

Appendix to UO No. Acad/C2/3269/2007 Dated 22/08/2007

KANNUR UNIVERSITY
B Sc. Statistics Syllabus
 (Effective from 2007 Admission onwards)

Scheme of Examination

Paper No	Title	Duration (Hrs)	Marks		Total
			Internal	External	
01	Statistical Methods & Probability Theory	3	10	60	70
02	Probability Distribution (Numerical Methods)	3	10	60	70
03	Mathematical Methods for Statistics	3	10	60	70
04	Computer oriented statistical methods	3	10	60	70
05	Statistical Inference	3	10	60	70
06	Sample survey and design of experiments	3	10	60	70
07	Applied Statistics	3	10	60	70
08	Practical	3	10	60	70
09	Project		40		40
	Total		120	480	600

1. There will be 7 theory papers and a practical along with a project work
2. Theory papers will have 4 hours a week totaling 28 hours in all. Six hours will be for practical. During second year one hour will be allotted for practical and during third year 5 hours
3. Project will be an assignment which does not come within the workload. Teachers are to device students into batches and supervise the project work. The project work will not be of a sample nature that is either data collection and analysis or statistical analysis of a given secondary data from some source.
4. There will be cent percent choice for each paper except for paper 8 (Practical). In case of practical three out of five questions are to be answered with each question carrying equal marks.
5. Scientific calculators are permitted in all examinations
6. Only numerical questions which can be done in allotted time are to be asked in practical examinations.
7. The practical examination is conducted just like the theory examinations.
8. For the purpose of determining the workload each practical hour will be treated as equivalent to the one theory hour.

Suggestion regarding the internal assessment:-

- a) Attendance 25%
- b) Assignment 25%
- c) Test Paper 50%

The following criteria are to be followed to make the awarding internal assessment marks.

- a) Each student must do 2 to 3 assignments. For practical paper the assignment should be written in record book.
- b) At least 3 test papers are to be conducted on each paper and average score on the best 2 must be used for assessment
- c) For the assignment of project work the Head of the Department must conduct viva in the presence of all the candidate of the batch and the project guide. The internal marks for the project work are 40. The marks will be awarded as follows.

Data collection/ field work	15
Project description	15
Viva	10.

Paper 1: Statistical Methods and Probability Theory

Unit 1: Collection of data – tabled – diagrams and graphics, Measures of Central tendency – A.M., Median, Mode, G.M., H.M., partition values (definitions and properties).

Measures of Dispersion – absolute and relative measures of dispersion – Range, (definition and properties) – Lorenz curve – moments – measures of skewness and kurtosis – Beeta and Gamma Co-efficient [15hrs.]

2: Correlation and Regression, Karl Pearson's correlation coefficient – definition and properties, Scatter diagram, Rank Correlation coefficient, Principle of least squares, fitting of linear, quadratic, exponential and power curve. Linear regression and regression coefficients, Multiple and Partial Correlation Coefficients (3Variables only) [20hrs.]

3: Time series: Components, additional and multiplicative models – Measurement of trend – least square method – St. lines and polynomials – moving average method – Index numbers: Definition, simple and weighted index number, fixed base index number – criteria of a good index number Laspeyre's, Paasche's, Marshall – Edge worth and Fishers' index numbers, Quantity index number – Test of consistency of index numbers, Chain base index numbers, Cost of living index numbers and its construction. [35hrs]

4: Association of Attributes: Classification – positive and negative classes, ultimate class, frequencies, order of classes. Consistency of data, Types of Association. Methods of determining association – comparison of observed and expected frequencies, comparison of proportions, Yule's coefficient of association and Yule's coefficient of Colligation.

5: Basic Probability of Random Experiment, sample point, sample space, events, algebra of event, statistical regularity, frequency and classical definitions, Axiomatic approach to probability – space and probability measure, addition and

multiplication theorem, conditioned probability, independence of events and Baye's theorem.

6: Random Variables: Discrete and continuous random variables, Probability mass function and probability density function, distribution function – definition and properties, change of variables (univariate case only), Bivariate distribution and density of functions, marginal and conditioned distributions, independence of two random variables.

Books for study

1. Fundamentals of Mathematical Statistics: S.C. Gupta and V.K. Kapoor (Sultan Chand).
2. Fundamentals of Statistics (Vol.I): Goon, Gupta, Das Gupta. (The World Press)
3. A First Course in Probability: Seldon Ross (MacMilan Publishing Co.)
4. Fundamentals of Applied Statistics: S.C. Gupta and V.K. Kapoor (Sultan Chand and Company Ltd.)
5. Statistical methods – An Introductory text: J. Medhi (Wiley Eastern Ltd.)
6. Statistics R.S.N. pillai and A.V. Bagarathi (Sultan Chand company Ltd.)

Topic Wise distribution of marks

There shall be questions for 90 marks and that the maximum marks that can be scored is 60. Scientific calculators are permitted in the examinations.

	Topic	Marks
1	Unit I	-
2.	Unit II	10
3.	Unit III	22
4.	Unit IV	8
5.	Unit V	20
6.	Unit VI	30
	Total	90

Paper II – Probability Distribution

Max: 60

Time – 3Hrs.

Unit 1. Mathematical Expectation:- Definition and properties, Mean deviation from the mean, Harmonic means, factorial moments, moment of bivariate probability distribution, Conditional Expectations, Conditional Variance. Moment generating function, cumulant generating functions and characteristic function – definition and property. probability generating function. [20 hrs.]

2. Standard discrete distribution:- Uniform, one point, two point distribution, point binomial, Binomial, Poisson, negative binomial, geometric and hyper geometric distribution. Fitting of binomial, poisson and geometric distribution. [30 hrs.]

3. Standard Continuous distribution:- Rectangular, Exponential normal, log normal, Cauchy, Beta, Gamma, Pareto, Weibull and bivariate normal distribution. Fitting of exponential and normal distribution [30hrs]

4. Correlation co-efficient, Co variances, Tchebychev's inequality and application. [20hrs.]

5. Simulation: Generation of random samples from normal population, Binomial, Geometric, uniform, exponential and beta distribution. [using inverse method]. Law of large numbers: Mode of convergence – convergence in probability. convergence in distributions. Weak law of large numbers – Bernoulli's weak law of large number, central limit theorem (for iid Lindberg-levy form and its application) [20hrs.]

6. Sampling distribution sampling distribution of mean and variance of samples from normal population. Chi-square, students t, F-distribution – properties and use of tables and interrelations. [20hrs.]

Books for reference:-

1. Introduction to the theory of statistics. A. Mood, F. Grabill, D Boes. (Mc Graw Hill)
2. Fundamentals of Mathematical Statistics. S.C. Gupta & V.K. Kapoor (Sultan Chand and sons)
3. Probability and statistics for engineers and scientists – Waltole and Myres (Mc Millan Publishing Co.)
4. Introduction to probability theory and Mathematical Statistics. V.K. Rohatgi (Wiley Eastern Ltd.)
5. Introduction to Probability and Statistics for Engineers and Scientists. S.M. Ross (Elsever)

Topic wise distribution of marks

Topic	Marks
1. Mathematical Expectation	15
2. Correlation and Regression	15
3. Standard discrete distribution	15
4. Standard Continuous distribution	15
5. Simulations and law of large numbers	15
6. Sampling distribution	15
Total	90

Model Question Paper
Second Year B.Sc. Degree Examination.

Part III – Statistics (Main)

Paper II – Probability Distribution

Time: 3Hrs
marks

Max: 60

Answer may be written either in English or Malayalam

Use of calculators and scientific tables are allowed

1. Define expectation of a random variables. Show that if $E(x^r)$ exists, then $E(x^s)$ exists for all $1 \leq s \leq r$. (4)
2. What do you mean by Probability generating function? Describe how do you obtain m.g.f from p.g.f? (4)
3. Define characteristic function and enumerate all its properties? (5)
4. Define cumulants. State and prove the additive property of cumulants? (5)
5. State and prove Chebychev's inequality? Write the uses of Chebychev's inequality (41/2)
6. Derive the recurrence relation for the central moments of Binomial distribution. Hence obtain μ_3 ?. (6)
7. If X & Y are independent Poisson Variates show that the conditional distribution of X given X+Y is binomial. (6)
8. State and prove the lack of memory property of geometric distributio (63/4)
9. Define normal distribution and show that

$$\mu_{2n} = (2n-1)\mu_{2n-2}\sigma^2 \quad (6)$$
10. Why Cawhy distribution is different from all other distributions? (23/4)
11. Find mean, variance of gamma distribution. (6)
12. Define beta 1st kind distribution and get the Harmonic mean of it? (4)
13. What do you mean by simulation? Illustrate this through an example? (4)

14. Explain how you generate random numbers from geometric distribution(31/2)
15. Define convergence in probability. Show that for any sequence of independent and identically distributed random variables with finite variance

$$\overline{X}_n \xrightarrow{P} E(x) \quad (5)$$

16. State central limit theorem? (21/2)
17. Define Chi-square Statistics? Derive its distribution. (6)
18. Find the interrelationship between t,F,X² (9)

Model Question Paper
First Year B.Sc. Degree Examination

Part III – Statistics (Main)

Paper I – Statistical Methods and Probability Theory

Time 3 hrs

Max Mark: 60

Answer may be written either in English or Malayalam

Use of calculators and scientific tables are allowed

1. For any two positive numbers a and b prove that A.M. \geq G.M. \geq H.M. (5)
2. Distinguish between skewness and kurtosis. Give one measure of each. How the values of these measures are interpreted? (5)
3. Define Regression coefficients. What are the properties of regression coefficients? (4)
4. Define Karl Pearson's correlation coefficients. With usual notation, show that $-1 \leq r \leq +1$ (6)
5. With usual notation, show that

$$R_{1.23}^2 = \frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{31}}{1 - r_{23}^2} \quad (5)$$
6. Explain the components of a time series. (5)
7. Explain the least square method of fitting a polynomial to a time series data. (5)
8. What is an index number? Explain various problems involved in the construction of index number. (5)
9. What is time reversal test? Show that Fisher's Index no. satisfies time reversal test. (5)
10. What is association of attributes? Define Yule's Coefficient of association and the coefficient of colligation. (5)
11. Define the following terms with examples
 - a) Random Experiment
 - b) Mutually exclusive events

- c) Independent events (6)
12. Describe the axiomatic approach to the definition of probability (4)
13. State and prove Bayes theorem (5)
14. Define random variables. Distinguish between discrete and continuous random variables with examples. (5)
15. Define Distribution function of a random variable. State its properties? (4)
16. The joint probability function of two random variables is given by the following table:-

Y \ X	1	2	3
1	0.1	0.1	0.2
2	0.2	0.3	0.1

Find a) $P(X+Y < 4)$

b) The conditional distribution of X given $Y=1$ (6)

17. Let X and Y have the joint p.d.f. $f(x,y) = 2, 0 < x < y < 1$. Find the marginal distributions. (5)

18. Let the p.d.f. of X be $f_x(x) = e^{-x} \quad x > 0$

Find the p.d.f. of $Y = e^{-X}$. (5)

Sd/-

Sri. C.H. Yoosuf

Chairman , BOS Statistics (UG)