	91
78	75	72
25	83	85
91	43	37
72	92	43

(The values given above are the marks of students in three different schools.) Also write null and alternative hypothesis for performing one-way ANOVA.
