

SUBMITTED TO TSCHE ON 18-06-2019
B.A./B.Sc. (STATISTICS)
Semester Pattern Syllabus (CBCS)
w.e.f: Academic Year: 2019-20
(With Mathematics Combination)

YEAR	SEMESTER	THEORY/ PRACTICAL	Paper Title	WORK LOAD (Hrs/ Week)	#CREDITS	MARKS
I	FIRST	Paper-I	Descriptive Statistics and probability	4	4	100 (External:80, Internal:20)
		<i>Practical-1</i>	<i>Descriptive Statistics and probability</i>	<i>3</i>	<i>1</i>	<i>50</i>
	SECOND	Paper-II	Probability distributions	4	4	100 (External:80, Internal:20)
		<i>Practical-2</i>	<i>Probability distributions</i>	<i>3</i>	<i>1</i>	<i>50</i>

	Sem-I	Sem-II	Sem-III	Sem-IV	Sem-V	Sem-VI	Total
No. of Credits:	4+1=5	4+1=5					
Marks:	125	125					
Total work load per week of Sem-I:							7
Total work load per week of Sem-II:							7

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Practical Examination Pattern

Semester	Pract No.	Method of Solving	No. of Problems given	Student has to attempt	Marks division		Total Marks	Duration of Exam
					Problem solving	Record		
I	Pract-1	Using Calculator	3	Any 2	3x15=45	5	50	3 hrs
		Using Computer (MS-Excel)	2	----- Any 1				
II	Pract-2	Using Calculator	3	Any 2	3x15=45	5	50	3 hrs
		Using Computer (MS-Excel)	2	----- Any 1				

Note: Each practical syllabus consists of two parts. From part-1, three problems will be given. Student has to answer any 2 problems. From part-2, two problems will be given. Student has to answer any one problem.

Production of **Record** is compulsory in student's own hand writing.
Periodically got signed by concerned lecturer, after completion of each topic.

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(Examination at the end of Semester-I)

Paper-I: Descriptive Statistics and Probability

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Unit-I

Descriptive Statistics: Concept of primary and secondary data, Methods of collection and editing of primary data, Designing a questionnaire and a schedule, Sources and editing of secondary data, Classification and tabulation of data, Measures of central tendency (Arithmetic mean, median, mode, geometric mean and harmonic mean) with simple applications, Absolute and relative measures of dispersion (range, quartile deviation, mean deviation, standard deviation and variance) with simple applications, Importance of moments, central and non-central moments, their inter-relationships, Sheppard's correction for moments for grouped data, Measures of skewness based on quartiles and moments, kurtosis based on moments with real life examples.

Unit-II

Probability: Basic concepts of probability, deterministic and random experiments, trial, outcome, sample space, event, operations of events, mutually exclusive and exhaustive events, equally likely and favorable events with examples, Mathematical, Statistical and Axiomatic definitions of probability, their merits and demerits. Properties of probability based on axiomatic definition, Conditional probability and independence of events, Addition and multiplication theorems for 'n' events, Boole's inequality and Bayes' theorem, Problems on probability using counting methods and theorems.

Unit-III

Random Variables: Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations. Distribution function and its properties, Transformation of one-dimensional random variable (simple 1-1 functions only), Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables.

Unit-IV

Mathematical Expectation: Mathematical expectation of a function of a random variable, Raw and central moments, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Definitions of moment generating function (m.g.f), characteristic function (c.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and statements of their properties with applications, Chebyshev's and Cauchy-Schwartz's inequalities and their applications.

List of reference books:

1. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
2. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
3. Goon A M, Gupta M K, Das Gupta B: Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.
4. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
5. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan , New Delhi.
6. Hogg, Tanis, Rao: Probability and Statistical Inference, (7th edition), Pearson.
7. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI.
8. Gerald Keller: Applied Statistics with Microsoft Excel, Duxbury, Thomson Learning.
9. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel (4th edition), Pearson Publication.

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Practical-1
Descriptive Statistics and Probability
(2 HPW :: 1 Credit :: 25 Marks)

Part - 1 (Using calculator)

1. Graphical presentation of data (Histogram, frequency polygon, Ogives). s
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of non-central and central moments – Sheppard's corrections for grouped data.
4. Computation of coefficients of Skewness and Kurtosis – Karl Pearson's, Bowley's, β_1 and β_2 .

Part - 2 (Using MS-Excel)

1. Basics of Excel- data entry, editing and saving, establishing and copying formulae, built in Functions in excel, copy and paste and exporting to MS word document.
2. Graphical presentation of data (Histogram, frequency polygon, Ogives) using MS-Excel
3. Diagrammatic presentation of data (Bar and Pie) using MS-Excel
4. Computation of Measures of central tendency, dispersion, Coefficient of Variation and coefficients of Skewness, Kurtosis using MS-Excel.

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Paper-II: Probability Distributions

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Unit-I

Discrete distributions – I : Uniform and Bernoulli distributions : definitions, mean, variance and simple examples. Definition and derivation of probability mass functions of Binomial distribution, Poisson distribution, properties of these distributions: median, mode, m.g.f, c.g.f., p.g.f., c.f., and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Poisson approximation to Binomial distribution.

Unit-II

Discrete distributions – II: Negative binomial, Geometric distributions: Definitions and real life applications, properties of these distributions: m.g.f, c.g.f., p.g.f., c.f. and moments upto fourth order, reproductive property (wherever exists), lack of memory property for Geometric distribution. Poisson approximation to Negative binomial distribution.

Hyper-geometric distribution: definition, real life applications, derivation of probability function, mean, variance. Binomial approximation to Hyper-geometric distribution.

Unit-III

Continuous distributions – I : Rectangular and Normal distributions – definition, properties such as m.g.f., c.g.f., c.f. and moments up to fourth order, reproductive property, wherever exists and their real life applications. Normal distribution as a limiting case of Binomial and Poisson distributions.

Unit-IV

Continuous distributions – II: Exponential, Gamma distributions - definition, properties: m.g.f., c.g.f., c.f. and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Beta distribution of two kinds: Definitions, mean and variance. Cauchy distribution - Definition and c.f.

Definition of convergence in Law, in probability and with probability one or almost sure convergence. Definition of Weak Law of Large Numbers (WLLN) and Strong Law of Large numbers (SLLN). Definition of Central Limit Theorem (CLT) for identically and independently distributed (i.i.d) random variables with finite variance.

List of reference books:

1. Goon A M, Gupta M K, Das Gupta B : Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.
2. Hoel P.G: Introduction to Mathematical Statistics, Asia Publishing house.
3. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
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(Examination at the end of Semester-II)

Practical-2

Probability Distributions

(2 HPW :: 1 Credit :: 25 Marks)

Part - 1 (Using calculator)

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-Areas method.
8. Fitting of Normal distribution - Ordinates method.

Part - 2 (Using MS-Excel)

1. Fitting of Binomial distribution-Direct method.
2. Fitting of Poisson distribution-Direct method.
3. Fitting of Normal distribution-Areas method.
4. Fitting of Exponential distribution.
5. Fitting of Cauchy distribution.

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Theory Question Paper Pattern

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Time: 3 hours]

[Max.Marks: 80

Section - A

Answer any EIGHT questions. All questions carry equal marks.

(8Qx4m=32)

1. From Unit I
2. From Unit I
3. From Unit I
4. From Unit II
5. From Unit II
6. From Unit II
7. From Unit III
8. From Unit III
9. From Unit III
10. From Unit IV
11. From Unit IV
12. From Unit IV

Section - B

Answer ALL questions. All questions carry equal marks. (4Qx12m=48)

13. a) From Unit I
(or)
b) From Unit I
14. a) From Unit II
(or)
b) From Unit II
15. a) From Unit III
(or)
b) From Unit III
16. a) From Unit IV
(or)
b) From Unit IV

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Practical Question Paper Pattern

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Time: 3 hours]

[Max.Marks: 50

Solve any TWO problems from Section-A and any ONE problem from Section-B. (3Qx15m=45m) and Record: 5m

Section-A

1. From Part 1
2. From Part 1
3. From Part 1

Section - B

4. From Part 2
5. From Part 2
