No.KU/Aca(S&T)/RPH-394A/2021-22/**1155**   Date: **29 OCT 2021**

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2021–22ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸಗಳಿಗೆ 1 ಮತ್ತು 2ನೇ ಸೆಮೆಸ್ಟರ್ NEP-2020 ಮಾದರಿಯ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

ಉಲ್ಲೇಖ: 1. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿಗಳು(ವಿಶ್ವವಿದ್ಯಾಲಯ 1) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರ ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 260 ಯುಎನ್‍ಇ 2019(ಭಾಗ–1), ದಿ:7.8.2021.

2. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 19.08.2021

3. ಈ ಕಚೇರಿ ಸುತ್ತೋಲೆ ಸಂ.No. KU/Aca(S&T)/RPH-394A/2021-22/18 ದಿ:21.08.2021.

4. ಸರ್ಕಾರಿ ಆದೇಶ ಸಂ ಇಡಿ 260 ಯುಎನ್‍ಇ 2019(ಭಾಗ–1),ಬೆಂಗಳೂರು ದಿ. 15.9.2021.

5. ಎಲ್ಲ ಅಭ್ಯಾಸಸೂಚಿ ಮಂಡಳಿ ಸಭೆಗಳ ನಡವಳಿಗಳು

6. ಎಲ್ಲ ನಿಖಾಯಗಳ ಸಭೆಗಳು ಜರುಗಿದ ದಿನಾಂಕ: 24,25–09–2021.

7. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 01 ದಿನಾಂಕ: 28.9.2021.

8. ಈ ಕಚೇರಿ ಸುತ್ತೋಲೆ ಸಂ.No. KU/Aca(S&T)/RPH-394A/2021-22/954 ದಿ:30.09.2021.

9. ಎಲ್ಲ ನಿಖಾಯದ ಡೀನರು / ಸಂಪನ್ಮೂಲ ತಜ್ಞರ ಸಭೆ ದಿನಾಂಕ 21.10.2021.

10. ಎಲ್ಲ ಸ್ನಾತಕ ಅಭ್ಯಾಸಸೂಚಿ ಮಂಡಳಿ ಅಧ್ಯಕ್ಷರುಗಳ ಸಭೆ ದಿನಾಂಕ 22.10.2021.

11. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 01 ದಿನಾಂಕ: 27.10.2021.

12. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: **29-10-2021**

———————

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2021–22ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, ಎಲ್ಲ B.A./ BPA (Music)/BVA/ BTTM/ BSW/ B.Sc./B.Sc. Pulp & Paper Science/ B.Sc. (H.M)/ BCA/ B.A.S.L.P./ B.Com/ B.Com (CS)/ & BBA ಸ್ನಾತಕ ಕೋರ್ಸಗಳ 1 ಮತ್ತು 2ನೇ ಸೆಮೆಸ್ಟರ್‍ಗಳಿಗೆ NEP-2020 ರಂತೆ ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಈಗಾಗಲೇ ಪ್ರಕಟಪಡಿಸಿದ್ದು, ಮುಂದೆ ದಿನಾಂಕ 04.10.2021 ವರೆಗೆ ಸರಕಾರವು ಕಾಲಕಾಲಕ್ಕೆ ನೀಡಿದ ನಿರ್ದೇಶನಗಳನ್ನು ಅಳವಡಿಸಿಕೊಂಡು ದಿನಾಂಕ 27.10.2021 ರಂದು ಜರುಗಿದ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯಲ್ಲಿ ಅನುಮೋದನೆ ಪಡೆದು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ www.kud.ac.in ದಲ್ಲಿ ಭಿತ್ತರಿಸಲಾಗಿದೆ. ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲದಿಂದ ಡೌನಲೋಡ ಮಾಡಿಕೊಳ್ಳಲು ಸೂಚಿಸುತ್ತ ವಿದ್ಯಾರ್ಥಿಗಳ ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ ತಂದು ಅದರಂತೆ ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕವಿವಿ ಅಧೀನದ/ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ ಸೂಚಿಸಲಾಗಿದೆ.

ಕುಲಸಚಿವರು.

ಅಡಕ: ಮೇಲಿನಂತೆ

ಗೆ,

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ. (ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ ಹಾಗೂ ಮಿಂಚಂಚೆ ಮೂಲಕ ಬಿತ್ತರಿಸಲಾಗುವುದು)

ಪ್ರತಿ:

1. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

2. ಕುಲಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

3. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

4. ಅಧೀಕ್ಷಕರು, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ / ಗೌಪ್ಯ / ಜಿ.ಎ.ಡಿ. ವಿದ್ಯಾಮಂಡಳ (ಪಿ.ಜಿ.ಪಿಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ ಕೋರ್ಸಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

KARNATAK UNIVERSITY, DHARWAD

04 - Year B.Sc. (Hons.) Program

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SYLLABUS

Subject: STATISTICS

[Effective from 2021-22]

DISCIPLINE SPECIFIC CORE COURSE (DSCC) FOR SEM I & II,

OPEN ELECTIVE COURSE (OEC) FOR SEM I & II and

SKILL ENHANCEMENT COURSE (SEC) FOR SEM I

AS PER N E P - 2020

Karnatak University, Dharwad
Four Years Under Graduate Program in STATISTICS for B.Sc. (Hons.)
Effective from 2021-22

Sem	Type of Course	Theory/ Practical	Instruction hour per week	Total hours of Syllabus / Sem	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks	Credits
I	DSCC 1	Theory	04hrs	56	02 hrs	40	60	100	04
		Practical	04 hrs	52	03 hrs	25	25	50	02
	OEC-1	Theory	03 hrs	42	02 hrs	40	60	100	03
	*SEC-1	Practical	03 hrs	30	02 hrs	25	25	50	02
II	DSCC2	Theory	04 hrs	56	02 hrs	40	60	100	04
		Practical	04 hrs	52	03 hrs	25	25	50	02
	OEC-2	Theory	03 hrs	42	02 hrs	40	60	100	03
	Details of the other Semesters will be given later								

* Student can opt digital fluency as SEC or the SEC of his/ her any one DSCC selected

Name of Course (Subject): STATISTICS

Programme Specific Outcome (PSO):

On completion of the 03/ 04 years Degree in **STATISTICS** students will be able to:

PSO 1 : To Acquire knowledge of different topics of Statistics and ability to apply to relevant areas, scientific problems and basic analysis of data and interpretation.

PSO 2 : To provide a foundation of Statistics principles and business practices for effectively using Data Science Techniques and enterprise software/packages.

PSO 3 : Be able to use modern scientific, engineering and IT tools or techniques such as use of Excel and R tools for solving statistical problems related to the domain of interest.

PSO 4 : To specialize in Statistical Methods, Data Science, Machine Learning and its applications

PSO 5 : Be able to work effectively as an individual/ team member so as to build a multidisciplinary team.

PSO 6 : To cater the needs of managing the business application

PSO 7 ; Be in a position to develop industrial applications

PSO 8 : Shall abide by the norms of professional ethics in respective disciplines

PSO 9 : Be able to communicate effectively with the stakeholders and give and receive clear instructions.

PSO 10 : Remains curious and enthusiastic in learning advanced knowledge in the respective discipline.

B.Sc. Semester – I

Subject: STATISTICS
Discipline Specific Course (DSC)

The course STATISTICS in I semester has two papers (Theory Paper –I for 04 credits & Practical Paper -II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.

Course No.-1 (Theory)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-01	DSCC	Theory	04	04	56 hrs	2hrs	40	60	100

Course No.1 (Theory): Title of the Course (Theory) : **DESCRIPTIVE STATISTICS**

Course Outcome (CO):

After completion of course (Theory), students will be able to:

CO 1 Knowledge of introductory Statistics and its scope and importance in various areas such as Medical, Engineering, Agricultural, Social Sciences, etc.

CO 2 Knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency, dispersion, etc.

CO 3 Knowledge of correlation and regression analysis, regression diagnostics, partial and multiple correlations.

CO 4 Knowledge of types of data reflecting independence or association between two or more attributes.

Syllabus- Course 1(Theory): Title- DESCRIPTIVE STATISTICS	Total Hrs: 56
Unit-I : Introduction to Statistics	**13 hrs**
Statistics: Definition and scope. Concepts of population and sample (SRS, Stratified, Systematic and Cluster sampling methods-brief description). **Data**: quantitative and qualitative, cross-sectional and time-series, discrete and continuous. **Scales of measurement**: nominal, ordinal, interval and ratio. **Presentation of data**: tabular and graphical. Frequency distributions, cumulative frequency distributions and their graphical representations. Stem and leaf displays.	
Unit-II Univariate Data Analysis	**18 hrs**
Measures of Central Tendency: Mean, weighted mean, trimmed mean, Median, Mode, Geometric and Harmonic means, properties, merits and limitations, relation between these measures, partition values. **Measures of Dispersion**: Range, Quartile deviation, Mean deviation, Standard deviation and their relative measures. Gini's Coefficient, Lorenz Curve. Moments, Skewness and Kurtosis. Quantiles and measures based on them. Box Plot. Outliers. Chebyshev's inequality, normal data sets. (Ref.10)	

Unit-III Bivariate Data Analysis	15 hrs
Bivariate Data, Scatter plot, Correlation, types of correlation. Methods of studying correlation: Karl Pearson's correlation coefficient, Rank correlation– Spearman's and Kendall's measures. Concept of errors, Principle of least squares, fitting of polynomial and exponential curves. Simple linear regression and its properties. Fitting of linear regression line and coefficient of determination. (Ref. 10)	
Unit-IV Multivariate Data Analysis	10 hrs
Analysis of Categorical Data: Contingency table, independence and association of attributes, measures of association - odds ratio, Pearson's and Yule's measure, Multivariate Frequencies, Multivariate Data Visualization, mean vector and dispersion matrix, Multiple linear regression, multiple and partial correlation coefficients. Residual error variance.(Ref.7)	

Books recommended.

1. Agresti, A. (2010). Analysis of Ordinal Categorical Data, 2nd Edition, Wiley.

2. Anderson T.W. and Jeremy D. Finn (1996). The New Statistical Analysis of Data, Springer

3. Freedman, D., Pisani, R. and Purves, R. (2014). Statistics, 4th Edition, W. W. Norton & Company.

4. Gupta, S.C. (2018). Fundamental of Statistics, Himalaya Publishing House, 7th Edition.

5. Gupta S.C. and V.K. Kapoor (2020). Fundamental of Mathematical Statistics, Sultan Chand and Co. 12th Edition.

6. Hogg, R. V. McKean J. W. and Craig, A. T. (2012). Introduction to Mathematical Statistics, Pearson 7th Edition.

7. Joao Mendes Moreira, Andre C P L F de Carvalho, Tomas Horvath(2018). General Introduction to Data Analytics, Wiley.

8. Johnson, R.A. and Bhattacharyya, G.K. (2006). Statistics: Principles and methods. 5th Edition, John Wiley & Sons, New York.

9. Medhi, J. (2005). Statistical Methods, New Age International.

10. Ross,S.M.(2014). Introduction to Probability and Statistics for Engineers and Scientists, 5thEdition, Academic Press.

11. Tukey, J.W. (1977). Exploratory Data Analysis, Addison-Wesley Publishing Co.

B.Sc. Semester – I

Subject: STATISTICS
Discipline Specific Course (DSC)

Course No.-1 (Practical)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-01	DSCC	Practical	02	04	52 hrs	3hrs	25	25	50

Course No.1 (Practical): Title of the Course (Practical): **Practicals (based on Descriptive Statistics)**

Course Outcome (CO):

After completion of course (Practical), students will be able to:

CO 1 Practical knowledge of handling various types of data, their organization and evaluation of summary measures such as measures of central tendency, dispersion, etc.

CO 2 Practical knowledge of carrying out correlation and regression analysis, regression diagnostics, partial and multiple correlations.

CO 3 Computing knowledge of types of data reflecting independence or association between two or more attributes.

List of the Experiments for 52 hrs / Semesters

1.   Presentation of data by frequency tables, diagrams and graphs, stem and leaf plot.

2.   Arithmetic Mean (AM), Geometric mean, Harmonic mean, Weighted AM, Trimmed mean, Corrected mean.

3.   Mode, Median, Partition values.

4.   Absolute and relative measures of dispersion, Box plots.

5.   Problems on moments, skewness and kurtosis.

6.   Fitting of curves by least squares method.

7.   Karl Pearson's correlation coefficient and rank correlation.

8.   Regression of two variables.

9.   Multivariate Descriptive statistics, mean vector, dispersion matrix, correlation matrix, Partial and Multiple correlation.

10. Problems on Association of attributes.

General instructions:

Computation of all the practicals manually and using Excel

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

Students have to attempt 3 practical questions out of four practical questions given, each carrying 7 marks.

1. 7 Marks

2. 7 Marks

3. 7 Marks

4. Viva 2 Marks

5. Journal 2 Marks

   Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

Books recommended.

1. Agresti, A. (2010). Analysis of Ordinal Categorical Data, 2nd Edition, Wiley.

2. Anderson T.W. and Jeremy D. Finn (1996). The New Statistical Analysis of Data, Springer

3. Freedman, D., Pisani, R. and Purves, R. (2014). Statistics, 4th Edition, W. W. Norton & Company.

4. Gupta, S.C. (2018). Fundamental of Statistics, Himalaya Publishing House, 7th Edition.

5. Gupta, S.C. and V.K. Kapoor (2020). Fundamental of Mathematical Statistics, Sultan Chand and Co. 12th Edition.

6. Hogg, R. V. McKean J. W. and Craig, A. T. (2012). Introduction to Mathematical Statistics, Pearson 7th Edition.

7. Joao Mendes Moreira, Andre C P L F de Carvalho, Tomas Horvath(2018). General Introduction to Data Analytics, Wiley.

8. Johnson, R.A. and Bhattacharyya, G.K. (2006). Statistics: Principles and methods. 5th Edition, John Wiley & Sons, New York.

9. Medhi, J. (2005). Statistical Methods, New Age International.

10. Ross,S.M.(2014). Introduction to Probability and Statistics for Engineers and Scientists, 5thEdition, Academic Press.

11. Tukey, J.W. (1977). Exploratory Data Analysis, Addison-Wesley Publishing Co.

B.Sc. Semester – I

Subject: STATISTICS
Open Elective Course (OEC-1)
(OEC for other students)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-1	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

OEC-1: Title of the Course: **STATISTICAL METHODS**

Course Outcome (CO):

After completion of course, students will be able to:

CO 1 : Acquire knowledge of statistical methods.

CO 2 : Identify types of data and visualization, analysis and interpretation.

CO 3 : Know about elementary probability and probability models.

CO 4 : Employ suitable test procedures for given data set.

Syllabus- OEC: Title- STATISTICAL METHODS	Total Hrs: 42
Unit-I Introduction to Statistics, Univariate and Bivariate Data Analysis	**16 hrs**
Definition and scope of Statistics. **Data**: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. **Presentation**: tabular and graphic, including histogram and ogives. Concepts of population and sample. **Sampling from finite population** - Simple random sampling, Stratified and systematic random sampling procedures (definitions and methods only). Concepts of sampling and non-sampling errors. **Measures of Central Tendency**: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis. **Bivariate data**, scatter diagram, Correlation, Karl-Pearson's correlation coefficient, Rank correlation. Simple linear regression.	
Unit-II Probability and Distributions	**14 hrs**
Probability: Random experiment, sample space, events, mutually exclusive, equally likely and exhaustive events. Classical, statistical and axiomatic definitions of probability, addition and multiplication theorems, Bayes theorem (only statements). Discrete and continuous random variables, probability mass functions and probability density functions, distribution functions, expectation of a random variable. **Standard univariate distributions**: Binomial, Poisson and Normal distributions (Elementary properties and applications only).	

Unit-III Sampling Distributions and Testing of Hypothesis	12 hrs
Distribution of sample mean from a normal population, Chi-square, t and F distributions (No derivations) and their applications. Statistical Hypothesis – null and alternative hypothesis, simple and composite hypothesis. Type I and Type II errors, level of significance, critical region, p-value and its interpretation. Test for single mean, equality of two means, single variance, and equality of two variances for normal populations.	

Books recommended.

1. Daniel, W. W. (2007). Biostatistics - A Foundation for Analysis in the Health Sciences, Wiley

2. T.W. Anderson and Jeremy D. Finn (1996). The New Statistical Analysis of Data, Springer.

3. Mukhyopadyaya P. (1999). Applied Statistics, New Central book Agency, Calcutta.

4. Ross S. M. (2014). Introduction to Probability and Statistics For Engineers and Scientists, 5th Edition, Academic Press.

5. Cochran, W G (1984). Sampling Techniques, Wiley Eastern, New Delhi.

B.Sc. Semester - I

Subject: STATISTICS
SKILL ENHANCEMENT COURSE (SEC)-I

Title of Paper: DATA ANALYSIS WITH SPSS – I

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Mode of Examination	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
SEC-I	Theory + Practical	02	03hrs	30	Practical	2hr	25	25	50

Course Outcome (CO):

After completion of Skill Enhancement course, students will be able to:

CO 1 Frame and formulate management decision problems.

CO 2 Understand the basic concepts underlying quantitative analysis.

CO 3 Use sound judgment in the applications of quantitative methods to management decisions.

Theory /List of the Experiments for 30 hrs / Semesters

STATSEC 1.1: Data Analysis with SPSS – I	30 Hrs (10 hrs theory + 20 hrs practicals)
Unit –1 Introduction	2+4
Need of SPSS, preparation of coding sheet of the questionnaire, defining the type of variable and data, constructing the database – defining variable name, type of variable, width of variable name, labeling, assigning the numeric value to the characteristic, declare measurement of scale of data. **List of Practicals** Demonstration of SPSS : Overviews of SPSS 1. Construct the SPSS database containing 20 variables with String characters for 10 observations, Explore Cross tabulation.	
Unit – 2 Data Editing in SPSS	2+4
Enter the data based on type of data case wise for different variables, defining the grouping of variable for repeated measures. Replacing the missing value, transforming the data into same variable and different variable, use of commands –Compute variables using different operators and functions and saving of the data. **List of Practicals** 2. Construct the SPSS database containing 20 variables with Numeric characters for 10 observations and Explore Levels of Measurement, Graphs, Charts and Cross tabulation.	

Unit – 3 Univariate and Bivariate Data analysis	6+12

Calculation of Measures of central tendency, Dispersion, Karl-Pearson's correlation, Regression, Multiple linear regression.
List of Practicals
  3. Explore Measures of Central Tendency, Dispersion, Skewness and Kurtosis
 	
  4. Explore Measures of Association, Explore Spuriousness, Explore Correlation
 	
  5. Explore Bivariate Linear Regression, Explore Multiple Linear Regression	

General instructions:

Theory hour allotted is to be treated as instructional hour for the practical exercises.

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination.

1. **Writing Procedure – 5 Marks**

2. **Creating Database – 10 Marks**

3. **Execution and presentation of Results - 5**

4. **Viva - 2 Marks**

5. **Journal - 3 Marks**

     Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

Books recommended.

1. Robert V. Hogg, Joseph W. McKean and Allen T. Craig (2007). Introduction to Mathematical Statistics, Pearson Education, Asia.

2. Irwin Miller and Marylees Miller, John E. Freunds (2006). Mathematical Statistics with Applications, 7th Ed., Pearson Education, Asia.   .

3. Sheldon Ross (2007). Introduction to Probability Models, 9th Ed., Academic Press, Indian Reprint.

4. Gardener, M (2012). Beginning R: The Statistical Programming   Language,   Wiley Publications.

5. Cunningham, B.J (2012). Using SPSS: An Interactive Hands-on approach.

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8th Week
Written test-2	10%	1 hr	12th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	------	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science
04 - Year UG Honors programme:2021-22

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions   : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions   : 20 marks
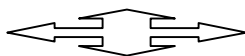
Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions   : 30 marks

   (Minimum 1 question from each unit and 10 marks question may have sub
      questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed.

B.Sc. Semester – II

Subject: STATISTICS
Discipline Specific Course (DSC)

The course STATISTICS in I semester has two papers (Theory Paper –I for 04 credits & Practical paper-II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.

Course No.-2 (Theory)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-02	DSCC	Theory	04	04	56 hrs	2hrs	40	60	100

Course No.2 (Theory): Title of the Course (Theory)**: PROBABILITY AND DISTRIBUTIONS**

Course Outcome (CO):

After completion of course (Theory), students will be able to:

CO 1 Ability to distinguish between random and non-random experiments

CO 2 Knowledge to conceptualise the probabilities of events including frequentist and axiomatic approach. Simultaneously they will learn the notion of conditional probability including the concept of Bayes' Theorem

CO 3 Knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments

CO 4 Knowledge of important discrete and continuous distributions such as Binomial, Poisson, normal distributions.

CO 5 Knowledge on R-programming in the descriptive statistics and probability models.

CO 6 Students will be able to write and execute R-code for basics of probability and statistics.

Syllabus- Course 2(Theory): Title- PROBABILITY AND DISTRIBUTIONS	Total Hrs: 56
Unit-I Probability	**15 hrs**
Random experiment, sample space and events, algebra of events. Definitions of Probability- Classical, statistical, subjective and axiomatic approaches – illustrations and applications, Addition rule, Conditional probability, independence of events and multiplication rule, Total probability rule, Bayes theorem- applications.	

Unit-II Random Variables And Mathematical Expectation (One Dimension)	**14 hrs**
Definitions of discrete and continuous random variables, Distribution function, probability mass and density functions – properties and illustrations, Expectation of a random variable and rules of expectation and related results, Moments and moment generating function – properties and uses.	
Unit-III Standard Distributions	**13 hrs**
Bernoulli, Binomial, Poisson distributions– mean, variance, moments. The generating functions- m. g. f., c.g.f., and p.g.f., The recursive relations for probabilities and moments of Binomial and Poisson distributions. Normal distribution and its properties.	
Unit-IV Data Analysis Using R- programming	**14 hrs**
Introduction to R: Installation, command line environment, overview of capabilities, brief mention of open source philosophy. R as a calculator: The four basic arithmetic operations. Use of parentheses nesting up to arbitrary level. The power operation. Evaluation of simple expressions. Quotient and remainder operations for integers. Standard functions, e.g., sin, cos, exp, log, etc. The different types of numbers in R: Division by zero leading to Infor -Inf. NaN. NA. No need to go into details. Variables. Creating a vector using c(), seq() and colon operator. How functions map over vectors. Functions to summarize a vector: sum, mean, sd, median etc. Extracting a subset from the vector (by index, by property). R as a graphing calculator: Introduction to plotting functions plot(), lines(), abline(). No details about the graphics parameters except colour and line width. Barplot, Pie chart and Histogram. Box plot. Scatter plot and simple linear regression using lm(y~x). Problems on discrete and continuous probability distributions.	

Books recommended.

1. Dudewitz. E.J.and Mishra.S.N. (1998). Modern Mathematical Statistics. John Wiley

2. Goon A.M., Gupta M.K., Das Gupta .B. (1991). Fundamentals of Statistics, Vol.I, World Press, Calcutta.

3. Gupta. S.C and V.K. Kapoor (2020). Fundamentals of Mathematical Statistics, Sultan Chand and Co,12th Edition.

4. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009). Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.

5. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007). Introduction to the Theory of Statistics, 3rd Edition. (Reprint), Tata McGraw-Hill Pub. Co. Ltd.

6. Ross, S. (2002),A First Course in Probability, Prentice Hall.

7. Sudha G.Purohit, Sharad D. Gore, Shailaja R Deshmukh,(2009). Statistics Using R, Narosa Publishing House.

8. R for beginners by Emmanuel Paradis (freely available at **https://cran.r-project.org/doc/contrib/Paradisrdebuts_en.pdf**)

B.Sc. Semester – II

Subject: STATISTICS
Discipline Specific Course (DSC)

Course No.-2 (Practical)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-02	DSCC	Practical	02	04	52 hrs	3hrs	25	25	50

Course No.2 (Practical): Title of the Course (Practical): **PRACTICALS (based on Probability and Distributions)**

Course Outcome (CO):

After completion of course (Practical), students will be able to:

CO 1 Practical knowledge of computing the probabilities, conditional probability including the concept of Bayes' Theorem

CO 2 Knowledge of computing discrete and continuous probability distributions such as Binomial, Poisson, normal distributions including expectation and moments.

CO 3 Practical knowledge of using R-programming in computing the descriptive statistics and probability models.

List of the Experiments for 52 hrs / Semesters

1. Two exercise on Descriptive statistics (Presentations, Summarizations, correlations, regression and Graphs using R)

2. Computing probability: using addition and multiplication theorems.

3. Conditional probability and Bayes' theorem.

4. Problems on pmf, expectation, variance, quantiles, skewness, kurtosis(Discrete Case).

5. Problems on pdf, expectation, variance, quantiles, skewness, kurtosis (Continuous case).

6. Problems on discrete probability distributions (Binomial and Poisson)

7. Problems on Normal probability distributions

8. Computation of moments and Moment generating functions (Discrete and Continuous Case).

9. Fitting of distributions Binomial, Poisson, Normal distributions.

10. Generation of random samples. (Binomial, Poisson, Normal)

General instructions:

Computation of all the practicals manually and using Excel/R

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

Students have to attempt 3 practical questions out of four practical questions given, each carrying 7 marks.

1. 7 Marks

2. 7 Marks

3. 7 Marks

4. Viva 2 Marks

5. Journal 2 Marks

      Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

Books recommended.

1. Dudewitz. E.J.and Mishra.S.N. (1998). Modern Mathematical Statistics. John Wiley

2. Goon A.M., Gupta M.K., Das Gupta .B. (1991). Fundamentals of Statistics, Vol.I, World Press, Calcutta.

3. Gupta. S.C and V.K. Kapoor (2020). Fundamentals of Mathematical Statistics, Sultan Chand and Co,12th Edition.

4. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009). Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.

5. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007). Introduction to the Theory of Statistics, 3rd Edition. (Reprint), Tata McGraw-Hill Pub. Co. Ltd.

6. Ross, S. (2002),A First Course in Probability, Prentice Hall.

7. Sudha G.Purohit, Sharad D. Gore, Shailaja R Deshmukh,(2009). Statistics Using R, Narosa Publishing House.

8. R for beginners by Emmanuel Paradis (freely available at **https://cran.r-project.org/doc/contrib/Paradisrdebuts_en.pdf**)

B.Sc. Semester – II

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-2	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

OEC-2: Title of the Course **BUSINESS STATISTICS**

Course Outcome (CO):

After completion of course, students will be able to:

CO 1   Acquire knowledge of statistical methods.

CO 2   Identify types of data and visualization, analysis and interpretation.

CO 3   Know about elementary probability and probability models.

CO 4   Employ suitable test procedures for given data set.

Syllabus- OEC: Title- BUSINESS STATISTICS	Total Hrs: 42
Unit-I Statistical Data and Descriptive Statistics	**12 hrs**
Nature and Classification of data: univariate, bivariate and multivariate data; time-series and cross-sectional data. Measures of Central Tendency: mathematical averages including arithmetic mean, geometric mean and harmonic mean, properties and applications. Positional Averages Mode and Median (and other partition values including quartiles, deciles, and percentiles). Measures of Variation: absolute and relative. Range, quartile deviation, mean deviation, standard deviation, and their coefficients, Properties of standard deviation/variance Skewness: Meaning, Measurement using Karl Pearson and Bowley's measures; Concept of Kurtosis.	
Unit-II Simple Correlation and Regression Analysis	**10 hrs**
Correlation Analysis: Meaning of Correlation: simple, multiple and partial; linear and non-linear, Correlation and Causation, Scatter diagram, Pearson's co-efficient of correlation; calculation and properties (Proof not required). Correlation and Probable error; Rank Correlation. **Regression Analysis:** Principle of least squares and regression lines, Regression equations and estimation; Properties of regression coefficients; Relationship between Correlation and Regression coefficients; Standard Error of estimate and its use in interpreting the results.	

Unit-III Index Numbers and Time Series Analysis	20 hrs
Index Number: Definition, Problems involved in the construction of index numbers, methods of constructing index numbers of prices and quantities, simple aggregate and price relatives method, weighted aggregate and weighted average of relatives method, important types of weighted index numbers: Laspeyre's, Paasche's, Bowley's, Marshall- Edgeworth, Fisher's, method of obtaining price and quantity index numbers, tests of consistency of index numbers, time reversal test and factor reversal test for index numbers, Uses and limitations of index numbers. Consumer price index number: Problems involved in the construction of cost of living index number, advantages and disadvantages, Aggregative expenditure method and Family budget method for the construction of consumer price index numbers. Applications of Cost of Living Index numbers. Definition and measurement of Inflation rate – CPI and GNP Deflator. **Time Series Analysis:** Introduction, definition and components of Time series, illustrations, Additive, Multiplicative and mixed models, analysis of time series, methods of studying time series: Secular trend, method of moving averages, least squares method – linear, quadratic, exponential trend fittings to the data. Seasonal variation - definition, illustrations, measurements, simple average method, ratio to moving average method, ratio to trend method, link relatives method, Cyclical variation- definition, distinction from seasonal variation, Irregular variation- definition, illustrations.	

Books recommended.

1. Levin, Richard, David S. Rubin, Sanjay Rastogi, and H M Siddiqui (2012). Statistics for Management. 7th edition, Pearson Education.

2. David M. Levine, Mark L. Berenson, Timothy C. Krehbiel, P. K.Viswanathan (2017). Business Statistics: A First Course, Pearson Education.

3. Siegel Andrew F. (2012). Practical Business Statistics. McGraw Hill Education.

4. Vohra N. D. (2017). Business Statistics, McGraw Hill Education.

5. Murray R Spiegel, Larry J. Stephens, Narinder Kumar (2017). Statistics (Schaum's Outline Series), Mc-Graw Hill Education.

6. Gupta S.C. (2018). Fundamentals of Statistics. Himalaya Publishing House, 7th edition.

7. Anderson, Sweeney, and Williams (2015). Statistics for Business and Economics, Cenage Learning.

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8th Week
Written test-2	10%	1 hr	12th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	------	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science
04 - Year UG Honors programme:2021-22

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions   : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions   : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions   : 30 marks

   (Minimum 1 question from each unit and 10 marks question may have sub
    questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed.