

Dr. Ambedkar Government Arts College

(AUTONOMOUS)

Department of Statistics

The Board of studies meeting held on 10.06.19 in the department of Statistics. After a brief discussion, the following suggestions were given by the panel members to incorporate in the syllabus for the academic year 2019 – 2020.

For Major Practicals to B.Sc Statistics students following are the recommended portions in TANSCHS syllabus :

1. Numerical problems involving determination of marginal and conditional probability distribution for discrete random variable.
2. Drawing random samples of size not exceeding 25 from Normal population with known mean and variance using random number tables.
3. Algebraic operations of matrix of order $p \times q$ ($p, q < 4$)
4. Determination of the rank of the order $p \times q$ ($p, q < 4$)
5. Inverse of a non-singular matrix of third and fourth order by (i) sweep-out method (ii) partitioning of matrix method
6. Solutions for system of linear equation.
7. Determination of characteristic roots and characteristic vectors.
8. Verification of Cayley Hamilton theorem.
9. Mathematics for Statistics paper I and II for allied changes to Mathematics for Statistics and Real analysis and Matrix algebra . Weightage is given equally to real analysis and matrix concepts for Real Analysis and Matrix Algebra paper. Mathematics concepts Integration, differentiation, weightage will be more in Mathematics for statistics.

10. As Non major elective is opted for other discipline students , we introduce NME – I as Introductory Statistics and NME – II as Statistics in real life .

11. For BBA Students , as recommended by TANSCE the name of the paper is changed to Business Statistics for Allied – III and Quantitative Methods for Allied – IV.

(i) In Business Statistics Unit – V (Extrapolation and Interpolation) is removed and add the Theory of attributes.

(ii) In Quantitative methods concept of sampling and large sample theory is included for the benefit of PROJECT for BBA students.

12. For B.Com students introducing Operations research as a Separate paper in Allied – IV and Business Statistical Methods as Allied – III.

13. For M.Com students Operations Research paper is introduced. Statistical quality control concept is added, separate unit for game theory . Sequencing problem with 2 machines only and NETWORK analysis together in separate unit. Transportation and Assignment problem in one single unit. Optimality for Transportation should be included. Dual simplex can be eliminated.

14. In Quantitative techniques for M.Com students in Unit – 1, specify measures of central tendency, dispersion. In Unit – II include fitting and testing the goodness of fit. Include Large sample test in Unit – III. Remove time series in Unit – I. Unit – IV needs to be revised.

CHAIRMAN

Mrs. K. Gokila

Assistant Professor and Head,

Department of Statistics

Dr. Ambedkar Govt. Arts College,

Vyasarpadi, Chennai – 39

K Gokila 10/6/19

University Nominee

Dr. V. Prakash M.Sc., M.Phil., Ph.D

Associate Professor,

Department of Statistics,

Presidency College,

Chennai – 05

Manab
10/6/19

Subject Experts

1. Dr. Joseph Arockiasamy M.Sc., M.Phil., Ph.D

Assistant Professor,

Department of Statistics,

Loyola College,

Chennai – 34

[Signature]
10/6/19

2. Dr. Ramadurai. M.Sc., M.Phil., Ph.D

Assistant Professor,

Department of Statistics,

University of Madras,

Chepauk, Chennai – 05

[Signature] 10/6/2019

Industrial Expert:

S. Radhika M.Sc.,

Senior Process Associate

DHL Global Services India LLP

Chennai

S. Radhika
10/6

Student Alumini :

Mr. Rajkumar

Senior Analyst

Citi Corporation

Ramanujam IT Park

Tharamani

Benny
10/6

Dr. AMBEDKAR GOVERNMENT ARTS COLLEGE

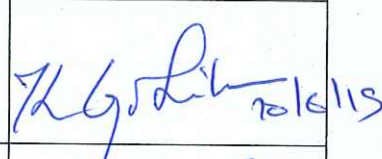
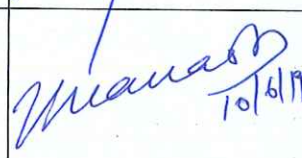
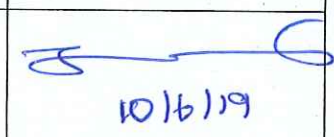
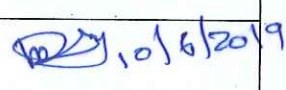
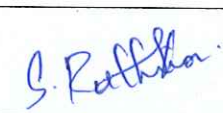
(AUTONOMOUS)

VYASARPADI, CHENNAI – 600 039.

DEPARTMENT OF STATISTICS

The Board of studies meeting of the department of Statistics held on 10.06.2019 at 10.30 am in the department of Statistics, Dr.Ambedkar Government Arts College, Chennai.

The following members were present in the meeting:

S.No	Name of the Members	Designation/Institutions	Signature
1	Mrs. K. Gokila Convenor.	Assistant Professor Department of Statistics Dr. Ambedkar Govt. Arts College Chennai- 39	 10/6/19
2	Dr. V. Prakash University Nominee	Associate Professor Department of Statistics Presidency College Chennai - 05	 10/6/19
3	Dr.L. Joseph Arockiasamy College Nominee	Assistant Professor Department of Statistics Loyola College Chennai- 34	 10/6/19
4	Dr. Ramadurai, M. College Nominee	Assistant Professor Department of Statistics University of Madras Chennai- 05	 10/6/2019
5	Ms. S. Radhika Industrialist	Senior Process Associate DHL Global Services India LLP Chennai	 S. Radhika
6	Mr. Rajkumar Student Alumini	Senior Analyst Citi Corporation Ramanujam IT Park Tharamani	 Rajkumar
7	Dr. R. Lakshmi Priya Member	Assistant Professor Department of Statistics Dr. Ambedkar Govt. Arts College Chennai- 39	 R. Lakshmi Priya 10/6/19
8	Mrs. T. Uma Member	Assistant Professor Department of Statistics Dr. Ambedkar Govt. Arts College Chennai- 39	 Uma 10/6/19

**DR. AMBEDKAR GOVERNMENT ARTS COLLEGE
(AUTONOMOUS)**

VYASARPADI, CHENNAI – 600 039.

(ACCREDITED BY NAAC AT LEVEL ‘B’)



SYLLABUS

B.SC., DEGREE (STATISTICS)

Under Choice Based Credit System

(Effective from the Academic year 2019 – 2020 onwards)

DEPARTMENT OF STATISTICS

DR. AMBEDKAR GOVT. ARTS COLLEGE (AUTONOMOUS)

VYASARPADI, CHENNAI – 39.



**Dr. AMBEDKAR GOVERNMENT ARTS COLLEGE
(AUTONOMOUS)
VYASARPADI, CHENNAI - 600 039**

(AFFILIATED TO UNIVERSITY OF MADRAS)

B.Sc. DEGREE COURSE IN STATISTICS

(Choice Based Credit System)

Dr. Ambedkar Government Arts College (Autonomous) offers the semester System of education with credits for UG courses. Credit is related to the number of hours a teacher teaches a particular subject as well as to the number of hours a student spends learning a subject or carrying out an activity. In the semester system of study, every academic year is divided into two semester sessions. Each semester will have a minimum of 90 working days and each day will have 5 working hours.

Differential weightage is given according to the content and duration of the course in the curriculum design. Each course is designed variously under lectures/tutorials/laboratory/work/seminar/project work/practical training/viva etc., to facilitate effective teaching and learning and the credits are assigned accordingly depending on the content and the specialization.

Regulations

(Effective from the Academic year 2019 - 2020 onwards)

1. Eligibility for Admission:

Candidates for admission to the Degree of Bachelor of Science course in Statistics shall be required to have passed the Higher Secondary Examination (HSE), conducted by the Government of Tamil Nadu, or an examination accepted as equivalent thereto by the Syndicate, with Mathematics or Statistics or Business Mathematics as a subject of study.

2. Eligibility For the award of Degree:

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a college affiliated to the University for a period of not less than 3 academic years, passed the examination of all the six semester prescribed earning. The Credit requirement for a two year UG course shall be 140 including 2 credits for Environmental Studies. 2 credits for Value Education and 1 credit for the compulsory Extension Services prescribed.

3. Duration

Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semester, the second academic year the third and the fourth semester and the third academic year the fifth and sixth semester respectively.

The odd semester shall consist of the period from June to November of each year and the even semester from December to April of each academic year. There shall not be less than 90 working days for each semester.

4. The CBCS System

All Programmes (named after the Core subject) mentioned earlier are based on Choice Based System (CBCS). It is an instructional package developed to suit the needs of students to keep pace with the developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

5. Course of Study

The UG programme consists of several courses. The term ‘course’ is applied to indicate a logical part of the subject matter of the programme and is invariably equivalent to the subject matter of a “paper” in the conventional sense.

The following are the various categories of Courses suggested for the UG programmes. Language Course (LC) (Tamil), English Language Course (ELC), Core Course (CC), Allied Courses (AC), Elective Courses (EC) (instead of Applied Course in the curriculum followed earlier) Non-major elective courses (NME) Skill based Elective

courses (SBE) Environmental studies (ES), Value Education (VE) and Extension Activity (EA).

6. Credits

The term ‘Credit’ refers to the weightage given to a course, usually in relation to the instructional hours assigned to it. For instance the course with six hour per week is assigned four credits, course with four / five hour per week is assigned three credits and course with two hour per week is given two credits. However, in no instance the credits of a course can be greater than the hours allotted to it.

The total minimum credits, required for completing and UG program is 140. The details of credits for individual components and individual courses are given below

Study Components	No.of Courses	Credit per Course	Total Credits
Part-I Tamil/ Other Languages	2+2=4	3	12
Part-II English	2+2=4	3	12
Part-III Core Courses	13-15	4-5	60
Allied Courses	4	5	20
Project/Electives with three Course	3	5	15
Part-IV 1. (a) Those who have not studied Tamil upto XII Standard and taken a non-Tamil Language under Part-I shall take Tamil comprising of two courses(level will be at 6 th standard) (b) Those who have studied Tamil upto XII Standard and taken a non-Tamil Language under Part-I shall take advanced Tamil comprising of two courses (c) Others who do not come under a+b can choose non-major elective comprising of two courses	1+1=2	2	4
2. Skill based courses (Elective)	2+2=4	3	12
3. Environmental Studies	1	2	2
4. Value Education	1	2	2
Part-V Extension Activities	1	1	1
Total			140

IV (3) & (4) Environmental Studies and value Education:

All the students undergo a course on Environmental Studies during III Semester and Value education during IV Semester.

V Extension Activity

All the students shall have to enroll for NSS/NCC/NSO (Sports & Games) Rotract/ Youth Red Cross or any other service organizations in the college and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the College before 31st March in a year. If a student LACKs 40 HOURS ATTENDANCE in the First Year, he/ shall have to compensate the same during the subsequent years.

Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will get ONE CREDIT

Literacy and Population Education Field work shall be compulsory components in the above extension service activities.

7. Selection of candidates to Non-Major Elective Courses and Skill based Elective Courses

The Non-Major and skill based elective Courses 2+4 in numbers for each UG degree, are open to all students irrespective of science, Arts or Commerce Programmes. A student shall choose at least two Non-Major Elective Courses and three skill based elective courses from outside his / her Department.

Selection of student to the EC (NME & SBE):

- a. The Department Committee shall follow a selection procedure on a first come first served basis, fixing the maximum number of students, giving counseling to the students etc. to avoid overcrowding to particular course(s) at the expense of some other courses.
- b. The failed candidates in one EC are permitted to opt for another EC in another programme or they are permitted to continue with the same EC.
- c. The College shall provide all information relating to the ECs in each programme to all the students so as to enable them to choose their ECs.

8. Attendance:

A Candidate shall be permitted to appear for the examinations only if he or she secures not less than 75% attendance in each subject / paper.

Students who have 74% to 60% of attendance shall apply for condonation in the prescribed form with the prescribed fee Rs.250/- each for Theory/Practical examination towards the condonation of shortage of attendance.

Students who have secured less than 60% but more than 50% of attendance are NOT Eligible for condonation of shortage of attendance and such candidates will not be permitted to appear for the regular examination, but will be allowed to proceed to the next year / next Semester of the course and they may be permitted to take next End Semester Examination by paying the prescribed condonation fee of Rs.250/- each for Theory/Practical separately.

Students who have below 50% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the programme by paying the fee for the break of study as prescribed by the academic council from time to time.

9. Conduct of Examination:

Examination will be conducted by the college at the end of each semester. A candidate who does not pass the examination in any paper(s) shall be permitted to appear in such failed paper(s) in the subsequent examinations.

10. College Day proficiency prize :

Candidates who pass all the examinations prescribed for the course in the first appearance only are eligible for ranking.

11. Scheme of Examinations:

Continuous Assessment	: 25 Marks
End semester Examination	: 75 Marks

Total 100 Marks

The break up for continuous Assessment is as follows.

a) Test	(1 x 10)	:10 Marks
b) Assignment	(1 x 10)	:10 Marks
c) Model Examination	(1 x 25)	:25 Marks
d) Attendance		: 5 Marks

Total 50 Marks

50 Marks for continuous assessment can be converted to 25 Marks.

For Major and Allied Practical's:

The breakup of marks for continuous assessment year end practical examination is as follows

Continuous Assessment	: 40 Marks
Practical	: 60 Marks

Total 100 Marks

The break up for continuous assessment for major and Allied Practical's are

a. Submission of Record/Observation	:25 Marks
b. Practical Tests (2 x 15)	:30 Marks
c. Model Practical Examination	:20 Marks
d. Attendance	: 5 Marks
Total	80 Marks (scaled down to 40)

The total marks will be converted to 25 Marks

The break-up of Marks for attendance:

Attendance %	Marks
Above 90 %	05
81 % - 90 %	04
75 % - 80 %	03
65 % - 74 %	02
60 % - 64 %	01

Project:	Internal	: 20 Marks
	Viva	: 20 Marks
	Project Report	: 60 Marks
	Total	: 100 Marks

The duration of the academic year end practical examinations for each paper shall be 3 hours carrying 60 Marks.

12. Requirements for proceeding to subsequent Semester

- Candidates shall register their names for the First Semester Examinations after the admission in the UG Courses.
- Candidates shall be permitted to proceed from the First Semester up to Final semester irrespective of their failure in any of the semester Examinations subject to the condition that the candidate should register for all the arrear papers of earlier semester along with current (subsequent) semester papers.
- Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefore from time to time by the University of Madras.

Provided in case of a candidate earning less than 50% of attendance in any one of the semester due to any extraordinary circumstance such as medical grounds, such candidate who shall produce medical certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Principal of the College, shall be permitted to proceed to the next semester and to complete the Course of study. Such candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the Course, after paying the fee for the break of study as prescribed from time to time.

13. Valuation of Answer Papers:

For undergraduate courses, only single valuation is permissible. Re-totaling and revaluation of theory papers are allowed. The fee prescribed for Re-totaling is Rs.250/- per paper and for revaluation Rs.500/- per script. Photo copy of the Answer scripts will be supplied to the candidate applying for revaluation.

14. Passing Minimum

- There shall be no Passing Minimum for Internal.
- For External Examination, Passing Minimum shall be of 40% (Forty Percentage) of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-voce.
- In the aggregate (External + Internal) the passing minimum shall be of 40%.
- He / She shall be declared to have passed the whole examination, if he/she passes in all the papers and practical's wherever prescribed / as per the scheme of examinations by earning 140 CREDITS in Parts-I, II, III, IV & V. He/she shall also fulfill the activities prescribed earning a minimum of 1 Credit to qualify for the Degree.

15. Classification of successful candidates:

Grading system:

The following table gives the marks, grade points, letter grades and classification to indicate the performance of the candidate.

Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

RANGE OF MARKS	GRADE PONTs	LETTER GRADE	DESCRIPTION
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
40-49	4.0-4.9	C	Satisfactory
00-39	0.0	RA	Re-appear
ABSENT	0.0	AAA	ABSENT

‘ C_i ’ is the credit earned for the course i in any semester;

‘ G_i ’ is the Grade Point obtained by the student for the Course i and ‘ n ’ is the number of Courses **passed** in that semester.

For a Semester:

Grade Point Average [GPA]

$$= \frac{\text{Sum of the multiplication of the grade points by the credits of the courses}}{\text{Sum of the credits of the courses in a semester}}$$

$$\text{GPA} = \sum_i C_i G_i / \sum_i C_i$$

16. Classification of Final Results

Cumulative Grade Point Average [CGPA]

$$= \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

$$\text{CGPA} = \sum_n \sum_i C_{ni} G_i / \sum_n \sum_i C_{ni}$$

CGPA	GRADE	Classification of Final Result
9.5-10.0	O+	First Class Exemplary
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	Third Class
4.0 and above but below 4.5	C	
0.0 and above but below 4.0	RA	Re-appear

Part I: LCs; Part II: ELCs and Part III CCs, ACs and ECs.

- ### 17. Pattern of Question Paper:

Answer 10 out of 12 Questions - $10 \times 2 = 20$ marks

Answer 5 out of 8 Questions - $5 \times 5 = 25$ marks

Answer 3 out of 5 Questions - $3 \times 10 = 30$ marks

11

Scheme of Examinations

First Semester

Subject Code	Sem	Study Components	Paper Title	Lecture Hours		Maximum Marks			Credits
				Theory	Prac	Int	Ext	Total	
19UAFTA1	I	Language	Language-Paper I	6	---	25	75	100	3
19UAFEN1		English	English-Paper I	4	---	25	75	100	3
19UASTC1		Core I	Descriptive Statistics	7	---	25	75	100	4
---		Core III	Practical - I	---	2	Practical examination will be at the end of semester II			
19UASTA1		Allied I	Mathematics for Statistics	7	---	25	75	100	5
19UASTN1		Non-Major Elective I	Introductory Statistics	2	---	25	75	100	2
19UASBE1		Soft Skills - I		2		40	60	100	3
TOTAL				28	2				20

Second Semester

Subject Code	Sem	Study Components	Paper Title	Lecture Hours		Maximum Marks			Credits	
				Theory	Prac	Int	Ext	Total		
19UBFTA2	II	Language	Language-Paper II	6	---	25	75	100	3	
19UBFEN2		English	English-Paper II	4	---	25	75	100	3	
19UBSTC1		Core II	Probability theory	7	---	25	75	100	4	
19UBSTC2		Core III	Practical-I	---	2	40	60	100	4	
19UBSTA2		Allied II	Real Analysis and Matrix Algebra	7	---	25	75	100	5	
19UBSTN2		Non-Major Elective II	Statistics for Real life	2	---	25	75	100	2	
19UBSBE2			Soft Skills - II		2	--	40	60	100	3
TOTAL				28	2				24	

Third Semester

S.No	Sem	Study Components	Paper Title	Lecture Hours		Maximum Marks			Credits
				Theory	Prac	Int	Ext	Total	
19UCFTA3	III	Language	Language-Paper III	6	---	25	75	100	3
19UCFEN3		English	English-Paper III	4	---	25	75	100	3
19UCSTC1		Core IV	Probability Distributions - I	7	---	25	75	100	4
---		Core VI	Practical-II	---	2	Practical examination will be at the end of semester IV			
19UCSTA3		Allied III	‘C’ Language for Statistics	5	---	25	75	100	4
---		Allied Practical	Allied Practicals- I	---	2	Practical examination will be at the end of semester IV			
19UCEVS1		E.V.S		2	--	25	75	100	2
19UCSBE3			Soft Skills - III		2	--	40	60	100
TOTAL				26	4				19

Fourth Semester

S.No	Sem	Study Components	Paper Title	Lecture Hours Theory Prac		Maximum Marks Int Ext Total			Credits
19UDFTA4	IV	Language	Language-Paper IV	6	---	25	75	100	3
19UDFEN4		English	English-Paper IV	4	---	25	75	100	3
19UDSTC1		Core V	Probability Distributions - II	7	---	25	75	100	5
19UDSTC2		Core VI	Practicals-II	---	2	40	60	100	4
19UDSTA4		Allied IV	Numerical Methods	5	---	25	75	100	4
19UDSTA5		Allied Practical	AlliedPracticals- I Practicals in ‘C’ and Numerical Methods	--	2	40	60	100	2
19UDVBE1		Value Education		2	--	25	75	100	2
19UDSBE4		Soft Skills - IV		2	--	40	60	100	3
19UDEXT1			Extension Activities						
TOTAL				26	4				27

Fifth Semester

S.No	Sem	Study Components	Paper Title	Lecture Hours		Maximum Marks			Credits
				Theory	Prac	Int	Ext	Total	
19UESTC1	V	Core VII	Operations Research	5	---	25	75	100	4
19UESTC2		Core VIII	Statistical Estimation Theory	6	---	25	75	100	5
19UESTC3		Core IX	Design of Experiments	6	---	25	75	100	4
19UESTC4		Core X	Statistical Quality control	5	---	25	75	100	4
19UESTE1		Core Elective I	Demography	5	---	25	75	100	5
----		Core XIV	Practicals-III	--	3	Practical examination will be at the end of semester VI			
TOTAL				27	3				22

Sixth Semester

S.No	Sem	Study Components	Paper Title	Lecture Hours		Maximum Marks			Credits
				Theory	Prac	Int	Ext	Total	
19UFSTC1	VI	Core XI	Sampling Techniques	5	---	25	75	100	4
19UFSTC2		Core XII	Testing of Statistical Hypotheses	6	---	25	75	100	5
19UFSTC3		Core XIII	Applied Statistics	6	---	25	75	100	5
19UFSTC4		Core XIV	Practicals -III	---	3	40	60	100	4
19UFSTE1		Core Elective II	Stochastic Processes	5	---	25	75	100	5
19UFSTE2		Core Elective III	Project using Statistical Packages	5	---	40	60	100	5
TOTAL				27	3				28
Grand Total				180		3800			140

SYLLABUS

Semester I

Core Paper – I

Code: 19UASTC1

Credits: 4

Hours: 7/week

Descriptive Statistics

Objective: To introduce the basic concepts of statistics and apply the statistical techniques in various fields.

UNIT - 1:

Statistical methods: Scope - Limitations - Preparation of questionnaire - Sources of data - Nominal, Ordinal, Ratio and Interval scale.

UNIT - 2:

Classifications – Tabulation - Diagrams – Graphs - Frequency distribution (inclusive and exclusive methods) – Definition – Problems.

UNIT - 3:

Measures of Location – Dispersion – Skewness – Kurtosis – Moments – Definition - Concepts - Problems.

UNIT - 4:

Correlation - Scatter diagram - Correlation co-efficient - Rank correlation - Regression Equations - Principle of least squares –Fitting of first and second degree equation and Exponential curves – Definition – Concepts - Problems.

UNIT -5:

Consistency of data - Conditions for consistency - Contingency table - Association of attributes – Definition – Concepts – Problems.

Books for Study:

1. Hogg, R.V. and Craig, A.T. (1998): Introduction to Mathematical Statistics, 4th ed. Academic Press.
2. Hoel, P.G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.
3. Goon, AM., Gupta M.K and .Dasgupta B (1991): Fundamentals of Statistics, Vol.1, World Press, Calcutta.
4. Bhat B.R, Srivenkataramana T, and Madhava K.S,(1996) Statistics: A Beginner's text Vol. I, New Age International (P) Ltd.
5. Gupta,S.P.:Statistical methods,Sultan Chand & Sons Pvt Ltd.New Delhi.

Books for Reference:

1. G.U.Yule and M.G. Kendall (1956): An introduction to the theory of Statistics, Charles Griffin.
2. M.R. Spiegel (1961): Theory and problems of statistics, Schaum's outline series. Snedecor .G.W. and Cochran W.G. (1967): Statistical methods, Iowa State University Press.
3. Anderson, T.W. and Sclove SL. (1978): An introduction to statistical analysis of data, Houghton Mifflin/co.
Croxtton FE, and Cowden D.J. (1973) Applied General Statistics, Printice Hall of India.

Semester II

Core Paper – II

Code: 19UBSTC1

Credits: 4

Hours: 7/week

Probability Theory

Objective: To understand the concepts of Probability theory and introduce Random variables in developing fields.

UNIT - 1:

Random experiment - Sample point - Sample space – Events - Algebra of events, Operations on events - Classical and statistical approach to probability - Axiomatic approach to probability - Problems.

UNIT – 2:

Definition: Conditional Probability-Addition–Multiplication–Baye’s theorem-applications - Problems.

UNIT –3: Discrete and continuous Random variables - Probability mass function - Distribution function and Probability density functions and Mathematical Expectation - their properties- Cauchy Schwartz inequality.

UNIT-4:

Moment generating function-Characteristic function- Cumulant generating functions - Their properties – Chebyshev’s Inequality.

UNIT-5:

Bi-variate distributions - Cumulative distribution function (c,d.f.) - Probability mass function (p.m.f) - Probability density function (p.d.f.) - Marginal and Conditional expectation - Their properties and Problems.

Books for Study:

1. A.M.Mood, F.A. Graybill and D.C. Boes (1974): Introduction to the theory of Statistics, International student ed. McGraw Hill.
2. Hogg, R.V. and Craig, A.T. (1998): Introduction to Mathematical Statistics, 4th ed. Academic Press.
3. A.M.Goon, M.K.Gupta & B. Dasgupta (1980): An outline of Statistical theory, Vol. I, 6th revised, World Press.

Books For Reference:

1. Rohatgi, V.K. (1984): An introduction to probability theory and mathematical statistics.
2. P.G.Hoel (1971): Introduction to Mathematical Statistics, Asia publishing house.
3. Murry R. Spiegel (1982): Theory and problems of Probability and Statistics, Schaum's outline series, McGraw Hill.
4. Seymour Lipshutz (1982): Theory and problems of probability, Schaum's outline series, McGraw Hill.
5. Marek Fisz (1961): Probability theory and Mathematical Statistics, John Wiley.
6. K.L.Chung (1983): Elementary probability theory with stochastic processes, Springer International student edition.
7. William.Feller (1968): An introduction to probability theory and its applications, Vol. I, 3rd ed., John Wiley & Sons.

Semester III

Core Paper – IV

Code: 19UCSTC1

Credits: 4

Hours: 7/week

Probability Distributions - I

Objective: To introduce discrete distributions and apply their concepts in the growth of an assortment of fields.

UNIT -1:

Discrete Uniform distributions – definition – moments. Bernoulli definition- moments. Binomial distribution- definition – moments- M. G. F- Characteristics- recurrence- Factorial – additive property- Fitting of Binomial distribution

UNIT -2:

Poisson distribution- definition- moments- recurrence- M.G.F- Characteristics- additive property. Negative Binomial – definition- M.G.F- Cumulants. Fitting of Poisson and Fitting of Negative Binomial.

UNIT -3:

Geometric distribution- definition- Lack of memory – moments – M.G.F - Simple applications..

UNIT -4:

Partial and Multiple correlations- Regression – Problems.

UNIT -5:

Central Limit Theorem (statement only) - Limiting distributions: Poisson - Binomial - Negative Binomial. Convergence: Binomial – Poisson.

Book for Study :

Gupta, S. C and Kapoor, V. K (2002), Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.

Book for Reference :

Hogg, R. V and Craig, A. T (2002), Introduction to Mathematical Statistics, Pearson Education Asia, India.

Semester IV

Core Paper - V

Code: 19UDSTC1

Credits: 5

Hours: 7/week

Probability Distributions - II

Objective: To introduce continuous distribution and apply their concepts in the growth of an assortment of fields.

UNIT -1:

Normal distribution–definition– limiting form of Binomial distribution- chief characteristics – recurrence relation- M.G.F- moments- Standard Normal variate (concepts only)- Area Property.

UNIT -2:

Rectangular (Uniform) distribution- Moments- M.G.F- Characteristic function. Exponential distribution – M.G.F.

UNIT -3:

Gamma distribution-definition-M.G.F- additive property- limiting form of Gamma distribution.

UNIT -4

Beta distribution of first and second kind- Constants.

UNIT -5:

Exact Tests: Exact tests based on derivation of Students t distribution- constants of t and applications. Derivation of Snedecors F- Constants and its applications. Relationship between t, F and χ^2 distributions. Chi-square distribution – derivation, M.G.F, additive property – its applications.

Books for Study:

1. Mood, A M. Graybill, F.A. and Boes, D.C. (1974) : Introduction to the theory of Statistics, McGraw Hill.
2. Hogg R.V. and Craig, A.T. (1972): Introduction to mathematical statistics, 3rd edition, Academic Press, USA.
3. Goon, A.M. Gupta, M.K., and Das Gupta, B. (1980): An outline of statistical theory, Vol.I, 6th revised ed. World Press limited, Calcutta.

Books For Reference:

1. Hoel, P.G. (1971) : Introduction to mathematical Statistics, Asia publishing house.
2. Rohatgi, V.K. (1984) An introduction to probability theory and mathematical statistics, Wiley Eastern.
3. Degroot, M.H. (1975): Probability and Statistics, Addison – Wesley
4. Marek Fisz (1961): Probability theory and Mathematical statistics, John Wiley.
5. Spiegel, M.R. (1982): Theory and problems of probability and statistics, Schaum's outline series, McGraw Hill
6. Snedecor, G.W. and Cochran, W.G. (1967): Statistical methods 6th edition, Oxford IBH Publishing Co.
7. Wilks, S.S. (1962): Mathematical statistics - John Wiley & Sons.

Semester V

Core Paper – VII Code: 19UESTC1 Credits: 4 Hours: 5/week

Operations Research

Objective: To introduce the concepts of Operations Research and apply their techniques in various optimization fields.

UNIT - 1

Introduction to OR- Nature- Scope- Functions- Models. Linear programming problem - Formulation of LPP

UNIT - 2

Standard and Canonical Form of LPP- - Graphical method- Simplex method.

UNIT - 3

Transportation problems- Balanced and Unbalanced -obtaining IBFS and Optimal solutions - Degeneracy. Balanced and Unbalanced Assignment problems - Travelling salesman problem.

UNIT - 4

Game Theory - Two person zero sum games, The maximin - minimax principle - Games without saddle points - Mixed strategies - Graphical solution of $2 \times n$ and $m \times 2$ games Dominance property. Sequencing - 'n' jobs through 2 machines - 'n' jobs through 3 machines.

UNIT - 5

Network analysis – Slack and Float – CPM – PERT – Finding optimum project duration and minimum project cost – Finding expected project time and variance.

Books for Study and Reference:

1. Handy A. Taha (1996): Operations Research, 6 ed. Prentice Hall of India
2. Kanti Swamp et al: Operations Research, suichand and Sons, New Delhi.
3. Goel & Mittal (1982): Operations Research, Pragati Prakashan, Meerut.
4. Gupta R.K.(1985): Operations Research, Krishna Prakashan, Mandir, Meerut.
5. Schaum's outline series : Operations Research.
6. Frederick S.Hillier & Gerald J.Lieberman: (1987) Operations Research, CBS publishers & Distributors, Delhi.
7. Sharma J.K. (2001): Operations Research. Theory and applications, Macmillan India Ltd.
8. Sharma J.K. (2002): Operations Research. Problems and solutions, Macmillan India Ltd.

Semester V

Core Paper VIII Credits: 5 Codes: 19UESTC2 Hours: 6/week

Statistical Estimation Theory

Unit-I

Point Estimation: Characteristics of good Estimators – Properties - Consistency and Unbiasedness- related theoretical concepts.

Unit – II

Efficiency-Most efficient estimator- Sufficient statistics – Neyman-Fisher Factorization theorem (statement only) – Simple problems.

Unit – III

Unbiased Estimation: Minimum variance unbiased estimators, Cramer – Rao Inequality, Rao- Blackwell theorem – Applications and simple problems.

Unit – IV

Methods of Estimation – Methods of Maximum likelihood and moments – Properties of estimators obtained by these methods – Simple problems. Method of minimum Chi-square.

Unit - V

Interval Estimation: Interval estimator, confidence coefficient, confidence limits, pivotal quantity. Confidence Interval for proportion(s), mean(s) and variance(s) based on normal – simple problems.

Books for study and Reference:

1. Mood, A.M. Graybill, F.A. and Boes, D.C. (1974) Introduction to the Theory of Statistics, McGraw Hill, New York.
2. Hogg, R.V. and Craig, A.T. (1972) Introduction to Mathematical Statistics, 3/e , Academic Press, New York.
3. Goon, A.M. Gupta, M.K. and Das Gupta, B. (1980) An outline of Statistical Theory, Vol.I, World Press, Calcutta.
4. Hoel, P.G. (1971) Introduction to Mathematical Statistics, Wiley, New York.
5. Rohatgi, V.K. and Saleh, A. K. MD.E. (2001) An Introduction to Probability and Statistics, Wiley, India.
6. Spiegel, M.R. and Ray, M (1980) Theory and Problems of Probability and Statistics, Schaum's Outline Series, McGraw Hill, New York.
7. Gupta, S.C, and Kapoor V K (1982): Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
8. Hogg, R. V. Tanis, E and Zimmerman, D (2014) Probability and Statistical Inference, Pearson, New Delhi.

Semester V

Core Paper IX Code: 19UESTC3 Credits: 4 Hours: 5/week

Design of Experiments

Objective: To introduce the concepts and basic principles of Design of Experiments and apply their techniques in Industrial, Agricultural and Biological fields.

UNIT - 1:

Basic Principles – Replication - Randomization and Local Control Techniques - Size of experimental unit - Methods of determination of experimental units .

UNIT - 2:

ANOVA - One-way, two-way classification (without interaction) - Multiple range tests: Newman Keul's test- Duncan's multiple range test. Tukey's test – Transformations Square root, Angular and Log transformations --Problems.

UNIT - 3:

Linear Model and its classifications. Completely Randomized Design (CRD) and its analysis-Randomized Block Design (RBD) and its analysis-Latin Square Design(LSD) and its analysis.

UNIT - 4:

Missing plot technique-Meaning-Least square method of estimating missing Observations- and two observations missing in RBD and LSD -

UNIT - 5:

Factorial experiments - Definition 2^2 , 2^3 and 3^2 factorial experiments and their analysis .

Books for Study:

1. Dass M.N and Giri N.C (1986) Design and Analysis of Experiments, Wiley Eastern, New Delhi.
2. Kempthorne, (1956) Design and Analysis of Experiments, John Wiley. New York.

Books For Reference:

1. Montgomery, D (1972) Design of Experiments, John Wiley and Sons
2. Kapoor, V.K. and Gupta, S.P. (1978): Fundamentals of applied statistics, Sultan Chand & Sons.

Semester V

Core Paper X

Code: 19UESTC4

Credits: 4

Hours: 5/week

Statistical Quality Control

Objective: To equip the concepts of Statistical Quality Control and apply their quality assessment techniques in various fields.

UNIT -1:

SQC: Need in Industry - Causes of Quality variation control charts - Use of the Shewhart - control chart - Specification and tolerance limits - 3 sigma limits - warning limits - applications - Simple Problems.

UNIT - 2:

Control chart for variables - X chart - R chart - σ chart - purpose - Basis of sub grouping - plotting X and R results - Determining the trial control limits - Interpretation of control charts X and R - Simple Problems.

UNIT - 3:

Control chart for attributes - Purpose - p chart - np chart - construction of p and np chart - choice between chart for P and chart for np - construction of c-chart - Problems.

UNIT - 4:

Acceptance of sampling plans for attributes - Producer's risk and consumer's risk - Concepts of AQL, LTPD, AOQ, AOQL, ATI and ASN - Single, Double and Multiples sampling plans - OC, AOQ, ATI curves for single and Double sampling plans - Problems.

UNIT - 5:

Variable sampling plans - Sigma known and sigma unknown determination of n and k for one sided specification - OC curve - Problems.

Books for Study:

1. Kapoor, V.K. and Gupta, S.P. (1978): Fundamentals of applied statistics, Sultan Chand & Sons.
2. Gupta, R.C.(1974): Statistical Quality Control.
3. Montgomery, D.C. (1983): Introduction to Statistical Quality Control, John Waley & Sons.
4. Ekambaram, S K. (1963): Statistical basis of Acceptance sampling, Asia Publishing House.

Books For Reference:

Grant, E,L. and Laven Worth, R.S.: Statistical Quality Control, McGraw Hill.

Semester VI

Core Paper XI

Code: 19UFSTC1

Credits: 4

Hours: 5/week

Sampling Techniques

Objective: To introduce the concepts of Sampling and apply their techniques in various fields.

UNIT - 1:

Sample survey – Design, Organization and execution and principles - Pilot survey – Types - sampling errors and non sampling error advantages - limitations.

UNIT - 2:

Sampling from finite population - Simple random sampling with and without replacement - Properties - Unbiased estimate of the mean, variance and mean finite population correction - Estimation of standard error from a sample - Determination of sample size - Problems.

UNIT - 3:

Stratified random sampling – Properties - Unbiased estimates of mean and variance - Estimates of the mean-optimum and proportional allocations.

UNIT – 4:

Relative precision of a stratified sampling and simple random sampling - Estimation of gain in precision in stratified sampling – Problems.

UNIT - 5:

Systematic sampling – Properties – Estimate of mean and variance of the estimated mean - Comparison of simple and stratified with systematic random sampling – Problems.

Books for Study:

William, G. Cochran (1984): Sampling techniques, Wiley Eastern.

Books for Reference:

1. Des Raj (1976): Sampling theory, Tata McGraw Hill,
2. Daroga Singh & Chaudhary, F.S. (1986): Theory and Analysis of Sample Survey Designs. Wiley Eastern.
3. Sukhatme P.V. et al (1984): Sample survey methods and its applications, Indian Society of Agricultural Statistics, New Delhi.
4. Murthy, M.N. (1967): Sampling theory and methods, Statistical Publishing Society, Calcutta.
5. Sampath S. (1999): Sampling theory and methods. New Age International Ltd.

Engineering Updates

6. Kapoor, V.K. and Gupta, S.P. (1978): Fundamentals of applied statistics, Sultan Chand & Sons.

Semester VI

Core Paper XII

Code: 19UFSTC2

Credits: 5

Hours: 6/week

TESTING OF STATISTICAL HYPOTHESES

Objective: To introduce the concepts of statistical inference and apply in various decision making fields.

Unit -I

Statistical Hypothesis– Null and Alternative Hypotheses – Simple and Composite hypotheses – Critical region – Type-I and Type-II error – Most Powerful test – Uniformly Most powerful test – Neyman-Pearson Lemma – Simple problems.

Unit - II

Likelihood ratio test procedure- properties – Tests for mean of normal population – Test for variance of a normal population.

Unit - III

Large Sample Tests – Sampling distribution, standard error. Large sample tests concerning mean, variance, proportions, correlation coefficient, difference between means, difference between variances.

Unit - IV

Small sample tests concerning mean, difference between means, variance, ratio of variances based on sample(s) from normal population(s). Tests for co-efficient of correlation, Chi-square Tests: Tests for association, independence and goodness of fit.

Unit - V

Non-Parametric tests – Sign, Median, Mann- Whitney Wilcoxon U tests and Run tests – Kolomogrov Smirnov Tests (One sample and two sample problems)

Books for study and Reference:

1. Mood, A.M. Graybill, F.A. and Boes, D.C. (1974) Introduction to the theory of Statistics, Tata McGraw Hill, New Delhi.
2. Hogg, R.V. and Craig, A.T. (1972) Introduction to Mathematical Statistics, 3/e, Amerind, New Delhi.
3. Goon, A.M. Gupta, M.K. and Das Gupta, B. (1980) An outline of Statistical Theory, Vol.I, World Press, Calcutta.
4. Hoel, P.G. (1971) Introduction to Mathematical Statistics, Wiley, New York.
5. Rohatgi, V.K and Saleh A. K MD.E. (2001) An Introduction to Probability and Statistics, Wiley, India.
6. Spiegel, M.R., and Ray, M. (1980): Theory and Problems of Probability and Statistics, Schaum's Outline Series, McGraw Hill, New York.
7. Gupta, S.C, and Kapoor, V. K. (1982) Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
8. Hogg, R. V. Tanis, E. and Zimmerman, D (2014) Probability and Statistical Inference, Pearson, New Delhi.

Semester VI

Core Paper XIII Code: 19UFSTC3 Credits: 5 Hours: 6/week

Applied Statistics

Objective: To interpret the concepts of Time series, Index numbers and Official Statistics and apply their tools in the various fields.

UNIT - 1:

Time series: Components - Additive and multiplicative models - Measurement of trend: Free hand method-Semi average method-Moving average method - Least square method. Problems.

UNIT - 2:

Measurement of seasonal variations: Simple average method - Ratio to trend method - Ratio to moving average method - Link relative method -Problems.

UNIT - 3:

Index Numbers: Weighted – Unweighted - Uses - Classification - Construction – Problems.

UNIT - 4:

Quantity Index numbers: Fixed and Chain base index numbers - Optimum test for index numbers - Time reversal test - factor reversal test - Cost of living index numbers. Problems.

UNIT - 5:

Official Statistics: Statistical System in India CSO and NSSO and its functions - Present structure of the Indian statistical system - Functions of a statistical system - Agricultural statistics - Industrial statistics - Trade statistics - Labour statistics - Transport and Communication statistics – Examples.

Books for Study:

1. Kapoor, V.K and Gupta, S.C (1978); Fundamentals of Applied Statistics, Sultan chand & Sons.
2. Saluja, M.R (1972): Indian official statistical systems: Statistical publishing society, Calcutta and The Indian Econometric Society, Hyderabad.

Books for Reference:

1. Gupta, S.P (1999): Statistical Methods, Sultan & Sons, New Delhi.
2. Croxton, F.E & Cowdon, D.J. (1973): Applied general statistics, Prentice Hall

Semesters I and II

Practicals- I

Core Paper III
2/week

Code: 19UBSTC2

Credits: 4

Hours:

(Based on core paper I)

NOTE:

Record 40 Marks, Practical Examination 60 Marks.

Duration of the Examination: Three Hours.

Six questions are to be set without omitting any unit.

Candidates are to answer any four questions.

All questions carry equal marks.

1. Construction of Uni-variate and Bi-variate frequency distributions,
2. Diagrammatic and graphical representations.
3. Ogives and Lorenz curves.
4. Measures of location, dispersion
5. Measures of skewness and kurtosis for both grouped and ungrouped data.
6. Measures of skewness and kurtosis using moments.
7. Principle of least squares and fitting of first, second degree and exponential curves.
8. Computation of correlation co-efficient.
9. Rank correlation.
10. Regression Equations.
11. Construction of contingency table.
12. Association of Attributes.
13. Numerical problems involving determination of marginal and conditional probability distribution for discrete random variable.
14. Drawing random samples of size not exceeding 25 from Normal population with known mean and variance using random number tables.
15. Algebraic operations of matrix of order $p \times q$ ($p, q < 4$)
16. Determination of the rank of the order $p \times q$ ($p, q < 4$)
17. Inverse of a non-singular matrix of third and fourth order by (i) sweep-out method (ii) partitioning oof matrix method
18. Solutions for system of linear equation.
19. Determination of characteristic roots and characteristic vectors.
20. Verification of cayley Hamilton theorem.

Semesters III and IV

Practicals- II

Core Paper VI
2/week

Code: 19UDSTC2

Credits: 4 Hours:

(Based on core paper III & IV)

1. Fitting of Binomial Distribution.
2. Fitting of Poisson Distribution.
3. Fitting of Normal Distribution- Ordinate method
4. Fitting of Normal Distribution- Area method
5. Problems using standard normal variate
6. Fitting of Negative Binomial Distribution.
7. Partial Correlations.
8. Multiple Correlations.
9. Multiple Regressions.
10. Independence of attributes
11. Testing the goodness of fit.

Semesters V and VI

Practicals- III

Core Paper XIV Code: 19UFSTC4 Credits: 4 Hours: 3 /week

(Based on core paper IX, X, XI & XIII)

1. Simple Random Sampling.
2. Stratified Random Sampling- Proportional Allocation
3. Stratified Random Sampling- Optimum Allocation
4. Systematic Sampling.
5. X Bar Chart, R Chart, σ chart.
6. p, np and c chart.
7. Analysis of Variance - one-way and two-way.
8. Design of Experiment –CRD.
9. Design of Experiment-RBD.
10. Design of Experiment-LSD.
11. Factorial experiments – 2^2 , 2^3 , 3^2 experiments .
12. Moving average method, Method of least squares
13. Ratio to trend method, Ratio to moving average method, Link relative method.
14. Fixed and chain base index numbers, Optimum test for index numbers
15. Time reversal test, factor reversal test, cost of living index numbers.
16. Estimation of Parameters by the methods of Moments and MLE
17. Testing of Hypotheses: Power of the test, Level of Significance
18. Test of Significance (i) Single Mean, Difference of Means, Proportions.
(ii) Equality of Variances,
(iii) Correlation Coefficient
19. Confidence interval for Mean and Variance.

Semester V

Core Elective Paper - I Code: 19UESTE1 Credits: 5 Hours: 5/week

Demography

Objective: To introduce the concepts of Demography and apply their techniques in the field of population studies.

UNIT – 1

Sources of Demographic data – Civil Registration- Population Census – Measurement of Population – Rates and Ratios of vital events.

UNIT – 2:

Mortality measurements- Crude Death rate- Specific Death rate- Age specific Death rate- –Merits and Demerits. Infant Mortality rate- Standardized Death rate- Direct and Indirect. Related simple problems.

UNIT -3:

Fertility- Measures of fertility- Crude Birth rate-General fertility rate- Specific fertility rate- Age Specific Fertility rate-Total fertility rate. Measurement of population growth- Pearle's vital index. Net reproduction rate- Gross reproduction rate. Related simple problems.

UNIT - 4:

Life table – assumptions- Structure - Construction – Relationship between function of the life table – Uses of Life table - abridged life table (Concept only)

UNIT – 5:

Stationary Population -Stable Population and Force of Mortality (Definition only) - Gompertz and Makcham law and its use.

Books for Study and Reference:

1. Srivastava, O.S (1983): A text book Demography, Vikas Publishing
2. Bogue, Donald, . J: Principles of Demography, (1976), John Wiley, New York.
3. Fundamentals of Applied Statistics (Chapter – Vital Statistics), S.C. Gupta and V.K. Kapoor, Sultan chand & Sons

Semester VI

Core Elective Paper II Credits: 5 Code: 19UFSTE1 Hours: 5/week

Stochastic Processes

UNIT - 1:

Basic Concepts : Definition and examples of stochastic process, classification of general stochastic processes into discrete and continuous time, discrete and continuous state spaces, types of stochastic processes, elementary problems.

UNIT - 2:

Markov chains: Definition and examples of Markov chain-Transition Probability Matrix-Chapman Kolmogorov equation-classification of states, recurrence, simple problems

UNIT - 3:

Basic limit theorem of Markov chain (statement only), stationary probability distribution, applications.

UNIT - 4:

Markov Process with discrete state space-Poisson Process- definition – Postulates – Properties of Poisson Process.

UNIT - 5:

Pure birth process- Yule-furry Process. Birth and death Process- Extinction Probability.

Books for Study and Reference:

Karlin, S. and Taylor, H.M. (1975): A first course in Stochastic processes, Academic press.

Hoel, P.M.G., Port, S.C. and Stone, C.J. (1991): Introduction to Stochastic processes, Universal Book Stall.

Parzen, E. (1962): Stochastic processes, Holden-Day.

Cinlar, B. (1975) Introduction to Stochastic processes, Prentice Hall.

Adke, S.R. and Manjunath, S.M. (1984): An introduction to Finite Markov Processes, Wiley Eastern.

Medhi, J. (1996): Stochastic processes, New Age International (p) Ltd.

Ross, S.M. (1983): Stochastic processes, John Wiley.

Taylor, H.M. and Karlin, S. (1999): Stochastic Modelling, Academic press.

Semester VI

PROJECT

(Using Statistical Packages)

Core Elective III Code: 19UFSTE2 Credits: 5 Hours: 5/week

Project Work and Viva Voce

Groups of students are expected to collect Primary data through Design of Sample surveys and secondary data from various sources, carry out statistical analysis and present a report on their findings. The project shall address some of the contemporary issues.

Semester I

Allied Paper - I

Code: 19UASTA1

Credits: 5

Hours: 7/week

Mathematics for Statistics

Objective: To represent the concepts of mathematics and apply their rules with precise statistical treatment.

UNIT – I

Partial Fractions- Form of partial functions. Series- Binomial, Exponential and Logarithmic series.

UNIT – II

Theory of Equations- polynomial equations with real coefficients-imaginary and irrational roots- solving equations with related roots- equations with given numbers as roots- equations whose roots are symmetric functions of roots of a given equation.

UNIT – III

Trigonometric Functions, Product Rule, Quotient Rule and Function of a Function Rule. (No Derivations)- Only Simple Problems. Inverse Trigonometric Function, Logarithmic Differentiation, and Differentiation of Implicit Function and Jacobian Transformations (No Derivations). Only Simple Problems.

UNIT – IV

Rules for Integration, Integration by Substitution – I, II, III.(Only Simple Problems). Integration by Partial Fractions and Integration by Parts.

UNIT – V

Recurrence Formula for Γn , Relationship Between Beta and Gamma Functions. (Simple Problems)

BOOKS FOR STUDY:

1. Duraipandian, P., and Udayabaskaran, S. (2008): Allied Mathematics (Vol 1) S. CHAND Publications.
2. Duraipandian, P., and Udayabaskaran, S. (2008): Allied Mathematics (Vol 2), Muhil Publications.

Books for study and reference:

1. Narayanan and T.K.Manickavachagam Pillai – Ancillary Mathematics Book II
2. Narayanan and T.K.Manickavachagam Pillai (1996) Calculus (Vol I & II)
3. Shanti Narayanan : Differential and Integral Calculus , Chand & Co.

Semester II

Allied Paper - II

Code: 19UBSTA2

Credits: 5

Hours: 7/week

Real Analysis and Matrix Algebra

Objective: To represent the concepts of mathematics and apply their rules with precise statistical treatment.

UNIT – I

Functions, Real –Valued Functions, Equivalence, Countability, Real Numbers, Least Upper Bounds. Sequences of Real Numbers: Definition of Sequence and Subsequence, Limit of a Sequence, Convergent Sequences, Divergent Sequences, Bounded Sequences, Monotone Sequences.

UNIT – II

Sequences of Real Numbers- Operations on Convergent Sequences, Operations on Divergent Sequences, limit Superior and Limit Inferior, Cauchy Sequences. Convergence and Divergence, Series with Non – Negative Terms, Alternating Series, Conditional Convergence and Absolute Convergences.

UNIT – III

Riemann Integral- Definition- properties- Derivatives- Rolle's Theorem, Darboux Property, The Law of Mean, Fundamental Theorems of Calculus- First and second. Improper integrals.

UNIT – IV

Theory of Matrices: Definition- Types of matrices- square, Row, Column, Diagonal, Scalar, and Unit Matrix. Transpose and Conjugate of Matrix. Symmetric, Skew symmetric and Hermitian matrix. Singular, Non- singular and Orthogonal Matrix. Related simple problems.

UNIT – V

. Rank of a matrix- Elementary transformations- Working rule to find the Rank of a matrix. Vectors- Linear dependence and independence of vectors- Consistency of non-homogeneous linear equations- Homogeneous equations- Eigen values and eigen vectors- Cayley –Hamilton theorem- Inverse of a matrix.

BOOKS FOR STUDY:

1. Richard R. Goldberg, (1970): Methods of Real Analysis, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.
2. Duraipandian, P., and Udayabaskaran, S. (2008): Allied Mathematics (Vol 1), S. CHAND Publications.
3. S. G. Venkatachalapathy (2007) :Allied Mathematics, Margham Publications. (For Unit IV and V)

Books for study and reference:

- 1 Gold berg R.R (1970) : Methods of Real Analysis, Oxford and IBH
- 2 Apostol. T.M (1985) Mathematical Analysis, Narosa publications
- 3 Bartle. R.G & Shebert, D.R.(1982) : Introduction to Real Analysis, Wiley Eastern & Sons
4. Narayanan and T.K.Manickavachagam Pillai (1996) Calculus (Vol I & II)

Semester III

Allied Paper - III Code: 19UCSTA3 Credits: 4 Hours: 5/week

‘C’ Language for Statistics

Objective: To expose the mathematical concepts and apply their techniques programming in ‘C’ language.

UNIT -1:

Introduction to “C”, variables, data types-declarations, type conversions, increment and decrement, Bitwise, Logical and Assignment operators.

UNIT-2:

Expression and conditional expressions, control structures, If-Else, SWITCH, WHILE, FOR and DO WHILE loop structures. Break continue, GO and Label statements. Function, function returning, Non-integers, Function arguments-Static and register variables.

UNIT-3:

Arrays and Strings-Array Declaration, Multi dimensional Arrays, Strings/Character Arrays, Array initialization-Pointers and addresses. Pointers and Arrays-Pointer to function.

UNIT-4:

Structures and functions, Array of structures Fields, Unions-type definition standard input and output –formatted output-output-Access to the standard library.

UNIT-5:

File Access, File handling in C-File descriptions-Error handling-‘Low level i/o-Read and Write’.Open,Create, Close,Unlike-Random Access-seek and I seek.

Books For Study and Reference:

1. Balagurusamy,E.(1997):ANSI ‘C’Programming,Tata-McGraw Hill Publishers Ltd.
2. Yaswant Kanetkar(1997): Let Us ‘C’,BPB Publications, New Delhi.
3. Bruce,H.Hunter:Introduction to ‘C’

Semester IV

Allied Paper IV

Code: 19UDSTA4

Credits: 4

Hours: 8/week

Numerical Methods

Objective: To introduce the concepts of Numerical methods and illustrate with numerical examples.

UNIT –1

Finite differences-forward and backward differences, operators E and Δ , and their basic properties, Interpolation with equal intervals: Newton's forward and backward differences-simple problems.

UNIT –2

Interpolation with unequal intervals: Divided differences and their properties, Newton's divided differences formula and Lagrange's formula for interpolation-simple problems.

UNIT-3

Central difference interpolation formula-gauss forward and backward differences formulae-Stirling, Bessel's Everett's central difference formula.

UNIT –4

Inverse interpolation-Lagrange's method-iteration of successive approximation method-simple problems. Numerical differentiation- Numerical differentiation upto 2^{nd} order only-simple problems.

UNIT –5

Numerical integration-Trapezoidal rule-simpsons $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rules-Weddle's rule-Euler's summation formula. Numerical method of solution of ordinary differential equations-Taylor's series method-Euler method and Runge Kutta upto second order – simple problems.

Books for Reference:

1. Calculus of finite differences and Numerical analysis by Gupta-Malik, Krishna Prakastan Mandir, Meerut.
2. Numerical methods in Science and Engineering by M.K. Venkataraman, National publishing house, Chennai.
3. Numerical Analysis by B.D. Gupta, Konark publishing.
4. Calculus of finite differences and Numerical Analysis by Saxena, S. Chand & Co.
5. Numerical mathematics by M.M.Ramasamy and Palaniappan.

Semesters III and IV

Allied Practicals - I

Code: 19UDSTA5

Credits: 2

Hours: 2/week

Numerical Methods & Programming in 'C'

Summation of Series :

1. Sin(x), 2. Cos(x), 3. Exp(x) (Comparison with built in functions)

String Manipulation:

1. Counting the no. of vowels, consonants, words, white spaces in a line of text and array of lines
2. Reverse a string & check for palindrome.
3. Substring detection, count and removal
4. Finding and replacing substrings

Matrix Manipulation:

1. Addition & Subtraction
2. Multiplication
3. Transpose, and trace of a matrix
4. Determinant of a Matrix

Solution of polynomial equation-Newton Raphson method

Solution of system of simultaneous equation-Gauss elimination method.

Lagrange interpolation.

Numerical integration by Trapezoidal, Simpson's and Weddle's rules.

Calculate the value of π (up to five decimal places).

Check the accuracy of the built in functions Sin(x), Cos(x), (x in radians) e^x, e^{-x} .

Generation of Fibonacci Sequence.

Matrix addition, multiplication, inverse, transpose, determinant of square matrix.

Solution of simultaneous equations by Iterative methods and by using inverse.

Semester - I

Non-Major Elective-I Code:19UASTN1 Credits: 2 Hours: 2/week

Statistics for beginners

Objective: To orient the students to learn Basic Statistics for other department students in all discipline (BA/B.com/B.sc/BBA)

UNIT – 1

Introduction of Statistics – Definition – Scope of Statistics – limitations of statistics.

UNIT – 2

Collection of Data : Data collection – Primary data – Secondary data – sources of data – Classification – Tabulation of data.

UNIT – 3

Presentation of Data : Diagrammatic presentation of data – construction of simple bar – sub divided – multiple bars – pie diagram – pictograms – cartograms.
Graphical presentation of Data – Histogram, frequency polygon – frequency curve – ogives

UNIT – 4

Measures of Central tendency – Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean

UNIT – 5

Theory of attributes – consistency of data – independence of attributes and Association of attributes – Yule's coefficient of association – coefficient of colligation.

Books for Study:

7. Hogg, R.V. and Craig, A.T. (1998): Introduction to Mathematical Statistics, 4th ed. Academic Press.
8. Hoel, P.G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.
9. Goon, AM., Gupta M.K and .Dasgupta B (1991): Fundamentals of Statistics, Vol.1, World Press, Calcutta.
10. Bhat B.R, Srivenkataramana T, and Madhava K.S,(1996) Statistics: A Beginner's text Vol. I, New Age International (P) Ltd.

11. Gupta,S.P.:Statistical methods,Sultan Chand & Sons Pvt Ltd.New Delhi.

Books for Reference:

4. G.U.Yule and M.G. Kendall (1956): An introduction to the theory of Statistics, Charles Griffin.
5. M.R. Spiegel (1961): Theory and problems of statistics, Schaum's outline series.
Snedecor .G.W. and Cochran W.G. (1967): Statistical methods, Iowa State University Press.
6. Anderson, T.W. and Sclove SL. (1978): An introduction to statistical analysis of data, Houghton Mifflin/co.
Croxtton FE, and Cowden D.J. (1973) Applied General Statistics, Printice Hall of India.

Semester – II

Non-Major Elective-II Code:19UBSTN2 Credits: 2 Hours: 2/week

Statistics in Real life

Objective: To orient the students to learn Basic Statistics for other department students in all disciplines (BA/B.com/BBA/B.sc)

Unit I

Application of Statistics in various fields : Definitions only – Vital Statistics – Demography – Sources of Demographic data – Population registration in India - Civil Registration system

Unit II

Official Statistics: Present official statistical systems in India –Ministry of Statistics and Programme implementation -NSSO, CSO and their functions -Registration of vital events – National Income Statistics – Agricultural Statistics – Industrial Statistics in India – Trade Statistics in India – Labour Statistics in India – Financial Statistics in India.

Unit III

Index numbers: Index numbers and their definitions - construction and uses of fixed and chain based index numbers-simple and weighted index numbers - Laspeyre's, Paasche's, Fisher's, and Marshall-Edgeworth index numbers – optimum tests for index numbers-Cost of living index numbers.

Unit IV :

Statistical quality control – definition of quality - need for quality control in industry –control charts – Mean chart and Range chart – simple problems

Books for study and reference

1. Statistical Methods - S P Gupta
2. Fundamentals of Applied Statistics - Gupta Kapoor
3. Demography -
4. Quality control – Montgomery

ENVIRONMENTAL STUDIES

Common for all U.G. Courses

(Effective from the Academic Year 2019 – 2020)

Code:19UCEVS1

Credits: 2

Hours: 2/week

Unit 1 : Scope and importance of Environmental Science : Definition, Multidisciplinary nature of environmental science, scope and importance; global environmental problems.

Unit 2 : Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Food chains, food webs and ecological pyramids.

Unit 3 : Biodiversity and its conservation : Introduction – Definition : Value of biodiversity: consumptive use, productive use. India as a mega-diversity nation, Hot-spots of biodiversity. Brief account on biodiversity conservation.

Unit 4 : Environmental Pollution : Definition – Cause, effects and control measures of :- a) Air pollution, b) Water pollution. Solid waste Management : Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

Unit 5 : Social Issues and the Environment : Water conservation, rain water harvesting. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents. Waste land reclamation.

Text Books:

1. Environmental Studies (UGC syllabus), Jazym Publications, Trichy.
2. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA.
3. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
4. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi
5. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India.

SEMESTER IV

VALUE BASED EDUCATION

Common for all UG Courses

(Effective from the Academic Year 2019-2020)

SUBJECT CODE:19UDVBE1

CREDITS 2

Hours : 2/week

OBJECTIVE

The age today is marked by vast technological changes which have wrought widespread transformations in social and cultural conditions. In such a situation Education without values becomes directionless. This paper stresses the importance of inculcating values in the young minds.

UNIT- I

Values

Definition and Meaning of Values- Human Values, Social Values, Cultural and Religious Values, Ethical Values, Global Values and Spiritual Values

UNIT-II

The Power of Positive Thinking

‘Building Self-Confidence’-Norman Vincent Peale (From Touchstone: Synergy of Values)

UNIT-III

Leadership: The Challenge of Excellence

Living Excellence –Anthony Robbins (From Touchstone: Synergy of Values)

UNIT-IV

The Personal Value of Truth and Its Importance

The Story of My Experiments with Truth - M.K. Gandhi (Chapter 2)

UNIT V

Human Rights

Human Rights – Universal Declaration of Human Rights – Human Rights violations (From Touchstone: Synergy of Values)

REFERENCE BOOKS

- 1) *Touchstone : Synergy of Values* (Madras University Publication - 2003)

- 2) Swami Vivekananda- *Youth and Modern India*, Ramakrishna Mission, Chennai.
- 3) M.K.Gandhi- *The Story of My Experiments with Truth*, Maple Classic
- 4) Norman Vincent Peale-*The Power of Positive Thinking*
- 5) Martin Meadows- *How to Build Self-Discipline: Resist Temptations and Reach Your Long-Term Goals*
- 6) M.G.Chitakra- *Education and Human Values*, A.P.H Publishing Corporation, New Delhi, 2003.
- 7) Anthony Jay Robbins - *Unlimited Power: The New Science of Personal Achievement*, Free Press New York, 1986 (Pages 408 – 410)
- 8) Ed. Dr. N.Venkataiah. *Value Education*. APH Publishing Corporation, New Delhi, 2007. (Pages 1- 8)

Question Paper Pattern

3 HOURS

75 MARKS

SECTION A - 2x10=20: Answers in one or two sentences

Choice: 10 out of 12

SECTION B - 5x05=25: Answers in 100 words.

Choice: 05 out of 07

SECTION C - 3X10=30: Answers in 500 words.

Choice: 03 out of 05

Questions should be chosen from each unit

SEMESTER I

SBE I : SOFTSKILLS- ESSENTIALS OF LANGUAGE AND COMMUNICATION

Common for all UG Courses

(Effective from the Academic Year 2019-2020)

SUBJECT CODE: 19UASBE1

CREDITS 3

OBJECTIVE

This course helps the learner to improve his / her language skills by practicing the primary skills LSRW.

UNIT I : LISTENING & WRITING SKILLS

Spelling Test [Words selected from the prescribed Poems in Foundation English will be tested]

UNIT II: READING SKILL

Reading the passages from the Short Stories of the prescribed syllabus of Foundation English. Fluency and Reading aloud are the criteria for testing reading skill.

UNIT III: SPEAKING SKILL

Introducing oneself

REFERENCE BOOK:

A Course in Listening and Speaking Part I – A Textbook for I Year Undergraduate(Non-Professional) General English Course – V.Sasikumar et al.

SUGGESTED YOUTUBE VIDEOS

<https://www.youtube.com/watch?v=VCb5qfNgNro>

<https://www.youtube.com/watch?v=zKZ1Y6oH8Fc>

<https://www.youtube.com/watch?v=chWUolYBgjA>

Internal Marks :40

External Marks – 60 [PRACTICAL PAPER]

The break up is

Unit I : Listening & Writing Skills – 20 marks

Unit II : Reading Skills – 20 marks

Unit III: Speaking Skills – 20 marks

SEMESTER II

SBE II: SOFTSKILLS - ESSENTIALS OF SPOKEN AND PRESENTATION SKILLS

Common for all UG Courses

(Effective from the Academic Year 2019-2020)

SUBJECT CODE:19UBSBE2

CREDITS 3

OBJECTIVE

This paper helps the learner to improve his/her speaking skills in a particular situation and also prepares for seeking job.

UNIT I

Speaking Skills - Narrating a story or incident

UNIT II

Interview Skills – Role play of Interview, Dress Code for Interviews and formal occasions

UNIT III

Reading a passage from the prescribed texts of Foundation English II. Voice modulation for direct speech, dialogues will be tested

STUDY AID

Language laboratory, Computers Software- power point, Flash

REFERENCE BOOK

A Course in Listening and Speaking Part I – A Textbook for I Year Undergraduate(Non-Professional) General English Course – V.Sasikumar et al.

SUGGESTED YOUTUBE VIDEOS

<https://www.youtube.com/watch?v=nhTcuUvLG0E>

<https://www.youtube.com/watch?v=ncuCMZRG1wo>

<https://www.youtube.com/watch?v=AxTys2C4t68>

<https://www.youtube.com/watch?v=1mHjMNZZvFo>

Internal Marks :40

External Marks – 60 [PRACTICAL PAPER]

The break up is

Unit I : Listening & Writing Skills – 20 marks

Unit II : Reading Skills – 20 marks

Unit III: Speaking Skills

– 20 marks

SEMESTER III

SBE III: SOFTSKILLS - PERSONALITY ENRICHMENT

Common for all UG Courses

(Effective from the Academic Year 2019-2020)

SUBJECT CODE:19UCSBE3

CREDITS 3

Objectives:

To make students understand the concepts and Determinants of Personality.

To enable students to keep themselves abreast of general knowledge and current information.

To bring out creativity and other latent talents with proper goal setting so that self-esteem.

To sharpen memory skills and other study skills which are vital for academic excellence.

To give training for positive thinking, which will keep the students in a good stead at the time of crisis.

Unit I Introduction

Definition of Personality - Determinants of Personality biological, psychological and socio-cultural factors. Misconceptions and Classifications. Need for personality development. Unit Self-awareness and self-motivation

Unit II

Definition of self, self concept and self awareness. Self analysis through SWOT and Johari window

Definition of Motivation. Types of Motivation Techniques and strategies for self motivation

Motivation checklist and Goal setting based on the principle of SMART. Self motivation and life

Unit III-

Memory and Decision making - Definition and importance of memory - Causes of forgetting -Techniques of improving memory The decision making process.

Unit IV

Study skills : Definition of study skills - Characteristics of study skills - Techniques of passing exams

Unit-V ASSERTIVENESS

Definition and characteristics Assertive-submissive-Aggressive differences Assertiveness skills

References

1. Mile, D.J. 2004. Power of positive thinking. Delhi:Rohan Book Company.
2. Praveshkumar. 2005. All about self-motivation. New Delhi: Goodwill Publishing House
3. Dudley, D.A. 2004. Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.
4. Lorayne, H. 2004. How to develop super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd.
5. Hurlock, E.B. 2006. Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.

SEMESTER IV

SBE IV: SOFTSKILLS - COMPUTER BASICS AND OFFICE AUTOMATION

Common for all UG Courses

(Effective from the Academic Year 2019-2020)

SUBJECT CODE:19UCSBE4

CREDITS 3

COURSE OBJECTIVES

The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel and Power point. The course is highly practice oriented rather than regular class room teaching.

UNIT - I

Introductory concepts: History - Generation - Classification - Block diagram - Memory unit – CPU.

UNIT - II

Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: UNIX – Windows. Introduction to Programming Languages: C, C++ and its features.

UNIT - III

Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing – Preview, options.

UNIT - IV

Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing.

UNIT - V

Power point: Introduction to Power point - Features – Understanding slide types – creating & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects.

TEXT & REFERENCE BOOKS

1. Peter Norton, “Introduction to Computers” –Tata McGraw-Hill.
2. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw-Hill.

Note : All units need an approach through practical exposure.

(For BBA degree students)**Credits: 5****hours/week : 6 hrs.****QUANTITATIVE METHODS**

Objective: To promote the skill of applying statistical techniques in business
To enable the students to apply the statistical tools in analysis and interpretation of data

Unit – I

Nature and scope of statistical methods – Limitations – Preparation of Questionnaire and schedule – Collection of data – primary and secondary data – sources – methods of collection of primary and secondary data. Observational studies and sample surveys.

Unit – II

Diagrammatic representation of data – one and two dimensional – Bars – Types of Bar diagrams. Graphical representation of data – Frequency curve – frequency polygon – Histogram and Ogive curve.

Unit – III

Measures of central tendency – Arithmetic Mean, Median, Mode, Geometric Mean and Harmonic Mean – Merits and Demerits.

Unit – IV

Measures of Dispersion – Absolute and Relative measures – Range, Quartile deviation, Mean deviation, Standard deviation and its Coefficients – Merits and Demerits. Measure of Skewness and Kurtosis.

Unit – V

Fundamental sets of frequencies – Consistency of Data – Conditions for consistency – Contingency table – Association of attributes.

Note: The proportion of theory and problems is 20:80

Books for study and reference:

1. Statistical methods – S. P. Gupta, Sultan Chand & sons
2. Comprehensive Statistical Methods – P.N. Arora, Sumeet Arora and S. Arora, S. Chand
3. Business Statistics -P.R. Vittal

(For BBA degree students)

Credits: 5**hours/week : 6 hrs.****BUSINESS STATISTICS**

Objective: : To promote the skill of applying statistical techniques in business
To enable the students to apply the statistical tools in analysis and interpretation of data

Unit – I

Correlation Analysis – Definition – Types – Scatter diagram – Karl Pearson's Correlation Coefficient – Spearman's Rank Correlation Coefficient – Its properties – problem.

Unit – II

Regression Analysis – Definition – methods – Regression equations – Regression lines – properties – Related simple problem.

Unit – III

Time Series – Definition – Components – Measurement of Trend – Graphical method, Semi average method, Moving average method and method of Least squares – Measurement of Seasonal Variations.

Unit – IV

Index Numbers – Definition – Methods – Test for Index Numbers – Cost of living Index Number – Chain base method – Uses of Index Numbers – Simple problems.

Unit – V

Concept of Sampling – Methods of Sampling – Random Sampling – Stratified Sampling – Systematic Sampling – Sampling Error – Non sampling Error.

Note: The proportion of theory and problems is 20:80

Books for study and reference:

1. Statistical methods – S. P. Gupta, Sultan Chand & sons
2. Comprehensive Statistical Methods – P.N. Arora, Sumeet Arora and S. Arora, S. Chand
3. Business Statistics -P.R. Vittal
4. Practical Statistics – R.S.N Pillai and Bagavathi, S. Chand
5. Statistics - R.S.N Pillai and Bagavathi, S. Chand

SECOND ALLIED COURSE - I

SEMESTER – III

(For B.Com degree students)

Credits: 5

hours/week : 6 hrs.

BUSINESS STATISTICS

Objective: To develop an understanding of a variety of statistical and quantitative techniques applicable to a wide range of business situations

Unit – I

Statistics – Introduction – Definition – Scope – Limitations – Collection of data
Classification – Tabulation of data – Diagrammatic and Graphical representation of statistical data.

Unit – II

Measures of central tendency – Arithmetic Mean, Median, Mode, Geometric Mean and Harmonic Mean – Merits and Demerits.

Unit – III

Measures of Dispersion – Absolute and Relative measures – Range, Quartile deviation, Mean deviation, Standard deviation and its Coefficients – Merits and Demerits – Measures of Skewness and Kurtosis.

Unit – IV

Correlation Analysis – Definition – Methods – Karl Pearson's Correlation Coefficient – Rank Correlation – Concurrent deviation method – Properties. Regression Analysis – Definition – methods – properties – simple problem

Unit – V

Time Series – Definition – Components of Time Series – Measurement of Trend – Measurement of Seasonal variation. Index Numbers – Definition – problems in the construction of Index numbers- simple and weighted Index numbers- Methods – Test for Index Numbers – Chain base method – Cost of living Index Number – Uses – Simple problem.

Note: The proportion of theory and problems is 20:80

Books for study and reference:

1. Statistical methods – S. P. Gupta, Sultan Chand & sons
2. Comprehensive Statistical Methods – P.N. Arora, Sumeet Arora and S. Arora, S. Chand
3. Business Statistics -P.R. Vittal
4. Practical Statistics – R.S.N Pillai and Bagavathi, S. Chand
5. Statistics - R.S.N Pillai and Bagavathi, S. Chand

SECOND ALLIED COURSE - I

SEMESTER – IV

(For B.Com degree students)

Credits: 5

hours/week : 6 hrs.

Operations Research

Objective : To help understand the conceptual aspects of Operations research.
To impart knowledge on Linear programming problem, transportation and assignment problem.

Unit – I

Introduction to Operations Research – Meaning – Scope – Models and Limitations of O.R

Unit – II

Linear Programming Problem – Mathematical Formulation – Graphical and Algebraic Method (Maximization and Minimization) – Simplex method only – simple problems.

Unit – III

Transportation Problem – Formulation – North West Corner – Least Cost Method – Vogel's Approximation method (Basic feasible solution only) – simple problem.

Unit – IV

Assignment problem – Formulation – Hungarian method of Assignment (Maximum and Minimum) – Simple problems.

Unit – V

Network analysis – Calculation of CPM – EST -EFT -LST -LFT and Total Float. PERT - simple problem (without Crashing).

Note: The proportion of theory and problems is 20:80

Books for study and reference:

1. Operations Research – Kanti Swarup, P.K. Gupta and Manmohan, Sultan chand
2. Operations Research – J.K. Sharma, Sultan
3. Introduction to Operations Research – P.R. Vittal

CORE COURSE - I SEMESTER – I
(For M.Com degree students)

Credits: 5

hours/week : 6 hrs.

OPERATIONS RESEARCH

Objectives: To understand the conceptual aspects of Operations research and impart knowledge on Linear Programming problem, Transportation and Assignment models.

Unit -1

Introduction to Operations Research – Meaning – definition – origin and history – characteristic feature – need – scope and limitation – Models of O.R and Phases of O.R – Linear Programming Problem(LPP) – Meaning – assumptions – applications – Formulation LPP – advantages – Limitations.

Unit – II

Obtaining optimal solution for LPP – Graphical method – Simplex method for Maximization function – Minimization function (simple problems only) – Duality in LPP meaning – construction dual LPP

Unit – III

Transportation Problem –meaning -Balanced and Unbalanced problems - Initial Basic Feasible Solution – North West Corner Rule – Least Cost method – Vogel's Approximation method – Solution by optimality by MODI method – Assignment Problem – Models – Hungarian method.

Unit – IV

Game Theory – meaning – types of games – basic assumptions – finding value of game for pure strategy – saddle point – payoff matrix – mixed strategy- graphical method – value of game – Network analysis – network diagram and critical path method CPM – PERT (No crashing) – Sequencing Problem – meaning – assumption – 2 machine problem only

Unit – V

Queueing theory – Meaning – objectives – limitations – Elements of Queueing system – Queueing models – M/M/1: ∞ /FIFO and M/M/I : N/FIFO. Statistical Quality Control (SQC) – Meaning of quality – Quality control – benefits – uses of SQC – Control charts- X and R chart – control limits.

Note: The proportion of theory and problems is 20:80

Books for study and reference:

1. Operations Research – J.K. Sharma, Sultan
2. Operations Research – Goel & Mittal
3. Operations Research, Theory and application – J.K. Sharma
4. ANAND SHARMA,(2014), 'Operations Research', Himalaya Publishing House,

Mumbai

5. AGARWAL N P AND SONIA AGARWAL, (2009), 'Operations Research and Quantitative Techniques', R B S A Publishers, Mumbai
6. GURUSAMY S,(2016), 'Operations Research', Vijay Nicole Imprints, Chennai
7. GUPTA P K & GUPTA S P, (2014), 'Quantitative Techniques & Operations Research', Sultan Chand and Sons, New Delhi
8. KANTI SWARUP, P.K.GUPTA & MAN MOHAN, (2010), 'Operations Research', Jain Book Agency, New Delhi
9. KAPOOR V K, (2011), 'Operations Research Techniques for Management', Sultan Chand and Sons, New Delhi
10. SHRIDHARA K BHAT, (2011), 'Operations Research', Himalaya Publishing House, Mumbai
11. Montgomery, D.C (1983) Introduction to Statistical quality control, John Wiley & Sons.
12. Ekambaram, S.K (1983) : Statistical basis of Acceptance sampling, Asia Publishing House.

CORE COURSE - II SEMESTER – II
(For M.Com degree students)

Credits: 5

hours/week : 6 hrs.

QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS

Objective: To develop an understanding of a variety of statistical and quantitative techniques applicable to a wide range of business situations.

Unit – I

Meaning – scope and limitations of quantitative techniques – uses of quantitative techniques in business decisions.

Unit – II

Concepts of Probability – definition of Probability – sample space – addition theorem of probability – multiplication theorem- conditional probability-Bayes's theorem. Theoretical distributions – Binomial – Poisson – Normal distribution – fitting and testing the Goodness of fit.

Unit – III

Testing of Statistical hypothesis – Null – Alternative hypothesis- type I and type II error Test of Significance – Large Sample test – Test for single Mean – Test for difference of means

Unit – IV

Significance tests in Small samples – Testing the significance of the mean of a random sample – Testing difference between means of two samples – F- test – chi square test – independence of Attributes. Analysis of Variance- assumption of ANOVA (one way and two way classifications , problems only).

Unit – V

Decision Theory – Meaning – Definitions – Uncertainty – pay offs – Expected opportunity loss (EOL) – Maximin principle – Minimax principle –Bayes principle – Decision tree analysis – steps in construction of Decision tree analysis.
Interpolation – Methods of Interpolation – Binomial expansion method – Newtons's method – Extrapolation. (problems only)

Note: The proportion of theory and problems is 40:60

Books for study and reference:

1. Fundamentals of Mathematical Statistics – S.C. Gupta and V.K. Kapoor, Sultan Chand
2. Statistical Methods – S.P. Gupta (1995), Statistical Methods, Sultan Chand & Sons, New Delhi

3. Gurusamy S, (2018), Operations Research, Vijay Nicole Imprints Pvt. Ltd, Chennai.
4. Joseph D and Anbarasu, (2011), Business Statistics, Vijay Nicole Imprints Pvt. Ltd., Chennai.
5. Kothari C R (1998), Quantitative Techniques, Vikas Publishing House, New Delhi.
6. Hooda, R.P (2010), Statistics for Business and Economics, Macmillan, New Delhi.
7. Hein, L.W (2011), Quantitative Approach to Managerial Decisions, Prentice Hall, Delhi
8. Levin, Richard I. and David S Rubin (2010), Statistics for Management, Prentice Hall,

