

VIMALA COLLEGE (AUTONOMOUS), THRISSUR



SYLLABUS OF STATISTICS AS COMPLEMENTARY COURSE OF BSc PSYCHOLOGY

UNDER CHOICE BASED CREDIT AND SEMESTER SYSTEM
(CBCSSUG 2019)

SCHEME AND SYLLABUS

2020 ADMISSION ONWARDS

Sem No	Course Code	Course Title	Instructional Hours/ week	Credit	Exam Hours	Ratio Ext: Int
1	STA 1C02	DESCRIPTIVE STATISTICS	4	3	2	4:1
2	STA 2C 02	REGRESSION ANALYSIS AND PROBABILITY THEORY	4	3	2	4:1
3	STA 3C 02	PROBABILITY DISTRIBUTIONS AND PARAMETRIC TESTS	5	3	2	4:1
4	STA 4C 02	STATISTICAL TECHNIQUES FOR PSYCHOLOGY	5	3	2	4:1

SEMESTER I**STA 1C 02- DESCRIPTIVE STATISTICS**

Contract Hours per week: 4
 Number of credits: 3
 Number of Contact Hours: 72
 Course Evaluation: External 60 Marks+ Internal 15Marks
 Duration of Exam: 2Hours

Question Paper Pattern

Type of Questions	Question number (From..... To	Marks
Short Answer	01 to 12	Short answer type carries 2 marks each - 12 questions (Maximum Marks 20)
Paragraph/ Problems	13 to 19	Paragraph/ Problem type carries 5 marks each – 7 questions (Maximum Marks 30)
Essay	20 to 21	Essay type carries 10 marks (1 out of 2) (Maximum Marks 10)
Total	01 to 21	60

Question Paper setter has to give equal importance to both theory and problems in sections B and C.

Objectives

1. To generate interest in Statistics
2. To equip the students with the concepts of basic Statistics
3. To provide basic knowledge about Statistical methods

Module 1: A basic idea about data- collection of data, primary and secondary data, organization, planning of survey and diagrammatic representation of data

10 Hours

Module 2: Classification and tabulation- Classification of data, frequency distribution, formation of a frequency distribution, Graphic representation viz. Histogram, Frequency Curve, Polygon, Ogives, Bar diagram and Pie diagram

10 Hours

Module 3: Measure of central tendency- Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean, Combined Mean, Advantages and disadvantages of each average

20 Hours

Module 4: Measures of dispersion- Range, Quartile Deviation, Mean Deviation, Standard Deviation, Combined Standard Deviation, Percentiles, Deciles, Relative Measures of Dispersion, Coefficient of variation

16 Hours

Module 5: Skewness and Kurtosis- Pearson's and Bowley's coefficient of skewness, Percentile Measure of Kurtosis

16 Hours

References

1. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., & Kapoor, V.K. Fundamentals of Applied Statistics. New Delhi: Sultan Chand and Sons.
3. Garret, H.E., & Woodworth, R.S. Statistics in Psychology and Education. Bombay: Vakila, Feffex and Simens Ltd.
4. Mood, A.M., Graybill, F.A and Boes, D.C. Introduction to Theory of Statistics. 3rd Edition Paperback – International Edition.
5. Mukhopadhyay, P. Mathematical Statistics. New central Book Agency (P) Ltd: Calcutta.

Assignments/ Seminar

Assignments/Seminar are to be given to students. The purpose of the assignments/seminar is to provide practical exposure to the students.

SEMESTER II**STA 2C 02- REGRESSION ANALYSIS AND PROBABILITY THEORY**

Contract Hours per week:	4
Number of credits:	3
Number of Contact Hours:	72
Course Evaluation:	External 60 Marks+ Internal 15Marks
Duration of Exam:	2 Hours

Question Paper Pattern

Type of Questions	Question number (From..... To	Marks
Short Answer	01 to 12	Short answer type carries 2 marks each - 12 questions (Maximum Marks 20)
Paragraph/ Problems	13 to 19	Paragraph/ Problem type carries 5 marks each – 7 questions (Maximum Marks 30)
Essay	20 to 21	Essay type carries 10 marks (1 out of 2) (Maximum Marks 10)
Total	01 to 21	60

Question Paper setter has to give equal importance to both theory and problems in sections B and C.

Objectives

1. To make the students aware of various Statistical tools
2. To create awareness about probability

Module 1: Bivariate data- relationship of variables, correlation analysis, methods of studying correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation, Calculation of Correlation from a 2-way table, Interpretation of Correlation Coefficient, Rank Correlation
11 Hours

Module 2: Regression analysis- linear regression, Regression Equation, Identifying the Regression Lines properties of regression coefficients, numerical problems
9 Hours

Module 3: Partial and Multiple Correlation Coefficients- Multiple Regression Equation, Interpretation of Multiple Regression Coefficients (three variable cases only)
16 Hours

Module 4: Basic probability- Sets, Union, Intersection, Complement of Sets, Sample Space, Events, Classical, Frequency and Axiomatic Approaches to Probability, Addition and Multiplication Theorems, Independence of Events (Up-to three events)
20 Hours

Module 5: Random Variables and their probability distributions- Discrete and Continuous Random Variables, Probability Mass Function, Distribution Function of a Discrete Random Variable

16 Hours

References

1. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., & Kapoor, V.K. Fundamentals of Applied Statistics. New Delhi: Sultan Chand and Sons.
3. Garret, H.E., & Woodworth, R.S. Statistics in Psychology and Education. Bombay: Vakila, Feffex and Simens Ltd.
4. Mood, A.M., Graybill, F.A and Boes, D.C. Introduction to Theory of Statistics. 3rd Edition Paperback – International Edition.
5. Mukhopadhyay, P. Mathematical Statistics. New central Book Agency (P) Ltd: Calcutta.

Assignments/ Seminar

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SEMESTER III**STA 3C 02- PROBABILITY DISTRIBUTIONS AND PARAMETRIC TESTS**

Contract Hours per week:	5
Number of credits:	3
Number of Contact Hours:	90
Course Evaluation:	External 60 Marks+ Internal 15Marks
Duration of Exam:	2Hours

Question Paper Pattern

Type of Questions	Question number (From..... To)	Marks
Short Answer	01 to 12	Short answer type carries 2 marks each - 12 questions (Maximum Marks 20)
Paragraph/ Problems	13 to 19	Paragraph/ Problem type carries 5 marks each – 7 questions (Maximum Marks 30)
Essay	20 to 21	Essay type carries 10 marks (1 out of 2) (Maximum Marks 10)
Total	01 to 21	60

Question Paper setter has to give equal importance to both theory and problems in sections B and C.

Objectives

1. To get a general understanding on various probability distributions
2. To familiarize the uses of Statistical test.

Module 1: Distribution Theory- Binomial, Poisson and Normal Distributions, Mean and Variance (without derivations), Numerical Problems, Fitting, Importance of Normal Distribution, standard normal distribution, simple problems using standard normal tables, Central Limit Theorem (Concepts only)

25 Hours

Module 2: Methods of Sampling- Random Sampling, Simple Random Sampling, Stratified, Systematic and Cluster Sampling, Non Random sampling, Subjective sampling Judgment sampling and convenience sampling.

20 Hours

Module 3: Fundamentals of Testing- Type-I & Type-II Errors, Critical Region, Level of Significance, Power, p value, Tests of Significance

15 Hours

Module 4: Large Sample Tests – Test of a Single, Mean Equality of Two Means, Test of a Single Proportion, and Equality of Two Proportions

10 Hours

Module 5: Small Sample tests-Test of a Single Mean, Paired and Unpaired t-Test, Chi-Square Test of Variance, F-Test for the Equality of Variance, Tests of Correlation

20 Hours

References

1. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., & Kapoor, V.K. Fundamentals of Applied Statistics. New Delhi: Sultan Chand and Sons.
3. Garret, H.E., & Woodworth, R.S. Statistics in Psychology and Education. Bombay: Vakila, Feffex and Simens Ltd.
4. Mood, A.M., Graybill, F.A and Boes, D.C. Introduction to Theory of Statistics. 3rd Edition Paperback – International Edition.
5. Mukhopadhyay, P. Mathematical Statistics. New central Book Agency (P) Ltd: Calcutta.

Assignments/ Seminar

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SEMESTER IV**STA 4C 02- STATISTICAL TECHNIQUES FOR PSYCHOLOGY**

Contract Hours per week: 5
 Number of credits: 3
 Number of Contact Hours: 90
 Course Evaluation: External 60 Marks+ Internal 15Marks
 Duration of Exam: 2Hours

Question Paper Pattern

Type of Questions	Question number (From..... To)	Marks
Short Answer	01 to 12	Short answer type carries 2 marks each - 12 questions (Maximum Marks 20)
Paragraph/ Problems	13 to 19	Paragraph/ Problem type carries 5 marks each – 7 questions (Maximum Marks 30)
Essay	20 to 21	Essay type carries 10 marks (1 out of 2) (Maximum Marks 10)
Total	01 to 21	60

Question Paper setter has to give equal importance to both theory and problems in sections B and C.

Objectives

1. To make the students aware of various Statistical test in different areas of Psychology
2. To give knowledge about applications of Statistics in different areas of Psychological studies.

Module 1: Analysis of Variance- assumptions, One-way and Two-way Classification with Single Observation per Cell, Critical Difference

20 Hours

Module 2: Non Parametric tests- Chi-square Test of Goodness of Fit, Test of Independence of Attributes, Test of Homogeneity of Proportions

20 Hours

Module 3: Sign Test- Wilcoxon's Signed Rank Test, Wilcoxon's Rank Sum Test, Run Test and Krushkal-Wallis Test

20 Hours

Module 4: Factorial Design- Basics of factorial Design, Factorial experiments and their uses in Psychological studies, Concepts of 22, 23 factorial experiments (without derivation), simple problems.

15 Hours

Module 5: Preparation of Questionnaire- Scores and Scales of Measurement, Reliability and Validity of Test Scores.

15 Hours

References

1. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., & Kapoor, V.K. Fundamentals of Applied Statistics. New Delhi: Sultan Chand and Sons.
3. Garret, H.E., & Woodworth, R.S. Statistics in Psychology and Education. Bombay: Vakila, Feffex and Simens Ltd.
4. Mood, A.M., Graybill, F.A and Boes, D.C. Introduction to Theory of Statistics. 3rd Edition Paperback – International Edition.
5. Douglas C. Montgomery. Design and Analysis of Experiments. 9th Edition.

Assignments/ Seminar

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**FIRST SEMESTER B.Sc DEGREE EXAMINATION
(UG-CBCSSUG)**

Statistics- Complementary

STA 1C 02 –DESCRIPTIVE STATISTICS

Time: 2 Hours

Max Marks:60

SECTION-A

Each question carries 2 Marks.

Maximum Marks that can be scored in this section is 20.

1. Compare less than and greater than Ogives.
2. What do you mean by percentiles?
3. Define geometric mean
4. What is the variance of the observations 8, 10,12?
5. How will you find range of a grouped frequency distribution?
6. What is meant by relative measure of dispersion?
7. Define quartile deviation
8. Distinguish between discrete and continuous data. Give examples.
9. The average pulse rate of 40 males was found to be 78 and that of a group of 60 females was 69. Find the combined mean pulse rate of the 100 patients.
10. What is combined standard deviation?
11. What are the advantages of median?
12. Draw a bar diagram depicting the following data.

Year	1992	1993	1994	1995
Export (in crore)	55	63	60	70

SECTION-B

Each question carries 5 Marks.

Maximum Marks that can be scored in this section is 30.

13. Explain Kurtosis. What are the different types of Kurtosis?
14. Discuss the graphical methods used for representing a frequency distribution.

15. The blood serum cholesterol levels of 10 patients are given below.
Calculate the S.D. and C.V.

220, 230, 240, 250, 260, 270, 280, 255, 265, 290

16. Write the importance of diagrams and graphs for data analysis.
17. Define classification. What are the different types of classification?
18. Explain Quartile deviation. What are the advantages and disadvantages of quartile deviation?
19. Calculate AM and SD for the following data

Class	10-14	14-18	18-22	22-26	26-30
frequency	20	30	11	3	5

SECTION-C

(Answer any one Question and carries 10 marks)

20. Calculate the mean deviation about the mean for the given data.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	8	12	15	12	6	3

21. (a) Define Skewness. What are the different types of Skewness?
(b) Calculate Karl Pearson's Coefficient of skewness for the
Following frequency distribution

Class	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100-104
frequency	8	15	18	25	14	9	6	5

[END]

**SECOND SEMESTER B.Sc DEGREE EXAMINATION
(UG-CBCSSUG)**

Statistics- Complementary

STA 2C 02–REGRESSION ANALYSIS AND PROBABILITY THEORY

Time: 2 Hours

Max Marks: 60

SECTION-A

Each question carries 2 Marks.

Maximum Marks that can be scored in this section is 20.

1. Define Spearman's rank correlation coefficient
2. Distinguish between discrete and continuous variables
3. What is meant by a scatter diagram?
4. State the Multiplication theorem of probability for two events
5. Define probability mass function
6. Define sample space. Give one example
7. Define the following
 - (a) Disjoint set
 - (b) Universal set
 - (c) Null set
8. If $P(A)=0.2$, $P(B)=0.6$, $P(A \cap B)=0.3$, then $P(A \cup B)=$ -----
9. If $f(x)=kx$, $x=1,2,3$ and zero elsewhere is a p.m.f. Find $P(X \geq 2.5)$.
10. If $r_{12}=0.93$, $r_{13}=0.99$ and $r_{23}=0.92$. Calculate $r_{12.3}$
11. Consider the following p.m.f

x	1	0	2
$f(x)$	k	$2k$	$3k$

Find the value of k .

12. Distinguish between mutually exclusive events and mutually exhaustive events

SECTION-B

Each question carries 5 Marks.

Maximum Marks that can be scored in this section is 30.

13. Distinguish between partial correlation and multiple correlations
14. What is meant by linear regression? What are two regression lines? Give their equations

15. Explain the different approaches to the theory of probability.
16. State addition theorem in probability. A problem in mathematics is given two students A and B. Whose chances of solving it are $\frac{1}{3}$ and $\frac{2}{3}$ respectively. What is the probability that the problem will be solved?
17. If $\sigma_x = 6$, $\sigma_y = 10$ and $\text{cov}(x, y) = -30$, find the correlation between X and Y. Comment on the same. Also find the regression coefficients.
18. In a box there are 8 white, six blue and 10 pink balls. If 3 balls are drawn at random from the box, what is the probability that
- Two balls are white
 - None of 3 is pink
 - 3 balls are blue
19. Define the distribution function of a discrete random variable. Also write its properties

SECTION-C

(Answer any one Question and carries 10 marks)

20. A random variable X has the following probability function

x	-1	0	2
$f(x)$	k	$2k$	$3k$

- Determine the value of k
 - Find $P(X < 2)$ and $P(X \leq 2)$
 - Write down the distribution function of X
21. (i) State the important properties of Karl Pearson's coefficient of correlation.
(ii) Calculate the correlation coefficient for the following data

X	7	15	13	3	10	12
Y	27	45	51	9	33	51

[END]

THIRD SEMESTER B.Sc DEGREE EXAMINATION**(UG-CBCSSUG)****Statistics- Complementary****STA 3C 02– PROBABILITY DISTRIBUTIONS AND PARAMETRIC TESTS****Time: 2 Hours****Max Marks: 60****SECTION-A****Each question carries 2 Marks.****Maximum Marks that can be scored in this section is 20.**

1. What is meant by a Statistical test? Give an example
2. Write down the test Statistic for testing the equality of means of two normal population whose variance are equal and when the sample sizes are small
3. Distinguish between Null and Alternative hypothesis
4. Give two instances where binomial distribution can be applied
5. What is sampling frame?
6. What is convenience sampling?
7. Define sampling distribution
8. A binomial distribution has $n= 500$ and $p= 0.1$. Find the mean and variance of this distribution
9. State central limit theorem
10. Define power of a test
11. What is standard error
12. Write down the p.d.f of standard normal distribution

SECTION-B**Each question carries 5 Marks.****Maximum Marks that can be scored in this section is 30.**

13. What are the main features of Normal distribution
14. If 3% electric bulbs manufactured by a company are defective. Find the probability that in a sample of 100 bulbs, exactly five bulbs are defective (Given $e^{-3}=0.0492$)
15. Describe Paired sample t test
16. Distinguish between systematic sampling and stratified sampling
17. A sample of 25 items were taken from a population with SD 10 and the

sample mean is found to be 65. Can it be regarded as a sample from a normal population with mean $\mu=60$.(use $\alpha =5$)

18. The customer accounts at a certain departmental store have an average balance of Rs.120 and SD of Rs. 40. Assume that the account balance are normally distributed
- What proportion of the accounts as over Rs. 150
 - What proportion of accounts in between Rs. 100 and Rs. 150
19. Sample sizes 10 and 18 taken from two normal population gave standard deviation 14 and 20 respectively. Test the hypothesis that the samples have come from population with the same standard deviation at 5% level of significance

SECTION-C

(Answer any one Question and carries 10 marks)

20. Explain the test procedure for test the equality of variance of two normal populations with known mean
21. The screws produced by certain machine were checked by examining samples. The following table shows the distribution of 128 sample according to the number of defective items they contained

No. of defective	0	1	2	3	4	5	6	7	Total
No of samples	7	6	19	35	30	23	7	1	128

Fit a binomial distribution to the data

[END]

FOURTH SEMESTER B.Sc DEGREE EXAMINATION
(UG-CBCSSUG)

Statistics- Complementary

STA 4C 02– STATISTICAL TECHNIQUES FOR PSYCHOLOGY

Time: 2 Hours

Max Marks: 60

SECTION-A

Each question carries 2 Marks.

Maximum Marks that can be scored in this section is 20.

1. What is meant by validity
2. What are contingency tables
3. Write down the test statistic of chi- square test for testing homogeneity
4. What are the advantages of non- parametric test
5. What is meant by Ratio scale
6. State three assumptions of ANOVA technique
7. State the null hypothesis of one way ANOVA
8. Define the term reliability
9. Write down the test statistic of chi- square test for testing goodness of fit
10. What is meant by interval scale
11. Write any three assumptions associated with non-parametric test
12. What do you mean by pilot survey

SECTION-B

Each question carries 5 Marks.

Maximum Marks that can be scored in this section is 30.

13. What are the steps in preparing a questionnaire?
14. Write a short note on Krushkal- Wallis test
15. Describe the importance of factorial experiments in psychological studies
16. Briefly explain Wilcoxon's Rank sum test
17. The following are the marks obtained by 10 students in a certain examination

Marks: 43 48 65 57 31 60 37 48 78 59

Test the hypothesis that population variance is 100 (Test at 5% level of significance)

18. The following data give the number of lesions on halves of eight tobacco leaves

Pair number	1	2	3	4	5	6	7	8
Proportion 1, X_1	31	20	18	17	9	8	10	7
Proportion 2, X_2	18	17	14	11	10	7	5	6

Use Wilcoxon's signed rank test to test whether the two samples are significantly different

19. Explain the chi- square test for independence of attribute

SECTION-C

(Answer any one question and carries 10 marks)

20. A trucking company wishes to test the average life of each of the three brands of tyres. The company uses all branches on randomly selected trucks. The records showing the lives (thousands of miles) of tyres are as given. Using ANOVA, test the hypothesis that the average life for each brand is the same

<u>Brand I</u>	<u>Brand II</u>	<u>Brand III</u>
6	6	2
1	3	5
5	4	6
2	3	7

21. (i) Define the term validity
(ii) Explain various types of validity

[END]