(2024-2025)

Ordinances and Regulations With

Respect to

Choice Based Credit System (CBCS)

For the Programmes Under

The Faculty of Humanities

For the Course

Statistics(Minor)

Curriculum – Second Year Undergraduate Programmes Semester-III

and Semester -IV

2024-2025

HSNC UNIVERSITY, MUMBAI

Board of Faculty of Humanities
Board of Studies in the Subjects of Statistics

1) **Name of Chairperson/Co-Chairperson/Coordinator:-**

   a) **Dr Asha Jindal,** Professor and (UG:Head & PG:Coordinator), Department of Statistics, K. C. college, HSNC University Churchgate, Mumbai –400 020. Email ID- asha.jindal@kccollege.edu.in Mobile no- 9821235627

2) **Two to five teachers each having minimum five years teaching experience amongst the full time teachers of the Departments, in the relevant subject.**

   a) **Dr. S. B. Muley,** Assistant Professor, Department of Statistics, K. C. college, HSNC University Churchgate, Mumbai – 400 020. Email ID sakharam.muley@kccollege.edu.in , Mobile No- 9323817918

   b) **Mrs. Pratiksha Kadam,** Assistant Professor, Department of Statistics, K. C. college, HSNC University Churchgate, Mumbai – 400 020. Email ID pratiksha.kadam@kccollege.edu.in , Mobile No- 7507162816

   c) **Ms. Shailaja Rane,** Assistant Professor, Department of Statistics, K. C. college, HSNC University Churchgate, Mumbai – 400 020. Email ID shailaja.rane@kccollege.edu.in, Mobile No- 7506986359

3) **One Professor / Associate Professor from other Universities or professor / Associate Professor from colleges managed by Parent Body;**

   a) **Dr Anjum Ara Ahmed;** Professor and I/C Principal, Rizvi College, Mumbai. Email ID **anjumahmed8@gmail.com, Mobile No-** 8451046220

4) **Four external experts from Industry / Research / eminent scholar in the field relevant to the subject nominated by the Parent Body;**

a. **Prof. Suresh Kumar Sharma,** Senior Professor, Department of Statistics, Panjab University, Chandigarh.
Email ID ssharma643@yahoo.co.in, **Mobile No-**9815911381

b. **Mr Mukesh Jain,** Vice President and Chief Technological Officer, Capgemini. Email ID mdjain@hotmail.com, **Mobile No-**7972637347.

c. **Dr Santosh Gite,** Professor, Dept. of Statistics, University of Mumbai, Mumbai. Email ID santgite@yahoo.com, **Mobile No-** 9167157717.

d. **Mr Prashant Kumar Nair,** Director, Geo Spatial Analytics Global Lead, Intelligent Analytics, Nielsen Connect, Email ID prashantkumar.nair@nielsen.com , **Mobile No-**9833747057.

5. Top rankers of the Final Year Graduate and Final Year Post Graduate examination of previous year of the concerned subject as invitee members for discussions on framing or revision of syllabus of that subject or group of subjects for one year.

a) **Ms. Ruchi Pasad** (Postgraduate student 23-24) Email ID-skruchi13@gmail.com; Mobile no-9967281346

b) **Mr. Advitiya Tejasvi** (undergraduate student 23-24) Email ID-tadvitiya@gmail.com; Mobile no- 7761934693

Statistics
Part 1- Preamble

The Minor in Statistics program aims to equip students with a thorough understanding of statistical concepts and methodologies, developing their ability to apply statistical tools to real-world problems. The course is designed to balance theoretical foundations with practical applications, particularly emphasizing computational tools such as SPSS, Excel, Python. The integration of continuous assessment, project work, and applied learning ensures that students develop not only academic knowledge but also critical thinking, ethical decision-making, and effective communication skills, essential for careers in statistics, data science, finance, research, and beyond. The curriculum supports the objectives of the National Education Policy (NEP 2020) by focusing on interdisciplinary collaboration, sustainable practices, and lifelong learning.

1. Program Outcomes

After completing the program, student will be able to

PO1 Disciplinary knowledge- Demonstrate multi-disciplinary knowledge and understanding of various socio, economic, political, psychological, linguistic and environmental disciplines.

PO2 Communication Skills - Demonstrate the ability to listen carefully and express themselves confidently in a clear and concise manner, thereby leading to meaningful exchange of thoughts/ ideas with various sections of the society.

PO3 Critical thinking & Reflective Thinking - Critically evaluate and reflect upon practices, policies and theories and formulate coherent thoughts for real-world application.

PO4 Problem solving, Scientific and Analytical reasoning- Analyse, interpret, and draw conclusions from qualitative/quantitative data and apply the concepts /learning in socio, economic, political, psychological, linguistic, and environmental disciplines to analyse and address real life problems situations as open minded and rational citizens.

PO5 Research-related skills and Lifelong learning- Develop the skills of observing, inquiry, questioning, problematizing, synthesizing, articulating, and establishing cause and effect in one or more humanities discipline and real-life situations which are necessary for learning throughout life.

PO6 Cooperation/Teamwork & Leadership readiness/qualities -Develop the values of cooperation, coordination, teamwork, respect, understanding and tolerance across different

and globally diverse groups and aspire for an inclusive society for the betterment of all by challenging the challenges.

PO7 Information/digital literacy - Access and use Information and Communication Technology (ICT) in various learning experience; use appropriate digital mediums/software for gathering, storing, and disseminating information in a simplified way

PO8 Self-directed learning - Set simple, measurable, attainable, realistic, and time-bound goals for one-self and work in that direction to achieve them.

PO9 Multicultural competence- Appreciate diversity of language, norms, values, and beliefs of multiple cultures at regional, local, national and global levels making them capable to integrate and engage in a multicultural diverse society.

PO10 Moral and ethical awareness/reasoning - Embrace moral and ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, use ethical practices in all work and research avoiding fabrication, falsification or plagiarism.

2. **Course Objective:** The main objectives of the course are-

1) Students will build a strong foundation in core statistical principles and methodologies, allowing them to apply statistical techniques to real-world problems.
2) Students will commit to lifelong learning and remain updated on emerging statistical methods, computational tools, and technological advancements.
3) Students will develop problem-solving and analytical skills, enabling them to apply statistical models and methods in various industries, including finance, healthcare, and research.
4) Students will demonstrate professionalism, ethical responsibility, and effective communication in multidisciplinary and collaborative environments.
5) Students will possess the skills necessary for employability and entrepreneurship, and they will be well-prepared to pursue higher education or careers in data analysis, statistical consulting, or related fields.

3. Program Specific Outcomes (PSOs):

1. **Foundational Statistical Knowledge**: Demonstrate a comprehensive understanding of statistical principles and methodologies to apply them effectively in real-world scenarios.
2. **Data Analysis Skills**: Develop expertise in data collection, management, and analysis using statistical software such as SPSS, Excel, and Python.
3. **Interdisciplinary Applications**: Employ statistical tools to address problems across diverse domains, including finance, healthcare, and social sciences.
4. **Research Proficiency**: Gain competence in designing experiments, conducting hypothesis tests, and interpreting results in a scientific context.
5. **Ethical Awareness**: Evaluate and apply ethical considerations in statistical research and analysis, promoting sustainable practices.
6. **Communication Skills**: Articulate statistical findings effectively in both verbal and written formats to diverse audiences.
7. **Professional Readiness**: Equip students with industry-relevant skills for roles in data analysis, quality control, and operations research, enhancing employability and entrepreneurship potential.

4. Process adopted for curriculum designing.

The members of Department of Statistics initially drafted the syllabus. The draft syllabus was shown to Industry Partners, Academic Partners and Research Institute Partners through mail and in person invited to college. They suggested some changes. These changes were incorporated.

5. Salient features, how it has been made more relevant.

Statistics deals with collection, organization, analysis and interpretation of data. Statistical knowledge is very important as it helps to use appropriate methodologies for collecting data, tools for employing analysis and interpretation of results. It also provides us with techniques which are important in designing and planning of experiments.

A lot of data is generated at each and every moment. Data literacy has become crucial and indispensable to the society. Statistics has the quality of quantifying and measuring uncertainty which helps in assessing risk. It helps in extracting the meaningful information from the data, making predictions and taking decisions. Study of data has become an integral part of education,

business, and overall human progress. This has put Statistics on the center stage of teaching, research, policy making and development all over the globe.

The S.Y.B.A Statistics syllabus is a Choice based credit system comprising of one paper having three units each in both the semesters. The current course is designed to enhance the knowledge of the subject. While designing of the syllabus care has been taken to balance the fundamental techniques of Statistics with soft skills like analysis using Statistical Software.

Several radical changes have been made in the syllabi. Firstly, the concept of having seperate papers in practicals has been abondoned. All the numerical / practical work has been integrated with the teaching of theory courses. Secondly, majorly the numerical /practical work be carried out on computers.

The course would give the students option to develop skills in areas which have direct relevance to employability in insurance and finance industries, banks, econometrics, quality control, pharmaceutical, medical statistics, agricultural statistics, weather forecasting, civil services, stock market, machine learning and artificial intelligence related job opportunities in Statistics.

6. Learning Outcomes: Learning outcomes of various courses are:

Semester III (SYBA)

1. **STA207B – Statistical Methods**:
    - **Unit 1**: Understand estimation, related theory of point estimation, theory of testing and confidence sets, together with their applications.
    - **Unit 2**: Develop test procedure and to learn applications of Z, t, F, Chi-Square. Perform hypothesis testing for various datasets.
    - **Unit 3**: Conduct ANOVA and design quality control charts for Variables and Attributes(X-bar, R, and p-charts) and learn the application of Quality Control in Industry..
2. **STA207D – Practical Based on Statistical Methods**:
    - **Unit 1**: Perform sampling, estimation, and hypothesis testing.
    - **Unit 2**: Apply Z, t, Chi-square, and F tests manually and using statistical software.
    - **Unit 3**: Perform ANOVA and develop control charts.

Semester IV (SYBA)

1. **STA208B – Operations Research Techniques**:

    - **Unit 1**: Learn mathematical formulation of real-life situations using LPP and study methods to solve the formulated problems using graphical and simplex methods.
    - **Unit 2**: Learn mathematical formulation of real-life situations using Transportation., Assignment Problems and Apply transportation and assignment problem-solving techniques.
    - **Unit 3**: Learn mathematical formulation of real-life situations using Game Theory, Decision Theory and to study methods to solve the formulated problems manually and using TORA software.

2. **STA208D – Practical Based on Operations Research**:
    - **Unit 1**: Solve LPP problems using graphical and simplex methods.
    - **Unit 2**: Solve transportation and assignment problems.
    - **Unit 3**: Apply decision and game theory techniques.

Part 2- The Scheme of Teaching and Examination is as under: Semester – III Summary

Sr. No.	Choice Based Credit System			Subject Code	Remarks
1	Core Course (**Statistics**)			STA207B STA207D	Nil
2	Elective Course	Discipline Specific Elective (DSE) Course			
		2.1	Interdisciplinary Specific Elective (IDSE) Course		
		2.2	Dissertation/Project		
		2.3	Generic Elective (GE) Course		
3	Ability Enhancement Courses (AEC)				
	Skill Enhancement Courses (SEC)				

Second Year Semester III Internal and External Detailed Evaluation Scheme

Sr No.	Semester	Subject Code	Subject Title	NEP Course Type	Hours Per Week						Seasonal Evaluation Scheme (Internal + External)			Total Marks
					Units	S. L. E.	L	T	P	Credit	S. L. E	PA	SEE	
1	III	STA207B	Statistical Methods	Minor	3	20 %*	3	0	0	3	10	5	60	100
		STA207D	**Computer Applications & Practical** Based on Statistical Methods						2	1			25	

***One to two lectures to be taken for CONTINUOUS self -learning Evaluation.**

Part -3 Detailed Scheme Theory

Curriculum Topics along with Self-Learning topics - to be covered, through self-learning mode along with the respective Unit. Evaluation of self-learning topics to be undertaken before the concluding lecture instructions of the respective UNIT

Second Year Semester – III Units – Topics – Teaching Hours

S. N	**Subject Code**	**Subject Unit Title**		**Hours/Lectures**	**Total No. of hours**	**Credit**	**Tot al Marks**
1	STA207B	I	Elementary topics on Estimation and Testing of Hypothesis	15	45 H	3	100
		II	Applications of Z, T, Chi-square and F	15			
		III	ANOVA and Statistical Quality Control	15			
2	STA207D	I	Practical based on STA207B	2	30H	1	
			TOTAL			4	100

Lecture Duration – One hour **One Credit =15 class room teaching hours.**

L: Lecture: Tutorials P: Practical Ct-Core Theory, Cp-Core Practical, SLE- Self learning evaluation CT-Commutative Test, SEE- Semester End Examination , PA-Project Assessment, AT- Attendance

Part -3 Detailed Scheme Theory

Curriculum Topics along with Self-Learning topics - to be covered, through self-learning mode along with the respective Unit. Evaluation of self-learning topics to be undertaken before the concluding lecture instructions of the respective UNIT

Course Code: STA207B

Course Title: Statistical Methods

Unit	Content	No. of hours
I	**Elementary topics on Estimation and Testing of Hypothesis** 1.1 Sample from a distribution : Concept of Population and sample, Concept of Parameter, statistic, estimator and estimate. **1.2** Properties of good estimator (Only names), unbiasedness and standard error of an estimator. **1.3** Central Limit theorem (statement only). **1.4** Sampling distribution of sample mean and sample proportion (For large sample only). **1.5** Standard errors of sample mean and sample proportion. **1.6** Interval estimate of single mean, single proportion, Difference between two population mean and Difference between two population proportions from sample of large size. 1.7 **Testing of Hypothesis:** Concept of hypothesis Simple Hypothesis and composite hypothesis Null and alternate hypothesis, Types of errors, Critical region, Level of significance and Power of test. Concept of p-value, One tail and two tailed tests.	15
II	**Applications of Z, T , Chi-square and F:** 2.1 Large Sample Tests for Mean and Proportions**:** (Development of critical region is not expected.) (i) For testing specified value of population mean (ii) For testing specified value of population proportion (iii) Test for Difference between Two Population Means (iv) Test for Difference between Two Population Proportions. 2.2 Applications of Chi-square tests: goodness of fit, independence of two attributes and variance of normal distribution.Yate's correction for 2x2 contingency table. 2.3 Applications of Student's t-test for one and two population means and for correlation coefficient. 2.4 Z-transformation and its uses. 2.5 F-test for equality of variances.	15

III	**ANOVA and Statistical Quality Control** **ANOVA** 3.1 One-way classification as an extension of t-test and Two Way Classification: Model, Layout and Calculation of various sum of squares, Hypothesis, ANOVA Table. **Statistical Quality Control** : 3.2 The Meaning of Quality and Quality Improvement, Chance and Assignable Causes of Quality Variation, Statistical Basis of the Control Chart, Control Limits, Specification Limits, and Natural Tolerance Limits. The choice between Attributes and Variables Control Charts. Elementary ideas, Assignable and unassignable Causes, Control Charts, Various Patterns and its interpretation **3.3** Control Chart for Variables: X bar and R charts, Statistical Basis of the Charts, Construction of Control Chart, interpretation and Use of X bar and R Charts, when standards are known and unknown./at least one of them is unknown. **3.4** Control Chart for attributes: p-chart, np chart, c-chart (with constant/ variable sample size), Construction of Control Chart and their interpretation.	15

Self-Learning topics (Unit wise)

Unit	Topics
3	Central Limit theorem (statement only).
3	Sampling distribution of sample mean and sample proportion (For large sample only).
3	Standard errors of sample mean and sample proportion.
3	Point and Interval estimate of single mean, single proportion
3	Concept of hypothesis
3	Simple Hypothesis and composite hypothesis Null and alternate hypothesis
3	Types of errors, Critical region, Level of significance.
3	Test for Difference between Two Population Proportions.

Online Resources

'Business Statistics' by Dr Mukesh Kumar Barua from IIT Roorkee available on the Swayam portal, https://nptel.ac.in/courses/110/107/110107114/ for US-FST-202 for unit III.

Part -4 Detailed Scheme Practical

Course Code: STA207D

Paper-II-Practical Total Credit: 01

Title of Paper: Practical's based on Statistical Methods

Unit	Content	No. of Lectures
I	(i) Sampling distribution and estimation (ii) Testing of Hypothesis	2 hours per batch per practical
II	(i) Large Sample Tests for Attributes (ii) Large Sample Tests for Variables (iii) Applications of Chi-square test for Goodness of Fit (iv) Applications of Chi-square test for Independence (v) Applications of Student's t-test (vi) F- Tests (vii) Practical Using Megastat Add on to Excel on above.	
III	(i) Anova (ii) Control Chart for Variables (iii) Control Chart for Attributes	

Reference Books:

1. Medhi J.: Statistical Methods, An Introductory Text, Second Edition, New Age International Ltd.
2. Spiegel M.R.: Theory and Problems of Statistics, Schaum's Publications series. Tata McGraw-Hill.
3. Kothari C.R. : Research Methodology, Wiley Eastern Limited.
4. David S.: Elementary Probability, Cambridge University Press.
5. Hoel P.G.: Introduction to Mathematical Statistics, Asia Publishing House.
6. Hogg R.V. and Tannis E.P.: Probability and Statistical Inference. McMillan Publishing Co. Inc.
7. Pitan Jim: Probability, Narosa Publishing House.

Part 5- The Scheme of Teaching and Examination is as under: Semester – IV Summary

Sr. No	Choice Based Credit System			Subject Code	Remarks
1	Core Course (**Statistics**)			STA208B STA208D	
2	Elective Course	Discipline Specific Elective (DSE) Course			
		2.1	Interdisciplinary Specific Elective (IDSE) Course		
		2.2	Dissertation/Project		
		2.3	Generic Elective (GE) Course		
3	Ability Enhancement Courses (AEC)				
	Skill Enhancement Courses (SEC)				

Second Year Semester IV Internal and External Detailed Evaluation Scheme

Sr. No.	Semester	Subject Code	Subject Title	NEP Course Type	Hours Per Week						Seasonal Evaluation Scheme (Internal + External)			Total Marks
					Units	S. L. E.	L	T	P	Credit	S. L. E	PA/	SEE	
1	IV	STA208B	**Operation Research Techniques**	Minor	3	20 %*	3	0	0	3	10	5	60	100
		STA208D	**Computer Applications & Practical** Based on STA208B						2	1			25	

***One to two lectures to be taken for CONTINUOUS self -learning Evaluation.**

Part -6 Detailed Scheme Theory

Curriculum Topics along with Self-Learning topics - to be covered, through self-learning mode along with the respective Unit. Evaluation of self-learning topics to be undertaken before the concluding lecture instructions of the respective UNIT

Second Year Semester – IV Units – Topics – Teaching Hours

S. N	**Subject Code**	**Subject Unit Title**		**Hours/Lectures**	**Total No. of hours**	**Credit**	**Total Marks**
1	STA208B	I	Linear Programming Problem(L.P.P.)	15	45 H	3	100
		II	Transportation Problem and Assignment problem	15			
		III	Decision theory and Game Theory	15			
2	STA208D	I	Practical based on STA208B	2	15x2= 30H	1	
			TOTAL			4	100

Lecture Duration – One hour **One Credit =15 class room teaching hours.**

L: Lecture: Tutorials P: Practical Ct-Core Theory, Cp-Core Practical, SLE- Self learning evaluation CT-Commutative Test, SEE- Semester End Examination , PA-Project Assessment, AT-Attendance

Part -7 - Detailed Scheme Theory

Curriculum Topics along with Self-Learning topics - to be covered, through self-learning mode along with the respective Unit. Evaluation of self-learning topics to be undertaken before the concluding lecture instructions of the respective UNIT

Course Code: STA208B
Course Title: **Operation Research Techniques**

Unit	Content	No. of Lectures
I	**Linear Programming Problem (L.P.P.)** 1. Introduction to OR model, convex set 2. Definition, Mathematical Formulation (Maximization and Minimization), Concepts of Solution, Feasible Solution, Basic Feasible Solution, Optimal solution, Slack, Surplus & Artificial variable, Standard form, Canonical form 3. Graphical Method & Simplex Algorithm to obtain the solution to an L.P.P. Problems involving Unique Solution, Multiple Solution, Unbounded Solution and Infeasible Solution. 4. Big M method. 5. Primal and Dual conversion	15
II	**Transportation Problem and Assignment problems** 1. Definition, Basic concepts of Transportation Problem. 2. Initial Basic Feasible Solution using (i) North-West Corner rule.(ii) Matrix Minima Method. (iii)Vogel's Approximation Method. 3. Optimum Solution using MODI Method. 4. Problems involving unique solution, multiple solutions, degeneracy, maximization, prohibited route(s) and production costs. Unbalanced Transportation problem. 5. Introduction to Assignment problem, Optimum solution using Hungarian method 6. Special cases like Unbalanced and Maximization type Assignment problem	15
III	**Decision Theory and Game Theory:** **Decision Theory:** 1. Introduction and basics of Decision theory, Decision making under uncertainty: Laplace criterion, Maximax (Minimin) criterion, Maximin (Minimax) criterion, Hurwitz criterion, Minimax Regret criterion. 2. Decision making under risk: Expected Monetary Value criterion (EMV), Expected Opportunity Loss (EOL) criterion, EPPI, EVPI. **3.** Decision tree analysis **Game Theory:** **1. Introduction and Basics of game theory,** Definitions of Two persons Zero Sum Game, Saddle Point, Value of the Game, Pure and Mixed strategy, Optimal solution of two person zero sum games. Dominance property, Solution of Mixed Strategy Games 2 X 2. **2.** Graphical solution of (2xn) and (mx2) games.	15

Self-Learning topics (Unit wise)

Unit	Topics
1	Introduction to OR model, convex set, Graphical Method, Big M method, Primal and Dual conversion
II	Definition, Basic concepts of Transportation Problem, Initial Basic Feasible Solution using Matrix Minima Method. Introduction to Assignment problem, Optimum solution using Hungarian method, Special cases like Unbalanced and Maximization type Assignment problem
III	**Introduction and Basics of game theory,** Definitions of Two persons Zero Sum Game, Saddle Point, Value of the Game, Solution of Mixed Strategy Games 2 X 2.

Online Resources

'Operations Research' by PROF.KUSUMDEEP, Department of Mathematics, IIT Roorkee available on the NPTEL portal, https://nptel.ac.in/courses/111/107/111107128/# for US-FAST-401 for unit I, II and III.

Part – 8- Detailed Scheme Practical

Course Code: STA208D
Paper-III-Practical Total Credit: 01
Title of Paper: Practical's based on Operations Research

Unit	Content	No. of Lectures
I	1. Formulation and Graphical 2. Simplex Method 3. Big-M Method	02 Hours per Practical per Batch
II	4. Transportation 5. Assignment 6. Practical based on 2, 3 and 4 using LPP Solver.	
III	7. Decision Theory-1 8. Decision Theory-2 9. Game Theory	

* All practical will be based on the raw online website data (Real life Data) and finished data and analysed using Calculator, SPSS / Excel

Reference Books:

1. Vora N. D. : Quantitative Techniques in Management, Third edition, GcGraw Hill Companies.
2. Kantiswarup, P. K. Gupta, Manmohan : Operations Research, Twelfth edition, Sultan Chand & sons.
3. Sharma S. D. : Operations Research, Eighth edition, Kedarnath Ramnath& Co.
4. TahaHamdyA. : Operations Research : Eighth edition, Prentice Hall of India Pvt. Ltd.
5. Vora N. D. ; Quantitative Techniques in Management, Third edition, McGraw Hill Companies.

The Scheme of Teaching and Examination:
The performance of the learners shall be evaluated in two components: Internal Assessment with 40% marks by way of continuous evaluation and by Semester End Examination with 60% marks by conducting the theory examination.

Examination Pattern for First Year Degree as per NEP 2020 Academic Year 2023-2024

1) Evaluation of Major and Minor Subjects

Subject	Formative Assessment (Marks)	Summative Assessment (Marks)
Major Subject	40	60
Minor Subject	40	60
Major (Practical based Subject)	-	25
Minor (Practical based Subject)	-	25
General Elective (GE/OE)	20	30

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FORMATIVE ASSESSMENT:- It is defined as the assessment of the learners on the basis of continuous evaluation as envisaged in the credit based system by way of participation of learners in various academic and correlated activities in the given semester of the programme.

A). Formative Assessment – 40
B). Practical's (internal Components of the Practical Course) 40 marks

1. For Theory Courses

Sr.No.	Particulars	Marks
1	Self-Learning Evaluation with Active participation in routine class instructional deliveries	10+5 Marks

2. For Courses with Practicals

Each practical course can be conducted out of 50 marks with 10 marks for internal **component of the Practical** and 40 marks for formative assessment which will be converted to 25 marks.

Practical's (Internal component of the Practical Course)

Sr. No	Evaluation type	Marks
1	Journal	5
2	Viva	5

C). SUMMATIVE ASSESSMENT =SEMESTER END EXAMINATION :-
It is defined as the examination of the learners on the basis of performance in the semester end theory / written examinations.

The semester end examination (external component) of 60 % for each course will be as follows:

a. For Theory Courses
Duration – 2 Hours

Theory Question Paper pattern for Main Papers of 60 Marks:

Sr. No.	All questions are Compulsory.	Marks
Q. 1	Attempt either a & b or p & q based on unit 1.	15
Q. 2	Attempt either a & b or p & q based on unit 2.	15
Q. 3	Attempt either a & b or p & q based on unit 3.	15
Q. 4	Attempt either a & b or p & q based on all three units.	15

b. For Practical Courses
Duration – 2 Hours

Practical Question Paper Pattern:-

Sr. No.	All questions are Compulsory.	Marks
Q. 1	Attempt any two out of three based on unit 1.	10
Q. 2	Attempt any two out of three based on unit 2.	10
Q. 3	Attempt any two out of three based on unit 3.	10
Q. 4	Attempt any two out of three based on all three units using Statistical Software.	10