



SRI Y.N.COLLEGE(Autonomous), Narsapur
Affiliated to Adikavi Nannayya University
Thrice accredited by NAAC with 'A' Grade
Recognized by UGC as 'College with potential for Excellence'
I B.Sc Statistics (for 2020-23 batch, w.e.f 2020-21)
Paper I, Syllabus for I semester
Descriptive Statistics

UNIT-I

Introduction to Statistics: Importance of Statistics. Scope of Statistics in different fields. Concepts of primary and secondary data. Diagrammatic and graphical representation of data: Histogram, frequency polygon, Ogives, Pie. Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean. Median and Mode through graph.

UNIT-II

Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non-Central moments and their interrelationship. Sheppard's correction for moments. Skewness and kurtosis.

UNIT-III

Curve fitting: Bi-variate data, Principle of least squares, fitting of degree polynomial. Fitting of straight line, Fitting of Second degree polynomial or parabola, Fitting of power curve and exponential curves.

Correlation: Meaning, Types of Correlation, Measures of Correlation: Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient (with and without ties), Bi-variate frequency distribution, correlation coefficient for bi-variate data and simple problems. Concept of multiple and partial correlation coefficients (three variables only) and properties

UNIT-IV

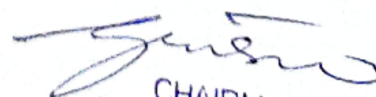
Regression : Concept of Regression, Linear Regression: Regression lines, Regression coefficients and it's properties, Regressions lines for bi-variate data and simple problems. Correlation vs regression.

UNIT-V

Attributes : Notations, Class, Order of class frequencies, Ultimate class frequencies, Consistency of data, Conditions for consistency of data for 2 and 3 attributes only, Independence of attributes, Association of attributes and its measures, Relationship between association and colligation of attributes, Contingency table: Square contingency, Mean square contingency, Coefficient of mean square contingency, Tschuprow's coefficient of contingency.



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Text Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy
- Dr M.Jaganmohan Rao, Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

Reference books:

1. Willam Feller: Introduction to Probability theory and its applications. Volume – I, Wiley
2. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd.,Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishinghouse.
4. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
5. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , New Delhi

Credits 2

Practicals - Paper – I

1. Graphical presentation of data (Histogram, frequency polygon, Ogives).
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of measures of central tendency (Mean, Median and Mode)
4. Computation of measures of dispersion (Q.D, M.D and S.D)
5. Computation of non-central, central moments, β_1 and β_2 for ungrouped data.
6. Computation of non-central, central moments, β_1 and β_2 and Sheppard's corrections for grouped data.
7. Computation of Karl Pearson's coefficients of Skewness and Bowley's coefficients of Skewness.
8. Fitting of straight line by the method of least squares
9. Fitting of parabola by the method of least squares
10. Fitting of power curve of the type by the method of least squares.
11. Fitting of exponential curve of the type and by the method of least squares.
12. Computation of correlation coefficient and regression lines for ungrouped data
13. Computation of correlation coefficient, forming regression lines for grouped data
14. Computation of Yule's coefficient of association
15. Computation of Pearson's, Tcherprows coefficient of contingency

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall be exported to MS word for writing inference.



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A handwritten signature in blue ink, appearing to read "Jagan" or similar.

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SEMESTER-I
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 2 questions
Unit - IV	: 1 question
Unit - V	: 1 question

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

SECTION-A


Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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I B.Sc. Statistics – Semester – I
Paper I - Descriptive Statistics

Model Question Paper (Theory) (for 2020-23 batch w. e. f 2020-2021)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M = 25M

1. Distinguish between primary data and secondary data.
2. Write the good features of measures of central tendency.
3. Define Standard Deviation and write the merits and demerits.
4. Explain about Sheppard's corrections.
5. Write the procedure for fitting the power curve.
6. Define Partial and Multiple correlation coefficients.
7. Define Regression and regression coefficients.
8. Write down the conditions for the consistency of data for 2 attributes.

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks.

5x10M = 50M

SECTION – A

9. Define Questionnaire. Explain different methods of Primary Data Collection.
10. Explain about measures of central tendency.
11. Derive the central moments in terms of non central moments.
12. Explain about Skewness and Kurtosis then prove that $\beta_2 \geq 1$.
13. State and prove that Karl Pearson Correlation Coefficient is independent of change of origin and scale.

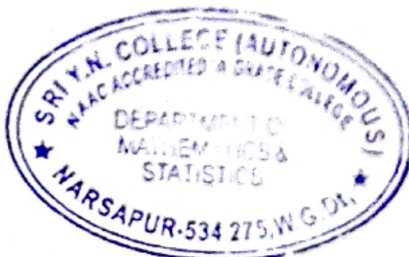
SECTION – B

14. Write the procedure for fitting of second degree parabola.
15. Derive the two regression lines of y on x and x on y.
16. Calculate the regression equation of Y on X for the following data.

X	6	2	10	4	8
Y	9	11	5	8	7

17. Define Yule's coefficient of colligation and association and derive the relation between them.

Explain about the 2x2 contingency table and Mean square contingency, Coefficient of mean square contingency, Tschuprow's coefficient of contingency.



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I B.Sc. Statistics – Semester – II
Paper II - Probability and Probability Distributions
(for 2020-23 batch w. e. f 2020-2021)

UNIT-I: Introduction to Probability: (Shorts -2, Essays– 2)

Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutually exclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events. Boole's inequality and Baye's theorem and its applications in real life problems.

UNIT-II: Random variable: (Shorts -1, Essays– 2)

Definition of random variable, discrete and continuous random variables, functions of random variable. Probability mass function. Probability density function, Distribution function and its properties. For given pmf, pdf calculation of moments, coefficient of skewness and kurtosis. Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

UNIT – III :Mathematical expectation : (Shorts -2, Essays– 2)

Mathematical expectation of a random variable and function of a random variable. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Definitions of M.G.F, C.G.F, P.G.F, C.F and their properties. Chebyshev and Cauchy - Schwartz inequalities.

UNIT – IV : Discrete Distributions: (Shorts -2, Essays– 2)


Binomial, Poisson, Negative Binomial, Geometric distributions: Definitions, means, variances, M.G.F, C.F, C.G.F, P.G.F, additive property if exists. Poisson approximation to Binomial distribution. Hyper-geometric distribution: Definition, mean and variance.

UNIT – V : Continuous Distributions: (Shorts -1, Essays– 2)

Rectangular, Exponential, Gamma, Beta Distributions: mean , variance, M.G.F, C.G.F, C.F. Normal Distribution: Definition, Importance, Properties, M.G.F, CF, additive property.



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5. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , New Delhi
6. Hogg Tanis Rao: Probability and Statistical Inference. 7th edition.Pearson.

Practicals Paper – II

1. Fitting of Binomial distribution – Direct method.
2. Fitting of binomial distribution – Recurrence relation Method.
3. Fitting of Poisson distribution – Direct method.
4. Fitting of Poisson distribution - Recurrence relation Method.
5. Fitting of Negative Binomial distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal distribution – Area method.
8. Fitting of Normal distribution – Ordinate method.
9. Fitting of Exponential distribution.



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SEMESTER-I
BLUE PRINT

Time: 3Hrs.

Max. Marks: 75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 1 question
Unit - III	: 2 questions
Unit - IV	: 2 questions
Unit - V	: 1 question

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing at least TWO questions from each section.

Each question carries 10 marks.

SECTION-A


Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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I B.Sc. Statistics – Semester – II

Paper II - Probability and Probability Distributions
Model Question Paper (Theory) (for 2020-23 batches w. e. f 2020-2021)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. State and prove Baye's theorem of Probability.
2. Define Distribution function and write its properties.
3. State and prove Cauchy Schwartz's inequality.
4. State and prove the additive property of Poisson distribution.
5. Derive the area property of Normal distribution.
6. Derive the mean and variance of geometric distribution.
7. Define mutually exclusive and equally likely events.
8. Define mathematical Expectation and Prove that $V(aX + b) = a^2 V(X)$.

PART-II

Answer any FIVE questions. Choosing at least TWO questions from each section.

Each question carries 10 marks.

5x10M = 50M

SECTION – A

9. State and prove Boole's inequality.
10. State and prove the Addition theorem of probability for n events.
11. Define Bivariate Random Variable. Joint distribution of X and Y is given by

$$f(x,y) = 4xy$$

Test whether X and Y are independent. For the above joint distribution, find the conditional density of X given Y=y.

12. A random variable X has the following probability distribution:

X:	1	2	3	4	5	6	7
P(X):	K	2K	2K	3K	K ²	2K ²	7K ² +K


13. State and prove Chebyshev's inequality.

SECTION - B

14. Define Moment Generating Function and state and prove the properties of it.
15. Derive the first four central moments of Binomial Distribution.
16. Define Negative binomial distribution and derive the mean and variance of Negative binomial distribution.
17. Prove that for Normal distribution $QD : MD : SD :: 10 : 12 : 15$
18. Define Beta distribution of first kind and derive the mean and variance



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II B.Sc Statistics (for 2019-2022 batch, w.e.f 2018-19)
Paper III, Syllabus for III semester
STATISTICAL METHODS

Unit-I (10 Marks-2,5 Marks-2)

Correlation: Def., scatter diagram, its coefficient and its properties., scatter diagram, computation of correlation coefficient for ungrouped data, spearman's rank correlation coefficient, properties of spearman's correlation coefficients and problems.

Unit-II (10 Marks-2,5 Marks-2)

Regression: simple linear regression, properties of regression coefficients. Regression lines, Concept of Correlation ratio, partial and multiple correlation coefficients, correlation verses regression and their problems.

Unit -III (10 Marks-2,5 Marks-1)

Curve fitting: Method of least square - Fitting of linear, quadratic, Exponential and power curves and their problems.

Unit-IV (10 Marks-2,5 Marks-2)

Attributes : Introduction, Nature, and consistency and mention its conditions. Independence and association of attributes, co-efficient of association, coefficients of contingency and their problems.

Unit -V (10 Marks-2,5 Marks-1)

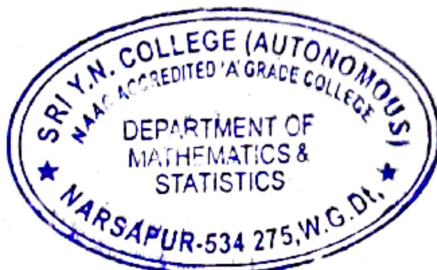
Exact sampling distributions: Concept of population, Parameter, random sample, statistic, sampling distribution, standard error. Statement and Properties of χ^2 , t, F distributions and their interrelationships.

Text books


1. BA/BSc II year statistics - statistical methods and inference - Telugu Academy by A.Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C. Ravichandra Kum.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.
3. Fundamentals of Mathematics statistics: VK Kapoor and SC Guptha.

Reference Books:

1. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das Guptha B.
2. Introduction to Mathematical Statistics : Hoel P.G.



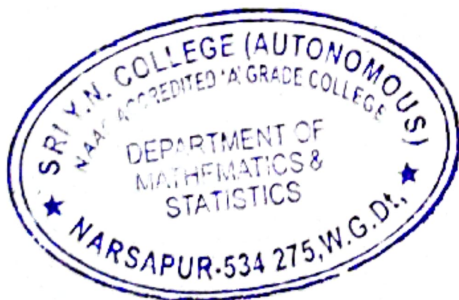
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Practicals

Conduct any 6 (Ms -excel is compulsory)

1. Fitting of straight line.
2. Fitting of exponential curves.
3. Fitting of power curve.
4. Computation of correlation coefficient & Fitting of Regression lines.
5. Rank correlation coefficient.
6. Computation of Contingency coefficients.
7. MS-Excel methods any for the Serial Numbers 1,2,4,5.



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SEMESTER-III
BLUE PRINT

Max. Marks:75

Time: 3Hrs.

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 1 question

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

Note: Under SECTION-A (Q.NO:13) & SECTION-B (Q.NO:14) will be given from UNIT-III.

SECTION-A

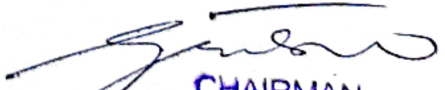
Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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II B.Sc Statistics

Statistical Methods

Model Question Paper (Theory) (for 2019-22 batch w. e. f 2018-2019)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. Explain the types of Correlation.
2. Explain the difference between Correlation Analysis and Regressive Analysis.
3. Explain the method of Least Squares.
4. Explain the independence of attributes .
5. Explain the concept of Standard Error.
6. The ranks of 10 students in Maths & Statistics are as follows.

M	3	6	4	2	1	7	10	9	5	8
S	1	7	4	5	6	8	9	3	2	10

Calculate the rank Correlation Coefficient between two given subjects.

7. Calculate the regression equation of Y on X for the following data.

X	6	2	10	4	8
Y	9	11	5	8	7

8. Examine the consistency of the following data.
N = 1000, (A) = 525 , (B) = 312 , (C) = 470, (AB) = 42 , (BC) = 86, (AC) = 147 &
(ABC) = 25

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

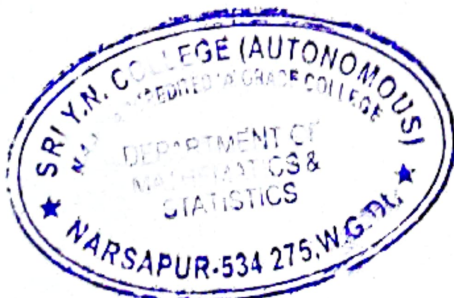
5x10M = 50M

SECTION – A


9. Define Correlation Coefficient. Derive the limits for Correlation coefficient are ± 1 .
10. State and prove the Edward Spearman's Rank Correlation Coefficient.
11. Define Regression Coefficients. Derive the Regression Coefficients are not affected by the change of origin but affected by the change of Scale.
12. Explain Partial and Multiple Correlation Coefficients.
13. How do you fit a straight line using the principle of least squares?

SECTION-B

14. Explain the fitting of an exponential Curve.
15. Derive the relation between Coefficient of association (Q) and Coefficient of Colligation (Y).
16. Explain the conditions for consistency of three attributes.
17. Derive the relationship between F and χ^2 distributions.
18. Define and explain the χ^2 , t and F distributions.



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Paper IV, Syllabus for IV semester
STATISTICAL INFERENCE

Unit-I (10 Marks-2,5 Marks-2)

Theory of estimation: Estimation of parameter, criteria of a good estimator- unbiasedness, consistency, efficiency, sufficiency and Statement of Neyman's factorization theorem. Estimation of parameters by the methods of moments and maximum likelihood (M.L), properties of MLE's. Binomial, Poisson & Normal Population Parameters estimate by ML method. Confidence intervals of the parameters of normal population.

Unit-II (10 Marks-2,5 Marks-2)

Concepts of Statistical hypothesis: Null and alternative hypothesis, critical region, two types of errors, level of significance, power of a test, 1 tailed, 2 tailed tests, Neymann-Pearson's lemma. Examples in of Binomial, Poisson, Normal distributions.

Unit-III (10 Marks-2,5 Marks-2)

Large Sample Tests: Large sample tests for single mean, two means, Single proportion. Two proportions, Standard Deviation of single and double samples and Fisher's Z transformation.

Unit-IV (10 Marks-2,5 Marks-1)

Small sample tests: Tests of significance based on χ^2 , t and F. χ^2 -test for test for independence of attributes, t – test for single, double ad paired tests, variance ration test (F-test).

Unit-V (10 Marks-2,5 Marks-1)

Non-parametric tests – advantages and disadvantages. Two sample run test, Two sample Median test and Two sample sign test.

TEXT BOOKS


1. BA / BSc II Year statistics – stastical methods and inference – Telugu Academy by A. Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C.Ravichandra Kumar.
2. K.V.S.Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

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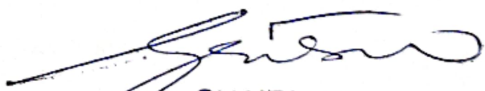
Practicals Semester – IV

Conduct any 6 (Ms-excel is compulsory)

1. Large sample tests for mean(s).
2. Large sample tests for proportion(s).
3. Large sample tests for standard deviation(s).
4. Large sample tests Fisher's Z-transformation.
5. Small sample tests for Single and Doublet – test
6. Small sample tests for Paired t – test.
7. F – Test.
8. Chi square test for independence of attributes .
9. Non – parametric tests – run test.
10. Non – parametric tests – median test.
11. Non parametric tests – sign tests.
12. MS-Excel methods for the above Serial Numbers 1,2,3,4.(any one of above).



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SEMESTER-IV
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 2 questions
Unit - IV	: 1 question
Unit - V	: 1 question

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

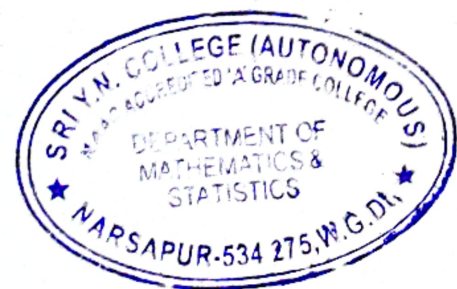
Note: Under SECTION-A (Q.NO:13) & SECTION-B (Q.NO:14) will be given from UNIT-III.

SECTION-A

Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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Statistical Inference

Model Question Paper (Theory) (for 2019-22 batch w. e. f 2018-2019)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. Explain the type I and type II errors.
2. Write the statement of Fisher – Neyman Factorization Theorem.
3. Explain the large sample test for single proportion .
4. Explain the paired t – test for difference of means.
5. What are the advantages of Non – parametric test.
6. Explain difference between large and small sample tests.
7. Explain the method of moments.
8. Explain One tailed and two tailed tests.

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

5x10M = 50M

SECTION – A


9. State and prove Rao – Cramer's inequality.
10. Explain the concept of Criteria of a good estimator.
11. State and prove Neyman – Pearson Lemma.
12. Explain the following.
 - (i) Null and Alternative Hypothesis.
 - (ii) Level of Significance.
 - (iii) Degrees of Freedom.
 - (iv) Power of the test.
 - (v) Critical Region.
13. Explain a large sample test for difference of two sample means.

SECTION-B

14. Explain the large sample test of significance for difference of standard deviations.
15. Explain the t – test for single mean.
16. Explain the chi – square test for the independence of attributes.
17. Explain the two sample sign test.
18. Explain the two sample median test.



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III B.Sc Statistics (for 2018-2021 batch, w.e.f 2019-20)
Paper V, Syllabus for V semester

SAMPLING TECHNIQUES & DESIGN OF EXPERIMENTS

Unit-I (10 Marks-2,5 Marks-2)

Sampling Theory: Principle steps in a sample survey, Census versus Sample survey, Sampling and Non sampling errors. Types of sampling – Subjective, Probability and mixed sampling methods.

Unit-II (10 Marks-2,5 Marks-1)

Simple Random Sampling : Meaning of samples and methods to draw, estimation of population mean, variances in SRSWR & SRSWOR, Advantages and disadvantages of these methods.

Unit-III (10 Marks-2,5 Marks-2)

Stratified Random Sampling : Proportional and optimum allocation of sample sizes in stratification. Variances of these methods. Comparison of their relative efficiencies. Advantages and Disadvantages of Stratified sampling. Concept of Systematic sampling, Advantages and Disadvantages.

Unit-IV (10 Marks-2,5 Marks-1)

Analysis of Variance: Causes of variation, statement of Cochran's theorem, One – Way with equal and unequal classifications and two way classifications.

Unit-V(10 Marks-2,5 Marks-2)

Design of Experiments: Principles of Experimentation in Designs Analysis of Completely randomized design (CRD) , Randomized block design (RBD) and Latin Square Design (LSD) , efficiency of these designs. Concept of Factorial experiments.

Text Books:


1. Telugu Academy B.A / B.Sc III year paper – III Statistics – applied statistics – Telugu Academy by Prof . K Srinivasa Rao, Dr D Giri, Dr A Anand, Dr V Papaiah Sastry.
2. KVS Sarma : Statistics Made Simple : Do it yourself in PC. PHI

Reference books:

1. Fundamentals of applied statistics : VK Kapoor and SC Gupta.
2. Anuvarthita Sankyaka Sastram – Telugu Academy.

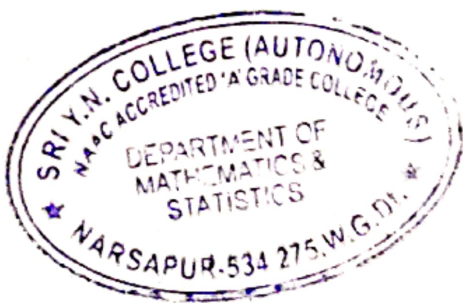


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Practicals

1. Estimation of Population mean, variance by SRSWOR
2. Estimation of Population mean, variance by SRSWR
3. ANOVA one – way classification
4. ANOVA – CRD
5. ANOVA – RBD
6. ANOVA – LSD
7. Ms – Excel methods for the about serial numbers 4,5,6 (any one)



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SEMESTER-V
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 1 question
Unit - III	: 2 questions
Unit - IV	: 1 question
Unit - V	: 2 questions

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

Note : Under Section –A (Q. No: 13) and Section – B (Q. No: 14) will be given from UNIT-III

SECTION-A


Unit - I	: 2 questions
Unit - II	: 2 questions
Unit – III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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III B.Sc. Statistics – Paper V

SAMPLING TECHNIQUES & DESIGN OF EXPERIMENTS

Model Question Paper (Theory) (for 2018-21 batch w. e. f 2019-2020)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M = 25M

1. Explain the advantages of Sampling over census.
2. Show that the Sample Mean is an Unbiased estimate of the population mean in SRSWOR.
3. Explain the proportional allocation method in Stratified Random Sampling.
4. Explain ANOVA and its assumptions.
5. Explain about C.R.D.
6. Explain the Systematic Random Sampling.
7. Explain the concept of Factorial Experiments.
8. Explain Sampling and Non – Sampling errors.

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

5x10M = 50M

SECTION – A


9. What are the principal steps in a Sample Survey. Discuss them briefly.
10. What is the difference between Census Survey and Sample Survey.
11. Derive the Variance of the Sample mean in SRSWOR.
12. Show that the Sample mean square is an unbiased estimate of population mean square.
13. Define and explain Stratified Random Sampling. What are the advantages and disadvantages of Stratified Random Sampling.

SECTION-B

14. Define Systematic Sampling and also give the advantages and disadvantages of Systematic Sampling.
15. Explain the analysis of variance of Two –Way classification and also give ANOVA 2 – way table.
16. What is meant by ANOVA 1 – way classification. Give layout and analysis for one – way classification.
17. What is Latin Square Design (L.S.D). Give the layout and analysis of a L.S.D. Discuss its merits and demerits.
18. Explain the analysis of Randomized Block Design (R.B.D).



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Paper VI, Syllabus for V semester

Quality and Reliability

Unit-I (10 Marks-2,5 Marks-2)

Importance of SQC in industry, statistical basis of shewart control charts, uses of control charts, control limits, natural tolerance limits and specification limits, concept of six – sigma.

Unit-II (10 Marks-2,5 Marks-2)

Variable Control Chart : Construction of mean, R, S.D, charts for variables, interpretation of control charts.

Attribute control charts – np, p charts, C chart, Interpretation of control charts.

Unit-III (10 Marks-2,5 Marks-1)

Acceptance Sampling Plans –Scope, Producer's risk and consumer's risk concepts of AQL and LTPD.

Unit-IV (10 Marks-2,5 Marks-1)

Sampling Plans: Single and double sampling plans, OC and ASN functions, Double and single Sampling plans for attributes using Binomial.

Unit-V(10 Marks-2,5 Marks-2)

Reliability : Introduction, failure rates, Hazard function, estimation of reliability, exponential distribution as life model, its memory less property

Text Books:

1. B.A / B.Sc III year paper – IV Statistics – applied statistics – Telugu Academy by Prof. K Srinivasa Rao, Dr D Giri, Dr A Anand, Dr V Papaiah Sastry

2. Fundamental of Applied Statistics : V.K.Kapoor and S.C.Gupta:

3. S K Sinha : Reliability and life testing . Wiley Eastern

Reference books:

1. R C Gupta : Statistical Quality Control.

Practicals

1. Construction of \bar{X} , R – Charts
2. Construction of P – Charts
3. Construction of P – Chart – Variable Sample Size
4. Construction of np – Chart
5. Construction of C – Chart
6. Ms – Excel methods for the serial numbers 1.
7. Ms – Excel methods for the serial numbers 2 to 4 (any one)



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SEMESTER-V
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 1 question
Unit - IV	: 1 question
Unit - V	: 2 questions

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

Note : Under Section –A (Q. No: 13) and Section – B (Q. No: 14) will be given from UNIT-III

SECTION-A


Unit - I	: 2 questions
Unit - II	: 2 questions
Unit – III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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III B.Sc. Statistics – Paper VI

MATHEMATICAL EXPECTATION AND PROBABILITY DISTRIBUTIONS

Model Question Paper (Theory) (for 2018-21 batch w. e. f 2019-2020)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. Explain the Process Control and Product Control.
2. Explain Standard Deviation Chart.
3. Explain need for Sampling Inspection Plan.
4. Explain Single Sampling Plan.
5. Explain Hazard Function.
6. Explain the Concept of Six – Sigma.
7. Explain Reliability Function.
8. What are the types of Control Charts.

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

5x10M = 50M

SECTION – A

9. Discuss the importance of Statistical Quality Control in industry.
10. Explain Construction of Mean & Range Charts.
11. What are the charts for attributes. Explain np, p – charts?
12. Explain the Double Sampling Plan.
13. Define and explain AQL & LTPD.

SECTION-B

14. Explain (i) Producer's Risk (ii) Consumer's Risk
15. Explain the memory less property of Exponential Distribution.
16. Explain Reliability function and give its estimation.
17. Write the O.C and A.S.N. function for Single Sampling Plan.
18. Explain Natural tolerance limits and Specification limits.



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Paper VII, Syllabus for VI semester

Optimization Techniques

Unit-I (10 Marks-2,5 Marks-2)

Operations Research: Origin and development of OR., Nature and features of O.R., Scientific method and Modeling in O.R., Advantages and limitations of models, General solution methods for O.R. models.

Unit-II (10 Marks-2,5 Marks-1)

Linear Programming Problem : Definition, components, basic assumptions, Mathematical formulation of the problem, Illustrations on mathematical formulation of LPP, LPP – Graphical solution method, some exceptional cases in graphical method – alternative optima , unbounded solution and infeasible solutions.

Unit-III (10 Marks-2,5 Marks-1)

Linear Programming Problem – Simplex Method - I –General LPP – Objective function, constraints, non negative restrictions, Solution of LPP, feasible solution and optimum solution, Canonical and standard forms of LPP., Basic solution – definition, degenerate solution, basic feasible solution, associated cost vector, improved basic feasible solution, optimum basic feasible solution and net evaluation, Fundamental theorem of LPP., the computational procedure – Simplex algorithm, Simple linear programming problems.

Unit-IV (10 Marks-2,5 Marks-2)

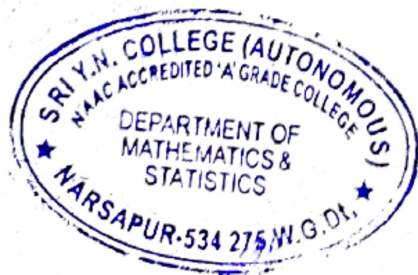
Linear Programming Problem Simplex method – II: Artificial variable technique, The Big M method or method of Penalties, Degeneracy, Alternative optima, Unbounded solutions, Non existing or infeasible solutions

Unit-V(10 Marks-2,5 Marks-2)


Duality in Linear Programming: General Primal – Dual pair, Formulation a dual problem, Primal – Dual pair in Matrix form, Duality.

Reference books:

1. Operations Research, Kanthi Swaroop.
2. Operations Research Theory, Methods and Applications, SD Sharma.
3. Krishna's Operations Research, Dr RK Gupta.
4. Operations research : Theory and Applications, JK Sharma.
5. Operations Research : An Introduction, Hamdy A Taha.



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Practicals

1. Formulation of LPP
2. Formulation of LPP by Graphical Method (Maximization)
3. Formulation of LPP by Graphical Method (Minimization)
4. Solutions of LPP by Simplex method
5. Solutions of LPP by Big – M method
6. Solutions of LPP by using principal of duality
7. MS Excel is compulsory for serial number 2,4,6



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SEMESTER-VI
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 1 question
Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

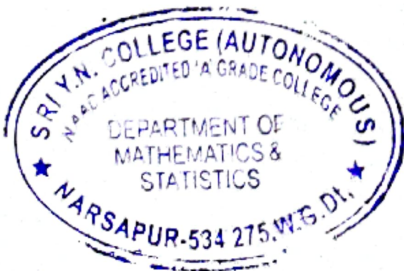
Note : Under Section –A (Q. No: 13) and Section – B (Q. No: 14) will be given from UNIT-III

SECTION-A


Unit - I	: 2 questions
Unit - II	: 2 questions
Unit – III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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III B.Sc. Statistics – Paper VII
OPTIMIZATION TECHNIQUES

Model Question Paper (Theory) (for 2017-20 batch w. e. f 2019-2020)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. Define OR and explain the features of OR.
2. Explain the different models in OR.
3. Explain the Mathematical formulation of LPP.
4. Explain an Optimum basic feasible solution.
5. Explain degeneracy in LPP
6. Explain an unbiased solution.
7. Explain the concept of duality.
8. Explain an economic interpretation of duality problem.

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.
Each question carries 10 marks.

5x10M = 50M

SECTION – A

9. Define OR and discuss the significance and scope of OR.
10. Explain the advantages and limitations of OR.
11. A company produces 3 products P,Q & R from three raw materials A,B & C. one unit of product P required 2 units of A & 3 units of B. One unit of product Q requires 2 units of B & 5 units of C. One unit of product R required 3 units of A, 2 units of B and 4 units of C. The company has 8 units of material A, 10 units of material B and 15 units of material C. Profits as per unit of products P,Q,R are Rs.3/-, Rs.5/- and Rs.4/- respectively. Formulate the given problem as LPP.
12. Explain the Graphical method of LPP.
13. State and prove Fundamental Theorem of LPP.

SECTION-B

14. Use Simplex method to solve the following LPP

$$\text{Max } Z = 7x_1 + 5x_2$$

Subject to the constraints

$$x_1 + 2x_2 \leq 6$$

$$4x_1 + 3x_2 \leq 12$$

$$\text{and } x_1, x_2 \geq 0$$

15. Use Charnes Penalty method and Big – M method to solve the following LPP.

$$\text{Min } Z = 2x_1 + x_2$$

Subject to the constraints

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 3$$

$$\text{and } x_1, x_2 \geq 0$$

16. Explain Artificial variable technique or Big – M method.

17. Write the rules for converting the primary into its dual with suitable example.

18. Show that Dual of dual of the primal is primal.



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III B.Sc Statistics (for 2018-2021 batch, w.e.f 2019-20)
Syllabus for VI Semester - Cluster Elective 8A
Operation Research - I

UNIT-I : Linear Programming problem - Advanced Techniques :

Revised Simplex Method – Algorithm, Simple Problems (2 and 3 variables), Simplex method versus revised simplex method, Bounded Variables – Computational procedure, Simple problems(2 and 3 variables).

UNIT –II :Transportation Problem :

L. P. formation of the Transportation problem, Tabular representation, Initial Basic Feasible Solution(I.B.F.S) to Transportation Problem, North West Corner, Least Cost and Vogel's approximation methods.

UNIT –III: Transportation Problem :

The optimality test - Transportation Algorithm - MODI(Modified Difference Method), Degeneracy Transportation Problem.

UNIT -IV: Assignment Problem :

Mathematical Formulation of the problem, Hungarian method for assignment problem, Special cases in Assignment problems – Unbalanced, prohibited, Maximization. Travelling Salesman Problem, A typical Assignment problem.

UNIT – V : Sequencing Problem :

Problem of Sequencing , Principal Assumptions, Solution of Sequencing , Problem – Processing n jobs through 2 machines and Processing n jobs through 3 machines - Johnson's optimal sequence Algorithm, Processing n jobs through k - machines - Johnson's Optimal sequence Algorithm, Simple Problems.

Books for reference:

1. Operations Research - Kanthi Swaroop
2. Operations Research – S.D. Sarma
3. Quality, Reliability and Operation Research – Telugu Academy Publications, Hyderabad


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Practicals

1. Revised Simplex.
2. Least Cost Entry Method.
3. VAM of TP.
4. MODI of TP.
5. Assignment problem.
6. M.S. Excel is compulsory for serial number 1,2, 3



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SEMESTER-V
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 1 question
Unit - II	: 2 questions
Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

Note : Under Section –A (Q. No: 13) and Section – B (Q. No: 14) will be given from UNIT-III

SECTION-A

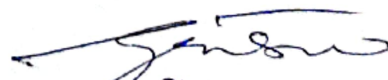
Unit - I	: 2 questions
Unit - II	: 2 questions
Unit – III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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Operation Research - I

Model Question Paper (Theory) (for 2018-21 batch w. e. f 2019-2020)

Time: 3Hrs

Max Marks: 75

PART-I

5x5M =25M

Answer any FIVE Questions, each question carries FIVE marks.

1. Explain bounded variables.
2. Write the tabular representation of transportation problem.
3. Explain briefly degeneracy transportation problem.
4. Explain travelling salesman problem.
5. Write the assumptions of sequencing problem.
6. Determine an initial basic feasible solution to the following transportation problem using North-West Corner Method.

	D1	D2	D3	D4	Availability
O1	5	3	6	2	19
O2	4	7	9	1	37
O3	3	4	7	5	34
Demand	16	18	31	25	

7. Solve the following assignment problem

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

8. We have five jobs, each of which must go through the two machines A and B in the order AB.

Processing times in hours are given in the table below.

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Determine a sequence for the five jobs that will minimize the elapsed time.

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

5x10M = 50M

SECTION - A

9. Explain Revised Simplex Algorithm.
10. Use revised simplex method to solve the following L.P.P.

$$\text{Minimum } Z = x_1 + 4x_2$$

Subjective Constraints

$$x_1 + 2x_2 \leq 7$$

$$4x_1 + x_2 \leq 6$$

$$\text{And } x_1, x_2 \geq 0$$

11. Explain least cost method.

12. Determine an initial basic feasible solution to the following transportation problem by using the VAM-Method.

	I	II	III	IV	Supply
A	13	11	15	20	2000
B	17	14	12	13	6000
C	18	18	15	12	7000
Demand	3000	3000	4000	5000	

13. Explain MODI method.

SECTION-B

14. Find the optimum solution to the following problem using UV-Method.

Destination/supply	I	II	III	IV	SOURCE
O1	21	16	25	13	11
O2	17	18	14	23	13
O3	32	17	18	41	19
DEMAND	6	10	12	15	43

15. Explain an algorithm to solve Assignment Problem by Hungarian method.

16. Solve the following assignment problem of maximization.

EMPLOYEE/JOBS	I	II	III	IV	V
A	10	5	13	15	16
B	3	9	18	13	6
C	10	7	2	2	2
D	7	11	9	7	12
E	7	9	10	4	12

17. Explain sequential procedure for solving 2 machines 'n' jobs problem.

18. Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing is not allowed.

Job	A	B	C	D	E	F	G
Machine M1	3	8	7	4	9	8	7
Machine M2	4	3	2	5	1	4	3
Machine M3	6	7	5	11	5	6	12

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Syllabus for VI Semester - Cluster Elective 8B
Operation Research - II

UNIT-I : Games and Strategies : (10 Marks – 2, 5 Marks - 2)

Introduction, Two person zero sum games, some basic terms, the Maxima-Minima Principle, Games without saddle points – mixed Strategies, Algebraic Method, Graphical solution of $2 \times n$ and $m \times 2$ Games, Dominance property.

UNIT-II: Inventory control – I : (10 Marks – 2, 5 Marks - 2)

Basic concepts of inventory problem, Types of inventories and cost associated with inventories, Factors affecting inventory control, The concept of EOQ(Economic Order Quantity), Deterministic inventory Problems (Static Demand Model).

UNIT-III: Inventory Control –II : (10 Marks – 2, 5 Marks - 1)

Price Breaks (Quantity Discounts) : Problems of EOQ with – One price break and More than one price break, Simple Problems, Probabilistic inventory models, Instantaneous demand, No-setup cost model – Discrete case and Continuous case, Newspaper Boy Problem, Simple Problem.

UNIT-IV: Network Scheduling –I : (10 Marks – 2, 5 Marks - 1)

Basic steps in PERT/CPM techniques Basic components, Logical sequencing (errors in drawing networks), Rules for network construction, Critical Path analysis(CPM) – Forward pass method, Backward pass method, Determination of floats and slack times, Simple problems.

UNIT-V: Network Scheduling - II : (10 Marks – 2, 5 Marks - 2)

Probability considerations in PERT (Project Evaluation and Review Technique), Distinction between PERT and CPM, Applications of network techniques, Limitations and difficulties in using Network, Project cost, Time Cost optimization algorithm, Simple Problems.

Text Books:

1. Kanthi Swarup , P.K.Guptha, Man Mohan, Operations Research.
2. Operations Research Theory, Methods and Applications, S.D. Sarma.

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Practicals

1. Game theory – Saddle Points
2. Graphical solution of $2 \times n$ and $m \times 2$ game
3. Dominance property
4. Inventory models
5. PERT/CPM Techniques
6. M.S. Excel is compulsory for serial number 1, 3

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SEMESTER-VI
BLUE PRINT

Time: 3Hrs.

Max. Marks:75

PART-I(5 x 5 = 25 M)

Answer any FIVE Questions, each question carries FIVE marks.

Unit - I	: 2 questions
Unit - II	: 2 questions
Unit - III	: 1 question
Unit - IV	: 1 question
Unit - V	: 2 questions

PART-II(5 x 10 M= 50 M)

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

Note : Under Section –A (Q. No: 13) and Section – B (Q. No: 14) will be given from UNIT-III

SECTION-A

Unit - I	: 2 questions
Unit - II	: 2 questions
Unit – III	: 1 question

SECTION-B

Unit - III	: 1 question
Unit - IV	: 2 questions
Unit - V	: 2 questions



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III B.Sc. Statistics – Cluster Elective 8B

Operation Research - II

Model Question Paper (Theory) (for 2018-21 batch w. e. f 2019-2020)

Time: 3Hrs

Max Marks: 75

PART-I

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. Describe Game and Strategy.
2. Explain Economic Order Quantity.
3. Explain EOQ Problem with one price break.
4. Write the factors affecting inventory control
5. Explain Logical Sequencing in networking.
6. Write the applications of network techniques.
7. Find the Saddle Point of the following payoff matrix.

Player B

	B1	B2	B3
Player A	A1 60	56	34
	A2 63	60	55
	A3 83	72	60

8. Develop a network diagram for the project specified below

Activity	A	B	C,D	E	F	G
Immediate Predecessor	-	A	B	C	D	E,F

PART-II

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

5x10M = 50M

9. Explain the graphical method of solving 2 x n game.
10. Solve the following game using the method of dominance

Player B

	B ₁	B ₂	B ₃	B ₄
Player A	A ₁ 4	2	3	6
	A ₂ 3	4	7	5
	A ₃ 6	3	5	4

11. Describe deterministic inventory problems.
12. A manufacturing company purchases 9,000 parts of a machine for its annual requirements, ordering one month usage at a time. Each part costs Rs.20. The ordering cost per order is Rs.15 and the carrying charges are 15% of the average inventory per year. You have been assigned to suggest a more economical purchasing policy for the company. What advice would you offer and how much would it save the company per year?
13. Explain Probabilistic Inventory Single Period Problem without set-up cost.

SECTION-B

14. The probability distribution of monthly sales of a certain item is as follows:

Monthly sales:	0	1	2	3	4	5	6
Probability	0.02	0.05	0.30	0.27	0.20	0.10	0.06

The cost of carrying inventory is Rs.10 per unit per month. The current policy is to maintain a stock of four items at the beginning of each month. Assuming that the cost of shortage is proportional to both time and quantity short, obtain the imputed cost of a shortage of one item for one unit of time.

15. Describe the rules of network construction.

16. The following details are available regarding a project

Activity	A	B	C	D	E	F
Predecessor Activity	-	A	A	B	C	D, E
Duration(week)	3	5	7	10	5	4

Draw the network, determine the Critical Path and find the project completion time.

17. Explain the difference between PERT and CPM.

18. Determination of project completion time in PERT. Find out the time required to complete the following project and the critical activities

Activity	A	B	C	D	E	F	G	H	I
Predecessor Activity	-	A	A	B	C	D, E	D, E	F	G
Pessimistic Time	6	9	12	15	10	26	26	8	5
Optimistic Time	2	3	8	9	8	16	19	2	1
Most likely Time	4	6	10	12	9	21	22	5	3

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