SHIVAJI UNIVERSITY, KOLHAPUR.

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CHOICE BASED CREDIT SYSTEM

Syllabus For

B.A. Part - I

Statistics

(Syllabus to be implemented from June, 2018 onwards.)

SHIVAJI UNIVERSITY, KOLHAPUR
SYLLABUS (SEMESTER PATTERN) (CBCS)
FOR B.A. I: STATISTICS
Implemented from June 2018

1. TITLE : B.A. Part I (Statistics)

   Under Faculty of Science.

2. YEAR OF : Syllabus (Semester Pattern) will be

   IMEPLENTATION Implemented from June 2018 & onwards.

3. DURATION : B.A. I-Two Semester (One year)

4. PATTERN OF EXAMINATION : Semester (CBCS Pattern),
   Practical- Internal Examination for each Semester.

   A) Theory Examination : At the end of each Semester as per Shivaji University Rule
   B) Practical Examination : At the end of each Semester, an Internal Practical Examination of one & half hours duration and of 10 marks will be conducted.

5. MEDIUM OF INSTRUCTION : English

6. STRUCTURE OF COURSE : B.A. I, Two Semesters, Two papers

CHOICE BASED CREDIT SYSTEM IN B.A. I STATISTICS.
Structure

B .A. Part I

Sr. No.	Paper No.	Semester	Name of the Subject	Distribution of Marks		
				Theory	Practical	Total
1	I	I	Descriptive Statistics – I -DSE (Discipline Specific Elective)	40	10	50
2	II	II	Elementary Probability -DSE (Discipline Specific Elective)	40	10	50

7. SCHEME OF TEACHING:

Sr. No.	Semester	Paper No.	Name of the Subject	Teaching Scheme		
				Theory Lectures/ week	Practical Lectures/ week	Total
1	I	I	Descriptive Statistics – I -DSE (Discipline Specific Elective)	3	1	4
2	II	II	Elementary Probability -DSE (Discipline Specific Elective)	3	1	4

8. SCHEME OF EXAMINATION:

- The examination shall be at the end of each semester.
- All papers shall carry 40 marks for Theory and 10 marks for practical.
- The evaluation of the performance of the students in theory shall be on the basis of semester examination as mentioned above.
- Question paper will be set in the view of the entire syllabus preferably covering each unit of the syllabus. In theory examination weightage to numerical problems should not exceed 40%.
- Use of non-programmable calculators is allowed for both theory and practical examinations.

- **Nature of question paper** (**Theory**)
  - There will be five objective type questions (multiple choice) having one mark each.
  - Long answer questions having 20 marks (Two out of Three, each of ten marks).
  - Short answer type questions having 15 marks (Three out of five, each of five marks).

- **Nature of question paper** (**Practical**)
  - There will be four questions of four marks each. Student has to attend any two questions.
  - Two marks are reserved for journal.
  - A student must complete all practicals and he/she has to produce journal along with completion certificate at the time of practical examination. Duration of practical examination will be one and half hour.
- The evaluation of the performance of the students in practical shall be on the basis of internal evaluation at the end of **each semester**.

- **Standard of Passing:-**

  In order to pass, student shall have to secure 35% marks in each of theory and practical examination separately. [i.e. minimum 14 marks for theory & minimum 4 marks for practicals].

Equivalence of Papers

Old (Semester Pattern)		New (Semester Pattern)		
Paper No.	Title of the Paper	Paper No.	Semester	Title of the Paper
I	Descriptive Statistics – I	I	I	Descriptive Statistics – I -DSE (Discipline Specific Elective)
II	Elementary Probability	II	II	Elementary Probability -DSE (Discipline Specific Elective)

B. A. I: (STATISTICS) SEMESTER I

PAPER-I: DESCRIPTIVE STATISTICS –I DSE (Discipline Specific Elective)

Total Credits : 4 Workload :

Theory : 3 Credits **Theory :** 3 Lectures per week

Practical : 1Credit **Practical :** 1 Lecture per week.

OBJECTIVES:

The main objective of this course is to acquaint students with some basic concepts in statistics. They will be introduced to some statistical methods of analysis of data and at the end of this course students are expected to be able,

1) to present the data in systematic manner.
2) to understand, to compute & to interpret measures of central tendency, dispersion, moments, skewness, kurtosis.

CONTENTS:

Unit 1. Nature and Representation of data: (10)

1.1: Meaning of data, Ungrouped data, Primary and Secondary data, Attributes and Variables, Discrete and Continuous variables with illustrations, Qualitative data & Quantitative data.

1.2: Definition of frequency distribution, discrete and continuous frequency distribution, Definition of class limits, Exclusive & inclusive classes, class midpoint, class width, class frequency, cumulative frequency and cumulative frequency distribution.

1.3: Diagramatic & Graphical representation of Frequency Distribution:
i) Simple bar diagram ii) multiple bar diagram iii) sub-divided bar diagram
iv) Pie diagram v) Histogram: definition and its construction (for equal class width).
vi). Construction of ogive curve (less than and more than).

1.4: Examples.

Unit 2. Measures of Central Tendency: (12)

2.1: Concept of Meaning of central tendency, Requirements of ideal measure of central tendency.

2.2: **Arithmetic Mean (A.M):** Definition, Properties of A.M.(with proofs): i) Effect of change of origin and scale, ii) Deviation of observations from A.M., iii) Mean of pooled data. Merits and Demerits of A.M.

2.3: **Geometric Mean (G.M)** and **Harmonic Mean (H.M.):** Definition for ungrouped data, their Merits and Demerits and uses.
Relation between A.M., G.M., and H.M. (without proof). i) A.M > G.M. > H.M.
ii) A.M. x H.M. $= (G.M.)^2$

2.4: **Median and Mode:** Definition, Computation for ungrouped and grouped data, Determination of Mode and Median by Graphical method, Empirical relation between Mean, Median and Mode.

2.5: **Partition values:** Quartiles, Deciles and Percentiles.

2.6: Examples to find mean, median, mode, Quartiles, Deciles, Percentiles for ungrouped & grouped frequency distributions and G.M. & H.M. for ungrouped data.

Unit 3. Measures of Dispersion: (12)

3.1: Concept of dispersion, Absolute and Relative measures of dispersion, Requirements Of an ideal measure of dispersion.
3.2: **Range:** Definition, Coefficient of range.
3.3: **Quartile Deviation (Semi-inter quartile range):** Definition, Coefficient of Q.D.
3.4: **Mean Deviation:** Definition, Coefficient of M.D., Minimal property of M.D. (without proof).
3.5: **Variance and Standard Deviation:** Definition, coefficient of S.D. and properties of S. D.
i) Effect of change of origin and scale(with proof), S.D. of pooled data (without proof), Merits and Demerits.
3.6: **Coefficient of Variation:** Definition and use.
3.7: Examples.

Unit 4. Moments, Skewness and Kurtosis: (11)

4.1: **Moments:** Definition of Raw moments (μ_r') and Central moments (μ_r) for ungrouped and grouped data.
4.2: Effect of change of origin and scale on row & central moments, relation of central moments in terms of raw moments (up to 4_{th} order).
4.3: Sheppard's correction.
4.4: **Skewness:** Concept of skewness of a frequency distribution.
4.5: Bowley's coefficient of skewness, Karl Pearson's coefficient of skewness, Measure of skewness based on moments (beta one & gamma one coefficients).
4.6: **Kurtosis:** Concept of kurtosis of a frequency distribution, Types of kurtosis, Measure of kurtosis based on moments(beta Two & gamma Two coefficients).
4.7: Illustrative Examples.

Books Recommended:

1. Agrawal B. L.: Basic Statistics, New Age International (P) Ltd.
2. Bhat B. R., Srivenkatramana T. and Madhava Rao K. S.: Statistics: A Beginner's Text, Vol. 1, New Age International (P) Ltd.
3. Goon A.M., Gupta M.K., and Dasgupta B.: Fundamentals of Statistics Vol. I and II, World Press, Calcutta.
4. Gupta S. P.: Statistical Methods, Sultan Chand and Sons, New Delhi.
5. Gupta V.K. & Kapoor S.C. Fundamentals of Mathematical Statistics.- Sultan & Chand.
6. Gupta V.K. & Kapoor S.C. Elements of Mathematical Statistics.- Sultan & Chand.
7. Snedecor G.W. and Cochran W. G.: Statistical Methods, Lowa State University Press.

List of Practicals:

1. Construction of Frequency distribution
2. Diagramatic & Graphical Representation.
3. Measures of Central Tendency I- (ungrouped data).
4. Measures of Central Tendency II- (grouped data).
5. Measures of Dispersion I- (ungrouped data).
6. Measures of Dispersion II- (grouped data).
7. Moments, Skewness & Kurtosis-I (ungrouped data).
8. Moments, Skewness & Kurtosis-II (grouped data).

B. A. I: (STATISTICS) SEMESTER II

PAPER II: ELEMENTARY PROBABITITY -DSE (Discipline Specific Elective)

Total Credits : 4 Workload :

Theory : 3 Credits **Theory :** 3 Lectures per week

Practical : 1Credit **Practical :** 1 Lecture per week.

OBJECTIVES:

The main objective of this course is to acquaint students with some basic concepts of probability, axiomatic theory of probability. By the end of this course students are expected to be able,
1) to understand concept of random experiments, sample spaces, events.
2) to compute the probabilities of various events.

CONTENTS:

Unit1. Experiments, Sample space and Events: (12)

1.1: Concepts of experiments, random experiments. Definitions of Sample space (Ω), Discrete and continuous sample space, Event, Elementary event, Compound event, Sure event, Impossible event.
1.2: Algebra of events (Union, Intersection, Complementation), Definitions of Mutually exclusive events respectively by veen diagram . Exhaustive events, Equally likely events.
1.3: Power set |P(Ω) :Definition & Examples of Power set (sample space consisting at most 3 sample points).
1.5: Illustrative examples.

Unit2. Probability: (13)

2.1: Apriori (classical) definition of probability of an event. simple examples of computation of probability of the events and also based on Permutations and Combinations.
2.2: Axiomatic definition of probability with reference to a finite and countably infinite sample space.
2.3: Proof of the results:

i) $P(\Phi) = 0$, i i) $P(A_c) = 1 - P(A)$,
iii) Addition Theorem: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ (with proof) and Statement of addition theorem for three events.
iv) If $A \subseteq B$, $P(A) \leq P(B)$, v) $0 \leq P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$.

2.4 Examples.

Unit3. Conditional Probability: (10)

3.1: Definition of conditional probability of an event, Multiplication theorem for two events.
3.2: Partition of sample space, Statement and proof of Baye's theorem upto three events.
3.3: Examples based on 3.1 and 3.2.

Unit4. Independence of events: **(10)**

4.1: Concept of Independence of two events.
Proof of the result that if A and B are independent then,
i) A and B_c, ii) A_c and B, iii) A_c and B_c, are independent.
4.2: Pairwise and Mutual Independence for three events.
4.3: Examples.

Books Recommended:

1. Bhat B. R., Srivenkatramana T and Madhava Rao K. S.: Statistics: a Beginner's Text, Vol. II, New Age International (P) Ltd.
2. Goon A. M., Gupta M. K., Das Gupta B.: Fundamentals of Statistics, Vol.II, World Press, Calcutta.
3. Gupta V.K. & Kapoor S.C. Fundamentals of Mathematical Statistics.- Sultan & Chand
4. Hoel P. G.: Introduction to Mathematical Statistics, Asia Publishing House.
5. Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics Ed.4.
6. Meyer P.L.: Introductory Probability and Statistical Applications, Addision Wesley.
7. Mood A. M., Graybill F. A. and Boes D. C.: Introduction to the Theory of Statistics, McGraw Hill.
8. Mukhopadhyay P.: Probability. Books and Allied (P) Ltd.
9. Rohatgi V. K. and Saleh A. K. Md. E.: An Introduction to probability and statistics. John wiley & Sons (Asia).

List of Practicals:

1. Sample Space and Events.
2. Computation of Probability without Permutation and Combination.
3. Computation of Probability using Permutation and Combination.
4. Probability: Addition theorem.
5. Probability: Multiplication theorem.
6. Conditional Probability.
7. Bayes theorem.
8. Pairwise & Mutual Independence.