GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
B.A/BSC SYLLABUS (Semester Wise) 2017-18
I B.Sc. Statistics/Semester-II
(With Mathematics Combination)
Mathematical Expectation and Probability Distributions
Total hrs per week: 04   **Total credits: 03**

Unit –I
Mathematical Expectation: Mathematical expectation (ME) 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 its properties Chebyshev and Cauchy-Schwartz inequalities

Unit-II
Discrete distributions: Binomial and Poisson distributions, their definitions, ist to 4 central moments, M.G.F, C.F, C.G.F, P.G.F, mean, variance, additive property if exists Poisson approximation to Binomial distribution.

Unit-III
Negative binomial, Geometric and Hyper-geometric distributions- Definitions, means, Variances, M.G.F, C.F, C.G.F, P.G.F, reproductive property if exists Binomial approximation to Hyper-geometric Distribution, Poisson approximation to Negative binomial distribution.

Unit-IV
Continuous distributions: Rectangular, Exponential, Gamma, Beta distributions of two kinds. Other properties such as mean, variance, M.G.F, C.G.F, C.F, reproductive property.

Unit-V
Normal Distribution: Definition, Importance, Properties, M.G.F, additive properties, Interrelation between Normal and Binomial, Normal & Poisson distribution, Cauchy Distribution.

Practical's-Semester-II

Conduct any 6 (MS-excel is compulsory)

1. Fitting of Binomial Distribution- Recurrence relation method
2. Fitting of Poisson Distribution- Recurrence relation method
3. Fitting of Negative Binomial Distribution.
4. Fitting of Geometric Distribution.
5. Fitting of Normal Distribution- Areas Method.
6. Fitting of Normal Distribution- Ordinates method.
7. MS-Excel methods for the above Serial Numbers 1 and 2

Text Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan

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

4. B.A/B.Sc Statistics Descriptive Statistics and Probability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P.Raj Kumar.

Reference books:

1. William Feller: Introduction to Probability theory and its applications.Volume –I, Wiley

2. GoonAM, Gupta MK, Das Gupta B: Fundamentals of Statistics, Vol-I, the world Press Pvt.Ltd. Kolkata.

3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.

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.

6. Hogg.Tanis.Rao: Probability and Statistical Inference. 7th edition. Pearson.

7. Sambhavyata Avadhi Siddantalu—Telugu Academy.

GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2017-18
I B.Sc. Statistics/Semester-II
(With Mathematics Combination)
Mathematical Expectation and Probability Distributions

MODEL QUESTION PAPER (THEORY)

Time: 3 hrs   **MaxMarks:60**

(Candidates are permitted to use Non-Programmable Calculators)

SECTION-A   **5x4 = 20M**

Answer any FIVE Questions. Each question carries equal marks

1. Define Moment Generating Function. Write its properties
   .
2. State Cauchy-Schwartz inequality

3. Derive the M.G.F of Binomial distribution.

4. State the additive property of Poisson distribution.

5. Write the properties of Negative Binomial distribution.

6. Derive the mean of Rectangular distribution.

7. Write the importance of Normal distribution.

8. Write the properties of Cauchy distribution.

SECTION-B   **4x8=32M**

Answer all the questions. Each question carries eight marks.

9 a) State and prove Addition and Multiplication theorems of expectation

(Or)

b) Define Characteristic function. Write its properties. State and Prove Chebychev's inequality.

10a) Derive the mean and variance of Binomial distribution.

(Or)

b) Derive Poisson distribution as a limiting form of a binomial distribution.

11a) Define geometric distribution. Derive its mean and variance.

(Or)

b) What is a hyper geometric distribution? Find Moment generating function and Characteristic function.

12a) Define Exponential distribution. Derive the memory less property of exponential distribution.

(Or)

b) Derive the interrelation between Normal and Binomial distributions.

SECTION – C
Answer all the questions, all questions carries Equal marks   (4 x2=8M)

13. Define Expectation and State Chebychev's inequality

14. Write the mean and variance of negative binomial distribution

15.   Define gamma distribution

16.   Write the properties of normal distribution

GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM
B.A/ B.Sc II YEAR. STATISTICS SYLLABUS
(With Mathematics Combination)
Semester-IV CBCS
Statististical Inference

Total hrs per week: 04   **Total credits: 03**

Unit – I

Theory of estimation: Estimation of a parameter, criteria of a good estimator-Unbiasedness, consistency, efficiency and sufficiency. 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 estimation by ML Method. Confidence intervals of the parameters of normal population.

Unit-II

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

Unit – III

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

Small sample tests: Tests of significance based on $\chi 2$, t and F. $\chi 2$-test for goodness of fit and test for independence of attributes. T-test for single, double and paired tests, Variance Ratio Test (F-test).

Unit – V

Non-parametric tests: Advantages and disadvantages, Two sample run test, Two sample Median test and Two sample sign test.

Practical's 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 test for standard deviation(s)
4. Large sample tests for 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).

Text Books:

1. B.A/B.Sc II Year statistics-statistical methods and inference-Telugu Academy by A.Mohanrao, N.SrinivasaRao, Dr.R.Sudhakara Reddy,Dr.T.C. Ravichandrakumar

2. K.V.S.Sarma Statistics Made simple: Do it yourself on PC, PHI.

3. B.A/B.Sc Statistics Descriptive Statistics and Probability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.

Reference Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi

2. Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd, Kolkata.

3. Hoel P.G: Introduction to matehematical statistics, Asia Publishing house.

GOVERNMENT COLLEGE(AUTONOMOUS) RAJAMAHENDRAVARAM
II B.A/B.Sc. Statistics(Semester-IV)
(With Mathematics Combination)
Statistical Inference
MODEL QUESTION PAPER (THEORY)

Time: 3 hrs   **MaxMarks: 60**

SECTION-A

Answer any five questions. All questions carry equal marks.   **5 x 4 =20M**

1. Explain the method of moments.

2. Explain confidence intervals.

3. Explain Null hypothesis and Alternative hypothesis.

4. Define one tailed and two tailed tests.

5. Explain test for single proportion.

6.   Explain paired t- test.

7. Explain Fisher's Z-transformation.

8. Explain chi-square test for independence of attributes.

SECTION-B

Answer ALL the questions. All questions carry equal marks.   **4 x 8 = 32M**

9a) Explain the criteria of a good estimator.
                        (OR)
 b) Explain the method of MLE. Find the MLE of Poisson distribution based on a random sample of size n.

10 a) State and prove Neyman-Pearson's Lemma.
                        (OR)
  b) How do you apply Neyman Pearson's lemma in case of Binomial distribution?

11 a) Explain the test procedure for (i) Testing of Mean and (ii) Equality of two means
                        (OR)
  b) The following samples have been drawn from normal population to test the null hypothesis that   = 2.
     0.468, 0.270, 0.074, 1.574, 1.680, 4.984,   1.596, 0.568, 4.040, 2.440

12 a) The following data obtained from a survey conducted about 320 families who are having five children. Fit a Binomial distribution for the data with $p = \frac{1}{2}$ and test the goodness of fit.

No. of boys	0	1	2	3	4	5
No. 0f families	14	56	110	88	40	12

(OR)

b) Explain the test procedure for Median.

SECTION-C
Answer ALL the questions. All questions carry equal marks: 4x 2 =8M

13. Explain Unbiasedness

14. Define Type I error and Type II errors

15. Write the uses of F test.

16 Write the assumptions of non parametric tests

GOVERNMENT COLLEGE (AUTONOMOUS) RAJAMAHENDRAVARAM

B .A/B.Sc. III Year: Statistics Syllabus
(With Mathematics Combination)
Semester-VI CBCS
APPLIED STATISTICS

Total no. of hrs per week: 03   **Total credits:03**

Unit-I

Analysis of Time series: Components of time series: meaning and examples, trend by least squares (straight-line and parabola) methods and moving average methods. Seasonal indices by Simple averages, ratio to moving average, ratio to trend and link relative methods.

Unit-II

Index Numbers: Meaning, problems involved in the construction of index numbers, simple and weighted index numbers, Criteria of good index numbers, fixed base and chain base index numbers. Cost of living index numbers, Wholesale price index numbers, Base shifting, Splicing and deflation of index numbers.

Unit-III

Official Statistics: Functions and organization of CSO and NSSO. Agricultural Statistics, area and yield statistics. National Income and its computation, utility and difficulties in estimation of national income

Unit –IV

Vital statistics: Meaning, Definition, Uses, Sources of vital statistics, Various Death rates- CDR, ASDR, STDR and Birth rates- CBR, ASFR, TFR.

Unit-V

Reproduction Rates: Measurement of population growth, crude rate of natural increase, Pearl's Vital index, Gross reproductive rate(GRR) and Net reproductive rate(NRR), Life tables, construction and uses of life tables and Abridged life tables.

Text Books:

1. Fundamentals of Applied Statistics: VK Kapoor and SC Gupta

2. 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. Papaya Sastry.

3. B.A/B.Sc Statistics Applied Statistics, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.

Reference Books:

1. Indian Official Statistics- MR Saluja

2. Anuvartita Sankhyaka sastram – Telugu Academy

Practical's Semester-VI

Conduct any 6 (MS-Excel is compulsory)

1. Measurement of Linear Trend

2. Measurement of Seasonal Indices-Link Relatives method

3. Reversal tests

4. Cost of Living Index Numbers.

5. Mortality, Fertility and Reproduction rates.

6. Life Tables.

7. MS-Excel Practical

GOVERNMENT COLLEGE (AUTONOMOUS)
RAJAMAHENDRAVARAM
III B.A/B.Sc. Statistics (Semester-V)
(With Mathematics Combination)
APPLIED STATISTICS
MODEL QUESTION PAPER (THEORY)

Time: 3 hrs **MaxMarks: 75**

SECTION-A
Answer ALL the questions. All questions carry equal marks. **5 x 10 = 50M**

1 a) How do you determine trend by least squares method
(OR)
  b) Explain the ratio to moving average method in Seasonal indices

2 a) Explain the problems involved in the construction of index numbers
(OR)
  b) Explain the criteria of a good index number.

3 a) Explain the functions and organization of CSO?
(OR)
  b) Explain National Income and its computation.

4 a) Explain about various death rates
(OR)
  b) Explain about various birth rates.

5 a) Explain Gross reproduction rate and Net reproduction rate.
(OR)
  b) Explain life tables and its construction.

SECTION-B
Answer any five questions. All questions carry equal marks. **5 x 3 = 15M**

6   Explain the method of simple averages

7   Explain cost of living index numbers

8   Explain NSSO

9   What are the sources of vital statistics

10 Explain abridged life tables.

11 Explain Base shifting of index number

12 Explain the use of national income

13 What are the uses of vital statistics

SECTION-C
Answer ALL the questions. All questions carry equal marks.   **10x 1= 10M**

14. Mention the components of time series

15. Define trend

16. Define an index number

17. Define splicing

18. Define Agricultural statistics

19. Define national income

20. Define Vital Statistics

21. Define pearl's vital index

22. Define Reproduction rate

23. Define fertility rate

GOVERNMENT COLLEGE (AUTONOMOUS)
RAJAMAHENDRAVARAM
BA/B.Sc. III Year: Statistics Syllabus
(With Mathematics Combination)
Semester-VI CBCS (Elective-I)
OPERATIONS RESEARCH

Total hrs per week: 03   **Total credits: 03**

Unit – I
Introduction to OR:
Meaning and scope of OR. Definition of O.R. LPP (Linear Programming Problem), Formulation of LPP, graphical solution of LPP-Problems.

Unit-II
LPP: Definition of LPP, IBFS, Basic and Non-Basic variable, Slack and Surplus Variables Simplex algorithm. Concept of artificial variables. Big –M /Penalty method and two-phase simplex methods and problems

Unit-III
Transportation Problems: Definition, feasible solution by North-West corner rule, Matrix minima and VAM methods. Optimal solution through MODI and stepping stone method for balanced and unbalanced transportation problem.

Unit-IV
Assignment problem: Meaning of assignment problem,   unbalanced assignment problem, traveling salesman problem. Hungarian method for optimal solution.

Unit-V
Sequencing problem: Optimal sequence of N jobs on two and three machines without passing.

Text Books:
1. Kanti Swaroop, P.K.Guptha and Man Mohan, Operation Research, Sultan Chand.

2. BA/BSc III year paper- IV Statistics- Quality, Reliability and operations research- Telugu Academy by Dr T.C. Ravichandrakumar, Dr. R.V.S. Prasad, Dr. D. Giri, Dr. G.S. Devasena.

3. Operations Research-S.D.Sharma

List of reference books
1. Kanti Swaroop, P.K.Gupta and Man Mohan: Operations Research. Sultan Chand.

2. Gass: Linear Programming. Mc Graw Hill.

3. Hadly: Linear programming. Addison-Wesley.

4. Wayne L. Winston: Operations Research. Thomson, India edition. 4th edition.

5. Taha: Operations Research: An Introduction : Mac Milan.

Practical's-Semester-VI
Conduct any 6 practical's

1. LPP- Graphical solution

2. Simple Method

3. Two Phase Simplex methods

4. Transportation-NWCR, Matrix Minima Method and VAM Method for IBFS

5. Assignment problem (Balanced)

6. Unbalanced assignment problems

7. Travelling Salsman problems

8. Sequencing problems-n jobs- 2 machines sequencing problem

9. N Jobs-3 machine sequencing problem.

GOVERNMENT COLLEGE (AUTONOMOUS)
RAJAMAHENDRAVARAM
III B.A/B.Sc. Statistics (Semester-VI)
(With Mathematics Combination)
OPERATIONS RESEARCH (Elective-I)
MODEL QUESTION PAPER (THEORY)

Time: 3 hrs   **MaxMarks: 75**

SECTION-A
Answer ALL the questions. All questions carry equal marks.   **5 x 10 = 50M**

1 a) Describe the nature and scope of Operation Research

(OR)

 b) Solve the following LPP by using Graphical method

Maximize $Z = 45X1 + 80X_2$

Subject to const: $5X_1 + 20\ X_2 \le\ 400$

$10X_1 + 15X_2 \le\ 450$

$X_1, X_2 \ge 0$

2 a) Explain the concept of artificial variable technique.

(OR)

 b) Solve the following LPP by using Big-M Method.

Minimize $Z = 2X_1 + 3X_2$

Subject t o const: $X_1 + X_2 \ge 5$

$X_1 + 2X_2 \ge 6$

$X_1, X_2 \ge 0$

3 a) Explain North-West Corner Rule and Least Cost Entry Methods.

(OR)

 b) Solve the following Transportation Problem by using VAM.

	D_1	D_2	D_3	Supply
O_1	50	30	220	1
O_2	90	45	170	3
O_3	250	200	50	5
Demand	5	2	2	9

4 a) Solve the following assignment problem by using Hungarian method

Machines

	1	2	3	4
A	10	25	15	20
B	15	30	5	15
C	35	20	12	24
D	17	25	24	20

(OR)

 b) Explain Hungarian method in obtaining optimal solution

5 a) Give an algorithm for n job-2 machines problem.

(OR)

b) Solve the following Sequencing problem

SECTION-B

Answer any five questions. All questions carry equal marks.   5 x 3 = 15M

6 Explain te formulation of LPP

7 Explain general LPP

8 Explain Slack and surplus variables

9 Define feasible solution in a transportation problems

10 Define unbalanced assignment problem

11 Explain sequencing problem

12 Explain travelling salesman problem

13 Explain the properties of a loop in TP

SECTION-C

Answer ALL questions. All questions carry equal marks.   10 x 1 = 10M

14 Define OR

15 Define LPP

16 Define basic feasibl solution

17 Define transhipment problem

18 How many methods are there to obtain IBFS in a TP

19 What is the purpose of Simplex method

20 Define total elapsed time

21 Define sequence

22 Define optimum solution

23 Define assignment problem.

FORECASTING METHODS

Unit-I
Smoothing Methods: Averaging methods, exponential smoothing methods, a comparison of methods, general aspects of smoothing methods

Unit-II
Decomposition methods: Trend fitting, the ratio-to moving averages classical Decomposition method, different types of moving averages.

Unit-III
Models for time series data:
Auto-covariance and auto correlation functions, stationary processes, white noise processes, moving average (MA) processes, auto regressive (AR) processes, Auto regressive and moving average (ARMA) processes, Auto regressive integrated and moving average (ARIMA) processes.

Unit-IV
Box-Jenkins Models : Identification, Estimation and diagnostic checking for the Models Simulation and Monto Carlo methods

Unit-V
Application of Time-series analysis: Determining randomness of data, Examining stationery of a time series, removing non-stationarity in a time series, Recognizing seasonality in a time series.

List of Reference Books:
1. Box, G.E.P, and Jenkins, G.M(1976) Time Series Analysis-Forecasting and control, Holden-dav, San Francisco

2. Anderson, T.W (1971). The statistical Analysis of time series, Wiley,N.V

3. Montgomery, D.C. and Johnson, L.A.(1977). Forecasting and Time series Analysis, MC Grawhill.

4. Kendall, Sir Maurice and Ord, J.K.(1990). Time series Arnold (Third Edition), Edward

5. Forecasting methods by Makridakis

6. V.K.Kapoor and S.C.Gupta: Fundamentals of Applied Statistics. Sultan Chand

7. Parimal Mukhopadhyay: Applied Statistics. New Central Book agency

Government College (A) Rajahmundry
B .A/B.Sc. III Year: Statistics Syllabus
(With Mathematics Combination)
(Examination at the end of VI semester)
Elective-1I (Model Paper)
FORECASTING METHODS

Time: 3hrs **Max marks: 75**

Section-A
Answer any five of the following questions **5 x 10 = 50M**

1. Explain about averaging methods
   (Or)
   Explain about exponential smoothing methods

2. Explain about the trend fitting decomposition method
   (Or)
   Explain about ratio to moving average method

3. Describe the auto covariance and auto correlation functions
   (Or)
   Explain about ARIMA process

4. Discuss about the Box-Jenkins models
   (Or)
   Explain the identification and estimation of the Box-Jenkins models

5. How do you apply the time series analysis in determining the Randomness of data.
   (Or)
   How do you remove nonstationarity in a time series?

Section-B
Answer any five of the following **5 x 3 =15M**

6. What are general aspects of smoothing methods

7. Discuss about different types of moving averages

8. Describe Auto regressive and Moving average (ARMA)

9. Explain simulation method

10. Explain stationary and non stationary time series

11. Describe white noise processes

12. Give the difference between smoothing and decomposition methods

13. Explain the importance of Box-Jenkins models.

Section-C

Answer all the following questions   **10 x1 = 10M**

14. Define Forecasting

15. Define time series

16. Define auto correlation function

17. Describe Monto-Carlo method

18. Define trend

19. What do you mean by Moving average process

20. How do you forecast the values by moving average method

21. Explain auto regressive process

22. Write any two uses of time series

23. Write any two uses of forecasting methods.