J.M.J.COLLEGE FOR WOMEN (AUTONOMOUS): TENALI

I B.Sc. STATISTICS, SEMESTER-I, PAPER-I

SYLLABUS w.e.f 2015 - 16

TITLE: DISCRIPTIVE STATISTICS AND PROBABILITY

UNIT I:

Concepts of Primary and secondary data, Methods of collection and editing of primary data, designing a questionnaire and a schedule, Measures of central tendency – Mean, Median, Mode, Geometric Mean and Harmonic Mean.

UNIT II:

Measures of dispersion: Range, Quartile Deviation and Standard deviation. Central and non central moments and their interrelationship. Sheppard's correction for moments, Skweness and Kurtosis.

UNIT III:

Basic concepts of probability, random experiments, trail, 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.

UNIT IV:

Addition and multiplication theorems of probability for n events, Boole's inequality and Baye's theorems and problems based on Baye's theorem.

UNIT V:

Definition of random variable, discrete and continuous random variables, functions of random variable, Probability mass function, Probability density function, Disribution function and its properties.

Bivariate random variable- meaning, joint, marginal and conditional Disrtibution, independence of random variable.

Practicals:

1. Diagrammatic representation of data (Bar and Pie)
2. Graphical representation of data (Histogram, Frequency polygon, Frequency curves, Ogives)
3. Central and non central moments and Sheppard's corrections for moments.
4. Measures of skewness and Kurtosis.
5. MS Excel methods for the above Serial Numbers 1,2,4

List of Text Books:

1. Fundamentals of Mathematical Statistics by VK Kapoor& SC Gupta
2. BA/BSc I year statistics-descriptive statistics, probability distribution- Telugu Academy

List of Reference Books:

1. Fundamentals of Statistics- GoonGupta, Das Gupta.
2. Probability and statistical Inferences 7^{th} edition pearson- hoog.

J.M.J. COLLEGE FOR WOMEN (AUTONOMOUS): TENALI

PAPER I: DESCRIPTIVE STATISTICS & PROBABILITY

I B.Sc(MCS) MODEL PAPER, SEMESTER - I

Time: 3 Hours **Max.marks:**70

SECTION-A

Answer ALL The Questions **5×10=50M**

1. (a) Explain questionnaire. State the characteristics of a good questionnaire

(OR)

(b) Find out mean and median of the following distribution

Marks	10-25	25-40	40-55	55-70	70-85	85-100
Frequency	6	20	44	26	3	1

2. (a)Define skewness and kurtosis and explain their measures?

(OR)

(b) Define central and non central moments. Establish relationship central from non central moments ?

3. (a)Define i) Mutually Exclusive Events

ii)Exhaustive Events

(OR)

(b)Explain mathematical and statistical definitions of a probability with example

4. (a)State and prove Baye's theorem

(OR)

(b)For any n events A_1, A_2, A_3 …..An prove that $P(\bigcap A_i) \geq \sum_{i=1}^{n} P(A_i) - (n-1)$

5. (a)Define Distribution function and explain its properties

(OR)

(b)Define joint, marginal functions of a bivariate random variable X and Y.

SECTION-B

Answer any FOUR of the following **4×5=20M**

6. Explain about Tabulation of data.
7. Find geometric men for the following data

X	110	115	118	119	120
f	4	11	21	6	2

8. What are the measures for dispersion
9. Define types of moments, Write Sheppard's correction for central moments
10. State and prove addition theorem of probability for 2 events.
11. Explain Conditional probability
12. Define random variable and write its types.

J.M.J.COLLEGE FOR WOMEN (AUTONOMOUS): TENALI

I B.Sc. STATISTICS, SEMESTER-II, PAPER-II

SYLLABUS w.e.f 2015 - 16

TITLE: MATHEMATICAL EXPECTATIONS AND PROBABILITY DISRIBUTIONS

UNIT I:

Mathematical expectation of a random variable and of a function of a random variable. Moments and covariance using mathematical expectation examples. Addition and multiplication theorems on expectation. Definitions of MGF, CGF, PGF, CF. Statements of properties. Chebyshev and Cauchy- Schwartz inequalities.

UNIT II:

Discrete Distributions: Binomial and Poisson distributions, their definitions, first four central moments, MGF, CGF, PGF, mean , variance, additive property if exists. Possion approximation to Binomial distribution.

UNIT III:

Negative Binomial, geometric, hyper geometric distributions- Definitions, means, variances, MGF, CGF, PGF, reproductive property if exists. Binomial approximation to Hyper Geometric distribution, passion approximation to negative binomial distribution.

UNIT IV:

Continuous Distributions: Rectangular, Exponential, amma, Beta Distributions of 2 kinds (mean& variance only). Other properties such as MGF, CGF, PGF,C.F, reproductive property.

UNIT V:

Normal Distribution: Definition, Importance, Properties, MGF,additive properties, Interrelation between Normal and Binomial, Possion distribution. Cauchy Distribution- Definition, CF and additive property.

PRACTICALS:

1. Fitting of Binomial Distribution- Direct and Recurrence Methods
2. Fitting of Poisson Distribution- Direct and Recurrence Methods
3. Fitting of Negative Binomial Distribution
4. Fitting of Geometric Distribution
5. Fitting of Normal Distribution- Areas and Ordinates Methods
6. Ms- Excel methods for the above Serial Numbers 1 and 2.

List of Text Books:

Fundamentals of Mathematical Statistics by VK Kapoor& SC Gupta

BA/BSc I year statistics-descriptive statistics, probability distribution- Telugu Academy

List of Reference Books:

Fundamentals of Statistics- GoonGupta, Das Gupta.

Probability and statistical Inferences 7^{th} edition pearson- hoog.

J.M.J. COLLEGE FOR WOMEN (AUTONOMOUS): TENALI

PAPER II: MATHEMATICAL EXPECTATIONS AND PROBABILITY DISRIBUTIONS

I B.Sc(MCS) MODEL PAPER, SEMESTER - II

Time: 3 Hours **Max.marks:**70

SECTION-A

Answer ALL The Questions **5×10=50M**

1. (a) State and prove Chebychev's Inequality.

(OR)

(b) Show that the mathematical expectation of the product of n independent random variables is the product of their expectations.

2. (a)Define binomial distribution. Obtain first two monentss about origin of the B.D

(OR)

(b)Derive recurrence relation for moments of the Poisson distribution.

3. (a) Derive Poisson distribution is a limiting case of negative binomial distribution

(OR)

(b)Define hyper geometric distribution and write its mean and variance

4. (a)Define gamma distribution. Give its moment generating function and cumulant generating function.

(OR)

(b)Define exponential distribution and find β_1 and β_2

5. (a)Define normal distribution. Give its chief characteristics.

(OR)

(b) X is normally distributed and the mean of X is 12 and SD is 4. Find the probability of the following

$X \geq 0$ ii) $X \leq 0$

SECTION-B

Answer Any FOUR of the following **4 ×5=20**

6. Prove that $V(X+Y)=V(X)+V(Y)+2Cov(X,Y)$
7. Derive characteristic function
8. Write the reproductive property of binomial distribution.
9. Define standard normal variate
10. Define MGF of negative binomial distribution
11. Additive property of normal distribution
12. Define beta 1^{st} and 2^{nd} kind distributions

J M J AUTONOMOUS COLLEGE FOR WOMEN, TENALI

PAPER: STATISTICAL METHODS

II B.Sc (MCS) SYLLABUS

SEMESTER- III

UNIT-I Bivariate random variable joint marginal and conditional distributions. Principal of least squares, fitting of linear, Quadratic, power curves and Exponential curves.

Bivariate distributions, joint, marginal and conditional, covariance.

UNIT-II Introduction of correlation & regression, Karl Pearson's coefficient of correlation, rank correlation, limits of rank correlation, correlation ratio.

UNIT-III Simple linear regression, lines of regression and properties of regression. Multiple and partial correlation. Multiple correlation coefficient, coefficient of determination.

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UNIT-IV Concepts of population, sample, statistic, sampling distributions, standard error. Exact sampling distributions χ^2, t, F distributions and statements and their properties and inter relations (t and F, F and χ^2).

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PAPER: STATISTICAL METHODS

II B Sc (M C S) MODEL PAPER

SEMESTER-III

SECTION-A

Answer any THREE of the following 3×20=60M

1.(a) Explain joint, marginal and conditional probability distribution functions?

(b) The joint distribution function of X & Y is

$$F(X\ Y) = \begin{cases} 1-e^{-x}-e^{-y}+e^{-x-y} & ;x>0,\ y>0 \\ 0 \text{ elsewhere} \end{cases}$$

Find the marginal densities of X,Y. Are X,Y independent?

2. (a) Describe the method of fitting the curve $y = ae^{bx}$ by using the principle of least squares.

(b).Fit a straight line of the form y=a+bx to the following data.

X:	0	1	2	3	4	5	6
Y:	3	5	6.8	9.2	10.9	13.1	15

3.(a) Define the correlation coefficient between 2 random variables and obtain its limits?

(b) The lines of regression in a bivariate distribution are X+9Y=2, Y+4X=49/3 find

(1) the coefficient of correlation and (2) variances of X, Y.

4. (a) Define and derive linear regression lines

(b). Derive the Spearmen rank correlation

5. (a). Explain parameter, statistic, sampling distribution, standard error

(b). Mention the properties of t and F distribution and write the relationship between them

6.(a) Explain partial correlation and multiple correlations

b. Derive the coefficient of determination

SECTION-B

Answer the following questions: 5×2=10M

1. Define the partial correlation?
2. Define independence of random variable using distribution function?
3. Define statistic & standard error?
4. Write any two properties of regression coefficients?
5. Two dimensional random variables(x,y) has the joint density function

   $f(x,y)= 8xy \quad ; 0<x<y<1$

   $= 0 \qquad$ otherwise

   Find the marginal distribution of X

LIST OF TEXT BOOKS:

Fundamentals of mathematical statistics

---S.C.guptha&V.K kapoor

Statistics paper ---Deepthi publications

LIST OF REFERENCE OF COPIES:

Fundamentals of statistics

---B M Agarwal

Statistical methods

---S P Gupta

J M J AUTONOMOUS COLLEGE FOR WOMEN, TENALI

PAPER: STATISTICAL INFERENCES

II B Sc (MCS) SYLLABUS

SEMESTER- IV

UNIT-I Point estimator, criteria of good estimator – Consistency , Unbiasedness, Efficiency , Sufficiency.Statement of Fisher Neyman Factorization theorem, derivations of sufficient statistic in binomial, Poisson, exponential cases. Estimation by the method of moments,Maximum likelihood method. Confidence interval for parameters of normal populations.

UNIT-II Concepts of null hypothesis, alternative hypothesis ,critical region,types of errors, Notion of randomized test procedure, level of significance, and power of a test, NP Lemma for testing a simple versus simple in Normal, statement of NP Lemma, example in the case of binomial& Poisson.

UNIT-III Large sample tests of significance of means, standard deviations, proportions, Correlation coefficient.

Small sample tests of significance based on normal $\chi 2$, t and F distributions

UNIT-IV Non parametric tests advantages & disadvantages, one sample tests – paired sample tests, sign test, Wilcox on signed rank test, two sample test – Wilcox on Mann Whitney , Wald – wolfitz run test.

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PAPER: STATISTICAL INFERENCES

II B Sc (M C S) MODEL PAPER

SEMESTER-IV

SECTION-A

Answer any THREE of the following 3×20=60M

1(a) Describe briefly the criteria of good estimator its suitable example.

(b). Explain the method of obtaining confidence interval for population mean in the case of normal distribution when standard deviation is 1.known 2. Unknown

2. (a) Define null and alternative hypothesis. How is a statistical hypothesis tested

(b). State and prove Neyman Pearson Lemma

3(a) Derive a statistic for testing the significance difference between two means in case of large sample theory.

(b)Before an increase in excise duty on tea, 800 persons out of a sample of 1000 persons were found to be drinkers, after an increase its 1200 people using standard error properties. State whether there is a significan difference in the consumption of tea after the increase excise duty.

4(a) Describe a $\chi 2$-test for independent of two attributes

(b). Explain the t-test for testing the significance of the difference between the two sample means

5(a) Describe the sign test

(b) Distinguish between parametric and non parametric test, mention the advantages and disadvantages of parametric tests.

6(a) Explain in detail Mann-Whitney wilcoxon test

(b). Confidence interval for parameters of normal populations

SECTION-B

Answer the following questions: 5×2=10M

1. Define simple and composite hypothesis with examples
2. Define one tailed test with example?
3. Define Non parametric test
4. Define interval estimation
5. Define type I and type II errors

J M J AUTONOMOUS COLLEGE FOR WOMEN, TENALI

PAPERV: Sampling, ANOVA and Time series

III B.Sc (MCS) SYLLABUS

SEMESTER- V

UNIT-I SAMPLING

Sampling and non sampling errors, sources and treatment of non – sampling errors, Advantages and limitations of sampling. Type of sampling, SRSWR and SRSWOR, Stratified Random sampling, systematic sampling, optimal, proportional and Neymann allocation, Comparisons and relative efficiency.

UNIT-II ANALYSIS OF VARIEEENCE

Definition, assumptions and applications of ANOVA, one-way and two-way classification With one observation per cell, concept of Gauss-Markov linear modal, Cochran's theorem And its Application in splitting total variation.

UNIT-III TIME SERIES

Time series and its components with illustrations, additive, multiplicative and mixed Models, determination of trend by least squares method, concept of smoothing, moving averages determination of seasonal indices by ratio to moving average, ratio to trend and link relatives method.

UNIT-IV INDIAN STATISTICAL SYATEM

Function and organizations of CSO and NSSO. Agriculture statistics, area yield of Statistics. National income and its computation. Utility and difficulties in estimation of National income.

List of text books:

Applied statistics-SC GUPTA, V.K.KAPOOR

Statistical methods-SP GUPTA

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PAPER V: Sampling, ANOVA and Time series

III B.Sc (MCS) MODEL PAPER

SEMESTER- V

SECTION-A

Answer any THREE of the following 3X20=60M

1(a) What are sampling techniques? Distinguish between SRSWR and SRAWOR..How do you select a simple random sample? Mention its advantages and disadvantages?

(b) With usual notation S.T $\text{Var}(\overline{y_n})_R \geq \text{Var}(\overline{y_{st}})_P \geq \text{Var}(\overline{y_{st}})_N$

2 (a) Explain what do you understand by analysis of variance and give ANOVA one way classification

(b) Explain ANOVA for two way classification

3(a) Define time series? And explain components of time series?

(b) Explain any two methods of studying trend in time series analysis

4(a) Write briefly about CSO

(b) Explain various functions of NSSO.

5(a) Explain systematic sampling technique. Give its advantages and disadvantaes.

(b) Explain the concepts of ANOVA.Also mention its assuptions required for the validity of the F-test in ANOVA.

6(a) What are seasonal indices and explain link relatives method to determine seasonal indices.

(b) Explain various organizations and publications of NSSO.

SECTION-B

Answer the following 5X2=10

1. Stratified random sampling
2. What is time series
3. Define ANOVA
4. Define probability sampling
5. Time series uses.

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PAPER V: QUALITY RELIBILITYAND OPERATIONS RESEARCH

III B.Sc (MCS) MODEL PAPER

SEMESTER- V

SECTION-A

UNIT-I STATISTICAL PROCES CONTROL

Importance of SQC in industry, statistical basis of control charts. Control charts for variables (mean,range std. dev) and attributes (p,np and c-charts). Construction and interpretation of control charts. Concept of six sigma and its importence

UNIT-II ACCEPTENCE SAMPLING PLANS

Producers risk and consumer risk, concept of AQL and LTPD. Sampling plans for attributes & derivations of their OC and ASN functions.

UNIT-III LINER PROGRAMMING PROBLEM

Meaning and scope of OR, introduction to OR, development of OR, formulation of Linear Programming Problem, graphical method, applications of LPP. Fundamental theorem of LPP simplex concept of artificial variables. Big M / penalty methodand two phase simplex methods (simple problems only). Concept of degeneracy algorithm and cycling, method of resolving them, concept of duality, dual simplex(simple problems)

UNIT-IV RELIABILITY

Introduction, hazard function, exponential distribution as life model, its memory- less property, reliability function and its estimation. Concept of system reliability – series and parallel systems.

List of text books:

Operations research – Kranthi swarup and P.K. Gupta sulthan chand

Statistical quality coltrol-R.C.Guptha

List of reference books:

Statistical methods- S.P.Guptha

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PAPER VI: QUALITY RELIBILITYAND OPERATIONS RESEARCH

III B.Sc (MCS) MODEL PAPER

SEMESTER- V

SECTION-A

Answer any THREE of the following

1 (a) What do you understand by S.Q.C? Discuss its need utility in industry

(b) Explain the construction of X and R charts

2 (a) Define the terms i) AQL ii) LTPD iii) AOQL

(b) Define OC and ASN functions with respect to single sampling plan for attributes

3(a)Describe the origin, development and scop of operations research

(b)Using graphic method solve the following LPP

Maximize $Z=2x1+3x2$ such that $x1-x2<2$, $x1+x2>4$, $x1,x2>0$

4(a)Explain the terms briefly i) Memory-less property ii) Reliability function

(b)Explain how exponential distruibution has become a life model and give some of its properties

5(a) Discuss about the graphical method to solve linear programming problem

(b) Explain the construction of C-chart with fixed an varying sample sizes

6 (a)Explain the procedure of simplex algorithm

(b)Solve Max. $Z=2x1+3x2$

subject to $x2+x2<1$

$3x2+x2<4$

$X1x2>0$

SECTION- B

Answer the following questions

1 Explain six sigma limits

2 Explain product control

3 Reliability function

4 Define slack variable

5 Define quality

J M J AUTONOMOUS COLLEGE FOR WOMEN, TENALI

PAPERVII: APPLIED STATISTICS

III B.Sc (MCS) SYLLABUS

SEMESTER- VI

UNIT-I DESIGN OF EXPERIMENTS

Principle of experimentations – Randomization, Replication,& Local control.

Mathematical analysis, importance and application of design of experiments. Analysis of Completely randomized design (CRD), randomized block design (RBD), Latin square Design (LSD), need for factorial experiments.

UNIT-II INDEX NUMBERS

Concept,construction,uses and limitations of simple weighted index numbers.

Fishers index as ideal index numbers.Fixed and chain based index numbers.Cost of living Index and wholesale price index number. Base shifting,splicing and deflation of index number.

UNIT-III VITAL STATISTICS

Sources of vital statistics,census and registration ,rates and ratios .Fertility rates and mortality rates standardized death rates.GRR and NRR,complete and abridged life tables and their construction and uses.

UNIT –IV DEMAND ANALYSIS

Introduction,demand and supply,price elasticity's of supply and demand,methods and determining demand and supply curves.

List of test books:

Applied statistics-SC GUPTA, V.K.KAPOOR

Statistical methods-SP GUPTA

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PAPERVII: APPLIED STATISTICS

III B.Sc (MCS) MODEL PAPER

SEMESTER- VI

SECTION-A

Answer any three of the following 3X20=60

1. a. Explain basic principles of Experimentation

   b. What is RBD? Explain the analysis of variance for their design

2. a. Define index numbers and explain various problems involved in construction of index Numbers

   b. Show that fishers index number is an ideal number

3. a. Explain the components of complete and abridged life tables

   b. Explain different reproduction rates

4. a. Define the following terms i) demand and supply ii) Laws of supply and demand

   b. Explain the terms briefly i) price elasticity of demand ii) significance elasticity of demand

5. a. Describe Latin square design and discuss its merits and demerits

   b. Write about the importance of cost of living index numbers

6. a.Explain different measures of mortality rates

   b.Explain Laspear's ,Paaschis, Dorbish –Bowleys price index numbers

SECTION-B

Answer the following questions **5X2=10**

1. Define vital statistics
2. Define splicing
3. Define cohort
4. Elasticity
5. Experimental error

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PAPERVIII: OPERATIONS RESEARCH-II

III B.Sc (MCS) SYLLABUS

SEMESTER- VI

UNIT-I TRANSPORTATION PROBLEM

Definition of transportation problem ,TPP as a special case of LPP, feasible solutions by N-W corner rule, row minima method &column minima methods, matrix minima method,VAM, optimal solution thro .MODI tableau method. Transshipment problem.

UNIT-II ASSIGNMENT PROBLEM

Formulation and description of assignment problem. Un balanced assignment problem,
Travelling salesman problem, optimum solution using Hungarian method.

UNIT-III SEQUENCING PROBLEM

Problem of sequencing. Definition of sequencing n-jobs through two machines, three machines and m-machines

UNIT-IV GAME THEORY

Elements of game theory, zero sum game, saddle point ,pay off matrix and strategies, value of the game, solutions of 2x2 games, solutions of mx2 games, solutions of 2xm games and dominance property.

List of text books:

Operation research –P K GUPTA, SULTAN CHAND

Statistical quality control-R .C .GUPTA

Reliability and life testing –S.K.SINHA Whily Eastern Publication

List of reference books:

LPP by Gauss Mc Graw hill publication

Telugu Academy

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PAPERVIII: OPERATIONS RESEARCH-II

III B.Sc (MCS) SYLLABUS

SEMESTER- VI

SECTION-A

Answer any three of the following **3X20=60M**

1 a. Explain two person zero sum game, pure strategy and mixed strategy

b. Solve the following game by using graphical method

		Player B			
Player A		B1	B2	B3	B4
	A1	1	0	3	2
	A2	2	1	0	-2

2. a. Define T.P. and explain how T.P becomes a specified case L.P.P?

b. Solve the following T.P by VAM method

	1	2	3	4	Supply
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
demand	6	10	12	15	43

3. a. Explain the procedure of Hungarian method

b. solve the following assignment problem?

Machines						
Jobs		1	2	3	4	5
	1	9	22	58	11	19
	2	43	78	72	50	63
	3	41	28	91	37	45
	4	74	42	27	49	39
	5	36	11	57	22	25

4. a Explain the procedure for sequencing of n-jobs through two machines

b. solve the following sequencing [problem

jobs	1	2	3	4	5	6
A	1	3	8	5	6	3
B	5	6	3	2	2	10

5.a. Explain the procedure of VAM

b. Find optimum solution of the given TP

19	30	50	10
70	30	40	60
40	8	70	20

5 8 7 14

6. a. Explain the procedure of n jobs through k machines in sequencing problem

b. solve the game

$$\begin{bmatrix} 50 & 45 \\ 47 & 50 \end{bmatrix}$$

SECTION-B

Answer the following questions

1. Define assignment problem
2. Define job sequencing
3. Optimum sequence
4. Unbalanced transportation problem
5. Mathematical model of TP