A.VEERIYA VANDAYAR MEMORIAL SRI PUSHPAM COLLEGE (AUTONOMOUS),
POONDI, THANJAVUR DIST.

Question Pattern for UG and PG Programmes for students to be admitted during 2014 – 2015 and afterwards

Total Marks: 75

QUESTIONS PATTERN

SECTION – A
(Question 1 to 10)

10 x 2 = 20 Marks

1. Short Answer Questions
2. Two Questions from each units (All are answerable)

SECTION – B
(Question 11 to 15)

5 x 5 = 25 Marks

1. 5 Paragraph type questions with "either / or" type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

SECTION – C
(Question 16 to 20)

3 x 10 = 30 Marks

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
I	**14U1STT1**	√ℜ|ς⌈ √⌈ ℜ⌋BΔ (χ|↔∑| *f*, E→||>, ∑ς*f*|Δ, √⌈ ℜ⌋B κ↔⌈ ς→)	**6**	**3**

{→: 1 ¬⊗Φ∞⊥

…∑↔Δ: 18

1. √↔ς.∴ o≡\| ∂\| \|⟨ς⌈ □]∫κ∫® ℘ς □ \|ς®E♥ ¬ ℘∫τ>Δ

   (]∫κo>ςBΔ ξ↵κμΔ)

2. ∑ς.∴ ℜ\|_ \|σΘ⌈ □ >τ∝⇑…>[

   (℘\|κ⇑ □\| >λ[E⊕♥A)

3. ℘ς↔]Bς⌈ □ •>⊆]↔♥ ℘ς*f*_\|⊥

   (•>⊆]↔♥ ¬ ℘∫ ∴, •>⊆]↔♥ ℘λ⌈ •>⊆]↔⇑ >ς\|Δ,

   •>⊆]↔ …>σλ[μ])

4. ℘ς↔]>ς⊗[□ T↔⇑>ςΦ

5. ℘®\|ℜ…\|ς®\| *f* \|_Bς□ •⊆>↔Δ □∑ς\|

   (♦≡…\| χJ\| ∴ ♦[∑ς…*f*, ♦≡\|⊥ ∑ς\| (>τ∝∑ς\|, γ⊆]↔ς ∑ς\|,

   \|[♠*f* ∑ς\|, ∴\|⌈Bς⟨ ∑ς\|))

6. \|κ↔ξ⇑μ □ \|σ↔ς⇔[\|\|> (\|ςυ→Δ \|σΘ∠Δ ∴⟩♥ ℘]_\|⌈)

{→: 2 χ\| ↔∑\| *f*

…∑↔Δ: 18

1. …\|®\|σ □ √↔ς\| ℘ςκΔ (1 ξ>_ 15 κ\| ↔)
2. …\|®\|σ □ ℘B□≡\|⊥ ¬>ς*f*∫Δ

{→: 3 E→\|\|>

…∑↔Δ: 18

1. …\|®\|σ □ ζ↔_ ¬\|ς\|ℜζΔ κς♠Δ℘ς\| (1 ξ>_ 10 κ\| ↔)
2. …\|®\|σ □ ∴….♠ς↔⇒E>Δ ξ↵κμΔ

⦃→: 4 ∑ς*f*|Δ

…∑↔Δ: 18

ζ.¬κ. ℘ς⌈•♥÷↔∴⌊B[□ ¬|⟨>∴ A⇑>⌈

⦃→: 5 √⌈ℜ⌋B κ↔⌈ς→

…∑↔Δ: 18

E→||>, A]♠Δ, ∑ς*f*|Δ, |σ|>, χ|↔∑|*f*

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
I	**14U1STE1**	**PART – II ENGLISH PROSE, POETRY AND COMMUNICATION SKILLS**	**6**	**3**

Objective

- To initiate the Students to understand English through Prose, Poetry and Basic Communicative Grammar

Unit – I

1) The Running Rivulets of Man, 2) Parliament is Marking Time,

3) The Lady in Silver Coat, 4) Mr. Applebaum at Play.

Unit – II

1) The Feigning Brawl of an Imposter, 2) Thy Life Is My Lesson,

3) Solve The Gamble, 4) The Stoic Penalty.

Unit – III

1) Nobility In Reasoning, 2) Malu the Frivolous Freak,

3) Bharath! Gird Up Your Loins! 4) Honesty is the Cream Of Chastity

Unit – IV

John Milton – On His Blindness.

Oliver Goldsmith – The Village Schoolmaster.

William Wordsworth – The Daffodils.

P.B.Shelley – Ozymandias.

Keats – La Belle Dame Sans Merci.

Hopkins – Thou Art Indeed, Just Lord.

Unit – V

Parts of Speech, Nouns, Pronouns, Conjunctions, Adjectives, Articles, Verbs, Adverbs, Interjection – sentence.

Semester	Subject code	Title	Hour	Credit
I	**14U1STC1**	**DESCRIPTIVE STATISTICS**	**4**	**5**

Subject description: This course introduces the historical development of Statistics, presentation of data, descriptive measurers and fitting mathematical curves to the data.

Goal: To enable the students understand and apply descriptive measures in Statistics.

Objective: On successful completion of the course students should have: known the history of Statistics and learnt data presentation in various forms.

UNIT-I: Origin, scope, limitations and misuse of Statistics-Collection-Classification-Tabulation of data. Diagrammatic representation of data: One-dimensional and two-dimensional diagrams – graphic representation: line diagram, frequency polygon, frequency curve, Histogram and Ogive curves.

UNIT-II: Measures of central tendency: Mean, Median, Mode, Geometric mean and Harmonic mean-Partition values: Quartiles, Deciles and Percentiles.

UNIT-III: Measures of Dispersion: Mean deviation, Quartile deviation and Standard deviation – Coefficient of variation.

UNIT-IV: Moments- measures of Skewness-Pearson's and Bowley's Coefficient of skewness, Coefficient of Skewness based on moments – Kurtosis.

UNIT-V: Curve fitting: principle of least squares, fitting of the curves of the form $y = a + bx$, $y = a + bx + cx^2$ and curves transformable to the above form.

Text book: "Fundamental of Mathematical Statistics" (Sulthan chand &sons) - Guptha, S.C and Kapoor V.K

Books recommended for study:

1. Mills, F.C : Statistical Methods-part I
2. Tara Yamane : Elements of Statistics

Semester	Subject code	Title	Hour	Credit
I	**14U1STC2**	**Probability and Distributions - I**	**5**	**5**

Subject description: This course introduces the various concepts, functions and properties and theorems related to random variables

Goal: To enable the students to understand and study random phenomena mathematically

Objective: On successful completion of the paper, the students should have understood the concepts of random variable, discrete, continuous, joint, marginal, conditional probability functions, expectation, conditional expectation and variance, generating functions, law of large numbers and central limit theorem and their applications.

Unit-I: Random variables –discrete and continuous random variables –distribution function-properties- probability mass function and probability density function –various statistical measures of continuous probability distribution.

Unit-II: Joint, marginal and conditional distribution functions and density functions-independence of random variables –Transformation of variables (one and two dimensional-concepts only).

Unit-III: Mathematical expectation-properties-addition and multiplication theorems – conditional expectation and conditional variance.

Unit-IV: Moment generating function, cumulant generating function, characteristic function and their properties.

Unit-V: Binomial, Poisson and Negative-Binomial distributions – Moments, m. g. f. , cumulants, additive property, recurrence relation for the probabilities- simple problems.

Books for study:

1. *"Fundamentals of Mathematical stat*istics" by Guptha, S.C &Kapoor, V.K (Sulthan chand &sons).

Books for Reference:-

2. *"Introduction to Mathematical statistics"* by Hogg.R.V and and Craig, A.G. (Amerin.,).

Semester	Subject code	Title	Hour	Credit
I	**14U1STMAA1**	**ALLIED MATHEMATICS - I**	**5**	**4**

Objectives:

- To introduce the basic concepts of summation of series and special types of matrices, theory & equation.
- To introduce Higher-level integral.

UNIT-I: Binomial, exponential and logarithmic (without proof) series – summation using the three series.

UNIT-II: Cayley – Hamilton theorem (No proof) – characteristic equation – Roots and vectors – Symmetric, Orthogonal, Unitary, Hermitian Matrices – Simple examples.

UNIT-III: Radius of curvature (Cartesian and Parametric) - partial derivatives of a function of two functions – Jacobians of 2 and 3 variables.

UNIT-IV: Beta and Gamma Integral (Simple problems only) – Evaluation of double and triple integrals

UNIT-V: Theory of Equations - relations between roots and coefficients – symmetric functions of the roots in terms of coefficients - imaginary roots and irrational roots - transformation of equation – Reciprocal equation

Books recommended for study:

Algebra volume I & II – Part I Algebra and Calculus Vol. II – T.K.M. Pillai (Relevant portions only)

Unit I : Chapter 3 (Vol – I),

Unit II : Chapter 2 (Vol – II),

Unit III: Chapter 1 (Section 6), chapter 3 (Section 3.2., 3.3.) and Chapter 7,

Unit IV: Chapter 5,

Unit V: Chapter 6 (Vol – I).

1. Algebra (Major) – T.K.M .Pillai.
2. Calculus (Major) – T.K.M. Pillai.
3. Ancillary Mathematics – P.R.Vittal, Margam Publications

Semester	Subject code	Title	Hour	Credit
I & II	**14U2STMAA2**	**ALLIED MATHEMATICS – II (NS)**	**3+3**	**3**

Objectives:

- To introduce concepts of Hyperbolic function and correlation
- To introduce the concepts of numerical solution of ordinary differential equation and 3 dimensional analytical geometry

UNIT –I: Trigonometry - Expansion of sin $n\theta$, cos $n\theta$, tan $n\theta$, $\sin^n \theta$, cos$n\theta$, tan$n\theta$- Hyperbolic function – Relation between circular and hyperbolic functions – separation of real and imaginary parts of hyperbolic functions

UNIT – II: Inverse hyperbolic functions – separation of real and imaginary parts of inverse hyperbolic function

UNIT – III: Numerical solution of ordinary differential equation - Taylor series methods, Euler, Modified Euler method – R.K.4^{th} order method

UNIT – IV: Finite difference method to solve ordinary second order differential equation – finite difference methods – numerical solution of partial differential equations – Poisson's equations.

UNIT – V: Standard equation of plane, straight line S.D., between two skew lines, spheres (up to intersection of plane)

Text Book:

1. Trigonometry and Analytical Geometry 3D - T.K.M.Pillai (*Relevant portions only*)
   Unit I : Chapter 3, 4
   Unit II : Chapter 4, 5
   Unit V : Chapter 2, 3 & 4

2. Numerical methods – P. Kandasamy, K. Thilagavathi and K. Gunavathi (*Relevant Portions*)
   Unit III: Chapter 11
   Unit IV: Chapter 12

General References:

1. Trigonometry - S.Arumugam
2. Statistics - M.Sivathanupillai
3. Ancillary Maths - P.R.,Vittal, Margam Publications

Semester	Subject code	Title	Hour	Credit
I & II	**14U2STS1**	**SKILL BASED EDUCATION – I(NS) Verbal Reasoning - I**	**1+1**	**2**

Unit I:

Series completion- Number series - Alphabetic series, Coding and decoding- Letter coding- Number coding and Blood Relations- Deciphering jumbled up descriptions- Relation puzzle.

Unit II:

Puzzle Test- Seating/ Placing arrangements- Comparison test and Logical Venn diagram.

Text Book:

"A modern approach to verbal reasoning" - R.S. Aggarawal, S.Chand and company Ltd., New Delhi- 55

Unit I : Chapter 1 (1-21); Chapter 4 (194-210); Chapter 5 (261-276).

Unit II: Chapter 6 (Page 288 to 296,) (307-310) (328-334)

Chapters 9 (441-449).

Semester	Subject code	Title	Hour	Credit
II	**14U2STC3**	**Probability and Distributions - II**	**5**	**3**

Subject description: This course introduces probability functions for random variables that are defined for different probabilistic situations

Goal: To enable the students to understand the properties and applications of various probability functions

Objective: On successful completion of the course, the students should have understood the applications and nature of the probability distributions such as binomial, Poisson...Normal*, t,* χ^2 and *F*.

Unit I: Chebychev's inequality, Cauchy - Schwartz inequality, convergence in probability, weak law of large numbers and central limit theorem.

Unit II: Geometric distribution – moments, *m.g.f* – Hyper-geometric distribution-mean, variance, *m.g.f*, Binomial as a limiting form of Hyper- geometric distribution – Multinomial distribution – moments

Unit III: Normal distribution – limiting form of Binomial distribution, properties, median, mode, moments, *m.g.f*, cumulants, mean deviation, area property, simple problems – Rectangular distribution-moments, *m.g.f.* characteristic function, mean deviation – Bivariate normal distribution.

Unit IV: Gamma, Beta distributions of I^{st} kind and II^{nd} kind – constants – Exponential distribution –additive property.

Unit V: Functions of normal random variable leading to χ^2, *t* and *F* distributions – inter relationship between the distributions and their properties.

Books recommended for study:

1. "*Fundamentals of mathematical statistics*" By Gupta, S.C and Kapoor, V.K.,(Sultan chand & sons)

Books for references:

1. "*Introduction to Mathematical Statistics*", Hogg R.V and Craig, A.G., (Amerind.)

Semester	Subject code	Title	Hour	Credit
II	**14U2STCPL1**	**MAJOR PRACTICAL - I descriptive statistics**	**3**	**3**

1. Formation of frequency distribution, Calculation of arithmetic, geometric mean, median and mode, Calculation of percentile.

2. Formation of charts and diagrams: Histogram, bar diagram, Pie diagram frequency line, and scatter diagram. Formation of Ogive curves.

3. Calculation of measures of dispersion: Range, Variance, Standard Deviation, Mean deviation, Quartiles.

4. Calculation of Skewness and kurtosis.

5. Problems related to curve fitting.

6. Calculation of correlation and regression coefficients and formation of regression lines.

7. Fitting straight line, non-linear trend lines and calculation of trend values using moving averages.

8. Calculation of Index numbers.

Note: Students should be given exposure in handling basic statistical data.

Three questions are to be answered out of five questions

Semester	Subject code	Title	Hour	Credit
II	**14U2STMAA3**	**ALLIED MATHEMATICS - III**	**5**	**3**

Objectives:

- To study vector differentiation and vector integration with application
- To study ordinary Differential equation and partial differential equation
- To study Fourier series and Laplace transforms

Unit-I: Differential Equation:- Second order differential equation with constant coefficient of the types $ay'' + by' + cy = e^{ax}$, $g(x)$, x^n, $\sin ax$, and $\cos ax$ only – solution of partial differentials of the form $f(p, q) = 0$; $f(z, p, q) = 0$; $f(x, p, q) = 0$; $f(Y, p, q) = 0$; $f(x, p) = g(Y, q)$; $z = px + qy + f(p, q)$ - Lagrange's method for solving $P_p + Q_q = R$.

Unit-II: Laplace Transforms:- Definition – Laplace Transform of function e^{at}, $\cos at$, $\sin at$ and t^n where 'n' is positive integer-First Shifting theorem – Laplace transforms of $e^{at}\cos bt$, $e^{at}\sin bt$, $e^{at}\sin hbt$, $e^{at}\cos hbt$, $e^{at}\,t^n$. Transforms of $f'(t)$ and $f''(t)$ – Inverse transforms relating to the above standard forms. Application of solution of ordinary differential equation with constant coefficients (involving the above transforms).

Unit-III: Fourier series:- Definition – finding Fourier coefficients for a given periodic function with period 2π-odd, even functions – Half range series.

Unit-IV: Vector differentiation:- Velocity and acceleration – scalar and vector fields – Divergence and *curl*-application – Laplalce operator.

Unit-V: Vector integration:- Application of Gauss and Stoke's theorems (no proof of the theorem).

Text Books:

Unit I: Chapter 2 & 4	Differential Equations – TKM Pillai
Unit II: Chapter5	Calculus Volume III – TKM Pillai
Unit III: Chapter6 Section 1 to 5	Calculus Volume III – TKM Pillai
Unit IV: Chapter IV	Vector Algebra & Analysis – TKM Pillai
Unit V: Chapter VI	Vector Algebra & Analysis – TKM Pillai

General References:

1. Engineering Mathematics – A Singaravelu(Volume I & II)
2. Vector Calculus – K.Viswanbathan and S.Selvaraj
3. Ancillary Mathematics – P.R.Vittal, Morgam Publications

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
III	**14U3STT3**	⏐ς♥÷B≡⏐⊥, ⏐®‖↔⏐⊥, √⌈ℜ⌋B κ↔⌈ς→	**6**	**3**

⦃→: 1 ⏐ς♥÷B≡⏐⊥ 1

…∑↔Δ: 18

1. E⌈♥ ℘]⏐ς↔Δ □ A⏐ς⌈ℜ ⏐ς⌋ ƒΔ □ ⏐ς♠_ κ⟩

2. ∴⟨…∴ ⏐⏐⌈ □ ∴⌈⌈κ♠Δ Aℜ⏐ ⏐ς⏐>

3. ⌈κ⏐ E⊆>ς∴⟨ □ σ∴⏐⌈B⌈ √⌈Δ℘⏐Δ

4. ⏐Δ℘↔ς∴ςB□Δ □ •⊆>↔ ⏐ς⌋ ƒΔ □ ⌈ƒς∴⟨♥ ℘ƒ⌈Δ (84 ℘ςƒ_⏐⊥)

⦃→: 2 ⏐ς♥÷B≡⏐⊥ 2

…∑↔Δ: 18

1. ¬℘⟩B A↔ς□Δ □ √‖⟨Bς[ζ⏐ ∴ς⊕ ∑ςB♠ς⌈ A↔ς□Δ (27 ℘ςƒ_⏐⊥)

2. ∑⟨¬κ⌋ ℘ς □•BΔκ↔ ⏐ς⌋ ƒΔ (ξ>_ 20 ℘ςƒ_⏐⊥)

3. …>Δ℘ςκ⟨ □ ∑ς®⏐♥ ℘ƒ⌈Δ (ξ>_ 10 ℘ςƒ_⏐⊥)

4. ⌈⊕ς♥A↔ς□Δ □σ⌈ς>⇑μℜ ⏐ς⌋ ƒΔ □ ∑÷ ∂κ>ς↔♥ ℘ƒ⌈Δ (ξ>_ 10 ℘ςƒ_⏐⊥)

⦃→: 3 ⏐®‖↔⇑ ¬>ςζ♥A

…∑↔Δ: 18

⏐®‖↔⇑ ¬>ςζ♥A □ >τ∝⇑μ⏐⊕ ¬κ≠Ξ⏐

⦃→: 4 ¬℘ςμℜ⏐®‖↔, ¬∴ςα¬℘B⌈♥A♥ ℘λυE

…∑↔Δ: 18

1. √[>τ∝ℜ ⏐®‖↔⏐©Δ, ⏐⏐>≡⏐©Δ □ A⌈κ⌈ ∴ς.… ℘÷ ⊗…↔ς⇔ς,
℘ς⏐κ ℘♥≠…⏐↑[⟩

⏐®‖↔♥ ℘λυE □ 10 ∴]♥¬℘⌋

¬∴ς⍺¬℘B⌈♥A♥ ℘λυE □ 5 ∴]♥¬℘⌋

||⌈⇓¬⊗ς_⌈ς𝔑|Δ

⦃→: 5

…∑↔Δ: 18

∂. √⌈𝔑⌋B κ↔⌈ς→

℘𝔑] √⌈𝔑⌋B≡|⊥ □ |ς♥÷B √⌈𝔑⌋B≡|⊥ □ Eυ⌈𝔑⌋B≡|⊥

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
III	**14U3STE3**	**PART – II ENGLISH SHAKESPEARE, EXTENSIVE READERS AND COMMUNICATIVE SKILLS**	**6**	**3**

Objective

- To introduce the language of the world renowned dramatist and novelist to enhance the vocabulary and communicative skills of the learners.

Unit – I

Funeral Oration – Julius Caesar

Trial for a Pound of Flesh – The Merchant of Venice

Unit – II

He Kills Sleep – Macbeth

A Real Love at First Sight – Twelfth Night

Unit – III

When the Moor Kills, "So Good a wife" – Othello

In Love is a "Midsummer Madness" – Tempest

Unit – IV

The Mayor of Casterbridge (Abridged) – Thomas Hardy

Unit – V

Note making, Hints Developing, Expansion of Ideas and Proverbs, Sequence of Sentences Synonyms, Antonyms.

Book Prescribed:

Unit–I : II & III: Selected scenes from Shakespeare.

Unit IV: The Mayor of Casterbridge Abridged by E.F.Dodd

Unit V : Communicative Grammar.

Semester	Subject code	Title	Hour	Credit
III	**14U3STC4**	**SAMPLING TECHNIQUES**	**4**	**5**

Subject description: This course introduces the concept, methods and analysis of sampling techniques

Goal: To enable the students to understand and apply the sampling procedures to different situations

Objective: On successful completion of the course the students should have understood sample and census surveys, errors that occur in surveys and various sampling methods and the different types of populations to which these sampling methods are applicable.

Unit-I: Sampling from a finite population –Random sampling –simple sampling with and without replacement –unbiased estimates of the mean and the variance of the population and of the variance of the estimator of the mean - Estimation of the sample size.

Unit-II: Stratified sampling – proportional and optimum allocation with regard to stratified random sampling-unbiased estimates of the mean and the variance of the population and of the variance of the estimator of the mean.

Unit-III: Systematic sampling –Unbiased estimates of the mean and the variance of the population and of the variance of the estimator of the mean.

Unit-IV: Cluster and two stage sampling –unbiased estimates of the mean and variance of the population and of the variance of the estimator of the mean.

Unit-V: Design, organization and execution of sample surveys –sampling and non-sampling errors and methods to deal with sampling errors.

Books for study:

1. Sampling Techniques by Cochran, W.G (Wiley Est)

2. Sampling theory of survey with applications by Sukathme P.V and sukathme B.V (Asia pub.House)

3. Sampling theory and Methods by Murthy, M.N (Statistical publishing

Semester	Subject code	Title	Hour	Credit
III	**14U3STC5**	**STATISTICAL INFERENCE–I Theory of Estimation**	**5**	**5**

Subject description: This course introduces concepts, methods and properties relating to estimation

Goal: To enable the students to understand and apply various estimation procedures

Objective: On successful completion of this course, the students should have understood the concepts of Point estimation and interval estimation, and their properties, calculation of partial and multiple correlation coefficients and multiple linear regression line.

Unit I: Concept of Statistical Inference- Parametric estimation- Sampling distribution – Standard Error. Derivation of Standard Error of mean, variance, proportion, difference between means variances and Proportions-concept of ordered statistics

Unit II: Point Estimation: Estimator, properties of point estimator – unbiasedness, consistency, Crammer Rao inequality – efficiency – asymptotic efficiency and sufficiency of the estimator – Rao Blackwell theorem.

Unit III: Methods of point estimation: method of maximum likelihood, method of minimum chi-square and method of moments - properties of estimators obtained by these methods (Without proof).

Unit IV: Interval Estimation: Fiducial limits-derivation of confidence intervals based on Normal t, χ^2 and F distributions. Confidence intervals- using Cramer – Rao inequality- Partial and multiple correlation and regression coefficients – Multiple linear regression lines.

Unit V: Numerical problems in interval estimation, multiple and partial correlation and regression–simple problems only.

Books for study:

1. *Introduction to mathematical statistics* by Hoel P.G : (Wiley International)
2. *Statistical methods* by Snedecor, GW and Cochran, WG (Oxford and I B H)
3. *Introduction to mathematical Statistics* by Hogg V and Craig .R (Amerind)
4. *Theory and application of Statistics* Vol. II by Ramasamy, M.M
5. *Introduction to Mathematical Statistics* by Brunk, H.D (Ginn and Co.)
6. *A first Course in Mathematical Statistics* by Weather Burn CE (Cambridge University press)

Semester	Subject code	Title	Hour	Credit
III	**14U3STCSA1**	**Allied Computer Programming in C**	**5**	**4**

Objectives:

- To introduce the techniques of C- Programming
- To solve the numerical problems using C

Unit I

Constants, variables and Data Types- Operators and Expressions- Input and Output Operators.

Unit II

Decision Making and Branching- Decision Making and Looping.

Unit III

Arrays- handling of Character Strings.

Unit IV

User Defined functions.

Unit V

Structures and Unions.

Text Book:

"Programming in Ansi C" by E.Balagurusamy; Second Edition, 1992, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.

Unit I : Chapters 2, 3 & 4

Unit II : Chapter 5 & 6

Unit III : Chapter 7 & 8

Unit IV : Chapter 9

Unit V : Chapter 10

Semester	Subject code	Title	Hour	Credit
IV	**14U4STCSAPL**	**Allied Computer Practical (NS)**	**3+3**	**2**

Programs for the following problems only
(For both theory and practical)

Programs

1. Pay bill calculation
2. Mark list
3. Ascending and descending orders
4. Test for palindrome word
5. (a). Mean, Standard deviation and coefficient of variation for raw data

   (b). Sorting a list and find its Median
6. Coefficient of correlation and regression equations
7. Matrix multiplication
8. Lagrange's interpolation
9. Range-kutta method (IV Order)
10. Trapezoidal rule and simpson rule

Reference

Chapter 2 to 7,
Chapter 8 (8.1, 8.2 & 8.8),
Chapter 9 (9.4 to 9.5),
Chapter 10,
Chapter 11 (11.1 to 11.8),
Chapter 12 (12.1 to 12.4, 12.6)
– Treatment as in

'*Programming in ANSI C*' by E.Balagurusamy, Second Edition, 1992. Tata McGraw Hill Publishing Company Limited, New Delhi.

Semester	Subject code	Title	Hour	Credit
IV	**14U4STS2**	**SKILL BASED EDUCATION – II (NS) Verbal Reasoning- II**	**1+1**	**2**

Unit I:

Number, Ranking and Time sequence test and Mathematical operations- Problem solving by substitution- interchange of signs and numbers.

Unit II:

Arithmetical reasoning, inserting the missing character and Data sufficiency.

Text Book:

"A modern approach to verbal reasoning" - R.S. Aggarawal, S.Chand and company Ltd., New Delhi- 55

Unit I: Chapter 12 (542-550); Chapter 13 (569-579).

Unit II: Chapter 15 (Page 601 to 609); Chapters 16 (Page 628 to 640)

Chapter 17 (654-662).

Semester	Subject Code	Title Of The Paper	Hours Of Teaching / Week	No. of Credits
IV	**14U4STT4**	⊗≡| √⌈ℜ⌋B∆ – ∂⊕ √⌈ℜ⌋B∆ – ¬⊗∆¬.∴ς∝ – √⌈ℜ⌋B κ↔⌈ς→	**6**	**3**

{→: 1

…∑↔∆: 18

ζ→⊆¬>ς| |

1. ζ⁄⇒E □ …>ς∝ {υ→ (℘ς.♦.:1) 2. ξ_|⌈ □ ¬⊗σo⇑ >ςΦ {υ→ (℘ς.♦.167)
3. ∴∫>∆ □ >|⌈σ {υ→ (℘ς.♦.181) 4. ¬∑Φ>_ □ >|⌈σ {υ→ (290)
5. ℘ς|⌈ □ >|⌈κ[{υ→ (347)

∑υ↙| □

1. ζ⁄⇒E □ (℘ς.♦. 1) 2. ξ_|⌈ □ (℘ς.♦. 69) 3. ∴∫>∆ □ (℘ς.♦. 70)
4. ¬∑Φ>_ □ (℘ς.♦. 74) 5. ℘ς|⌈ □ (℘ς.♦.79)

|o⇑¬>ς| |

1. ℘ς|⌈ □ (℘ς.♦. 2) 2. ζ⁄⇒E □ (℘ς.♦. 37)

∂|∑ς⌋→

1. ℘ς|⌈ □ (℘ς.♦. 5) 2. ∴∫>∆ □ (℘ς.♦. 6)

{→: 2

…∑↔∆: 18

ν≡ζ→±→

ζ⁄⇒E □ ζ[⊕ℜ ζ⊕κ[℘⇑μ

A⊕∑ς⌋→

℘ς*f*_ ♦J |⊥ 4, 30, 34, 47, 112, 165, 186, 191, 192, 242

℘]υ→♥ ℘⇑μ

√↔J *f*ς∆ ℘⇑μ ℘ς*f*_ ♦J . 4 (Ω⌈∆, ℵ⌈, κ≠, σ•∆A)

℘⟩℘ς*f*_

℘⇑>ς∆ ℘ς*f*_ □|κ| B

{→: 3 …∑↔∆: 18

℘®|♠♥ ℘ς|⌈

ξ↵⊣κμ∆

]∫ℜζ⊕⊥

1. ∴∫⊆μ 2. ≈ℜ|ξ| *f*| ∴ 3. χωϒ

{→: 4

…∑↔∆: 18

¬⊗∆¬.∴ς∝ κ↔⌈ς→

¬∴ς α □ σ⟨ℜ|Δ □ ¬∴ςαℜζ|Δ℘≡|⊥ □ χ⌈|⇓ ¬⊗Δ¬∴ςα|⊥ □ √⊆]B⇓ ¬⊗Δ¬ ∴ςα|⊥ □ ¬⊗Δ¬∴ςα⇑ >ζ]|⊥ □ κ|↔B|⊕|⊥ □ κς↵Δ >τ∝⇓¬⊗Δ¬∴ςα □ ¬>ς[| ∴ □ >τα[E⊕♥A|⊥ □ >τ∝⇓ ¬⊗Δ¬∴ςα ±_|⊥

{→: 5

…∑↔Δ: 18

∂. √⌈ℜ⌋B κ↔⌈ς→

⊗≡| √⌈ℜ⌋B≡|⊥, ℘]¬♠⌋□∝ℜ|□ℜζ ±_|⊥

Semester	Subject Code	Title of The Paper	Hours of Teaching/ Week	No. of Credits
IV	**14U4STE4**	**PART – II ENGLISH ENGLISH FOR COMPETITIVE EXAMINATIONS**	**6**	**3**

Objective

- To prepare the learners for competitive examinations and to know the fundamentals of practical communication.

Unit – I

Grammar – Number, Subject, Verb, Agreement, Articles, Sequence of Tenses, Common Errors.

Unit – II

Word Power - Idioms & Phrases, one word substitutes, Synonyms, Antonyms, Words we often confuse, foreign words & phrases, spelling.

Unit – III

Reading & Reasoning – Comprehension, Jumbled Sentences.

Unit - IV

Writing Skills – Paragraph, Precis Writing, Expansion of an idea, Report Writing, Essay, Letters, Reviews (Film & Book)

Unit – V

Speaking- Public speaking, Group Discussion, Interview, Spoken English.

Prescribed Text:

1. V.Saraswathi, English for Competitive Examinations, Chennai, Emerald Publishers, 2000.

Semester	Subject code	Title	Hour	Credit
IV	**14U4STC6**	**STATISTICAL INFERENCE – II: Testing of Hypothesis**	**5**	**5**

Subject description: This courses introduces the concepts of hypothesis testing

Goal: To enable the students to give inference on statistical population based on sample statistics

Objective: On completion of the course, the students should have gained knowledge on the methods of testing the hypothesis on different distributions and the nature of statistics to which such test procedure can be used.

Unit-I: Testing of Statistical hypothesis: Statistical hypothesis -simple and composite hypothesis, null and alternative hypotheses-sample and parameter space –two types of errors – critical region-power a test –Neyman- Pearson Lemma –simple applications

Unit-II: Most powerful tests-uniformly most powerful and unbiased tests based on Normal, t, and χ^2 and F distributions - likelihood ratio criterion –definition and simple applications

Unit –III: Test of significance –Asymptotic and exact tests based on Normal, t, and χ^2 and F distributions with regard to mean, proportion, variance, Standard deviation, coefficient of correlation, regression coefficients, partial and multiple correlation coefficients-Concept of observed significance level.

Unit-IV: Contingency table –Test for independence by contingency tables –goodness of fitness tests –tests of homogeneity of variances, correlation and proportions. Test of Normality (application only).

UNIT-V: Elementary ideas on distribution –free and non-parametric tests –Run, Median, Sign and Mann Whitney tests (without proof)-Equality of two distributions.

Books for study

1. *Introduction to Mathematical statistics* by Hogg, R.V and Craig, AG (amrend)
2. *Introduction to Mathematical statistics* by Hoel, P.G (Wiley International)
3. *Statistical Methods* by Snedecor, G.W and Cochran W. G (oxford and IBH)
4. *Introduction to Mathematical Statistics* by Brunk .H.D (Gann Co)
5. *Practical Non-parametric Statistics* by Conover (wiley International)
6. *Fundamentals of Mathematical statistics* by Guptha S.C and Kapoor V.K (Sulthan chand & sons)

Semester	Subject code	Title	Hour	Credit
IV	**14U4STC7**	**STOCHASTIC PROCESS**	**4**	**5**

Unit – I

Definition of Stochastic Processes – Classification of Stochastic Processes according to time parameter space and state space – Examples of Stochastic Processes

Unit – II

Markov Chains – Definitions and examples – Higher transition probabilities – Chapman - Kolmogorov equation – Classification of States – Limiting behaviour (concept and applications only)

Unit – III

Stationary processes and time series – Strict and wide Sense stationary models of time series – Concept of spectrum of time series

Unit – IV

Poisson Processes – Poisson process and related distributions – Birth-death processes – Simple examples

Unit – V

Markov process with continuous state space – Brownian movement – Wiener process – Differential equation for a Wiener process – Kolmogorov equations – first passage time distribution for Wiener process – Distribution of the maximum of a Wiener process – Distribution of the first passage time to a fixed point

Book for Study:-

1. J. Medhi (1982),: Stochastic Processes, Wiley Eastern Ltd, New Delhi.

Book for references:-

2. S. Karlin,H.M. Taylor, (1966): First Course in Stochastic Processes, Academic Press.
3. N.U. Prabhu, (1965): Stochastic Processes, Mac.Millan, New York.

Semester	Subject code	Title	Hour	Credit
IV	**14U4STCSA2**	**ALLIED DATA MINING**	**5**	**4**

Objective: To know about the architecture and concepts of data warehousing and mining.

UNIT I: Introduction – data mining – data mining functionalities – classification of data mining systems – data mining task primitives – integration of a data mining system with a database or data warehouse system – descriptive data summarization.

UNIT II: Data processing – data cleaning – data integration and transformation – data reduction – data discretization and concept of hierarchy generation – data ware housing and OLAP technology – a multidimensional data model – data warehouse architecture.

UNIT III: Classification and prediction – what is classification?-What is prediction? – Issues regarding classification and prediction – Bayesian classification.

UNIT IV: Cluster analysis – types of cluster analysis partitioning methods – Hierarchial methods – Density based methods.

UNIT V: Applications and trends in data mining – data mining application, social impacts of data mining – trends in data mining – data mining system products and research prototypes.

Book for study :-

1. "Data mining concepts and techniques", Jiawei Han and Micheline Kamber, second edition, Morgam Kaufman Publications – 2006.

Books for references:-

2. "Data warehousing in the real world", Sam Anahory and Dennis Murray, Addition Wesely, Pearson Education Asia Pvt. Ltd – 2000.

Semester	Subject code	Title	Hour	Credit
V	14U5STC8	OPERATIONS RESEARCH	7	6

Objective: This course introduces the concepts, models and problem solving techniques of optimization problems. To enable the students gain knowledge about various optimization techniques like linear programming, duality in linear programming and integer programming.

UNIT – I: Introduction to O.R. Introduction – origin and development – nature and features – modeling in O.R. – general solution methods – scientific method – methodology of O.R. – applications of O.R. – opportunities and shortcomings of O.R. – limitations of O.R.- Linear Programming Problem - Mathematical formulation of L.P.P. – graphical solution of L.P.P.

UNIT – II: Simplex methods – problems - Use of artificial variable – big-M method – two phase methods – problems - Concepts of Primal and dual problems.

UNIT–III: Transportation and Assignment model in O.R.:- General transportation problem – transportation table – loops in transportation tables – L.P.formulation of the T.P. – north west corner method – least cost or matrix minima method – Vogels' approximation method – Assignment problem**:** Introduction – Mathematical formulation of the problem –assignment method.

UNIT – IV: Game theory:- Introduction – method of solving game theory problems – games with mixed strategies – game with dominance – games with Arithmetic method – use of linear programming in solving a game – graphical solution to a game – approximate solution of a game.

UNIT – V: PERT / CPM:- Introduction – Concept of network – rules for construction of network – dummy activities – to find the critical path – algorithm for critical path – PERT model – CPM model .

TEXT BOOK: *Operations Research*, Sultan Chand & Sons, New Delhi (2006) P.K.Gupta, Kanti Swarup and Man Mohan.

Unit I : Chap 1, 2, 3
Unit II : Chap 4: Sec.4.1, 4.3, 4.4
Unit III : Chap 10: sec. 10.1 – 10.9
Chap 10: sec. 11.1 – 11.3
Unit IV : Chap 17: Sec. 17.1 – 17.9
Unit V : Chap 21

Books for Reference:

- *Problems in Operations Research*, Sultan Chand & Sons, New Delhi (2006). - P.K.Gupta and Man Mohan.
- *Operations Research-An Introduction*, Mac Millan Publishing Company, New York (1982). – Hamdy A.Taha.

Semester	Subject code	Title	Hour	Credit
V	**14U5STC9**	**Statistical Quality Control**	**7**	**7**

Subject description: This course introduces the application of statistical tools on industrial environment to study, analyze and control the quality of products.

Goal: To enable the students to know the concepts of process control and product control.

Objective: On successful completion of the course, the students should have understood various tools used such as control charts, sampling plans, quality system standards and reliability concepts to control the quality of industrial outputs.

Unit – I: Need for *SQC* – Role of frequency distribution – Statistical basis for *SQC* – variable control charts –□*X*, *R* and σ charts.

Unit II: Control Chart for attributes – *np, p, c* and *u* chart–Group control chart, *OC* and *ARL* of control charts, *CUSUM* charts using *V*-mark and decision intervals (concepts only)

Unit III: Acceptance sampling for Attributes – Single sampling plan – Double sampling plan – OC, AOQ, ASN and ATI curves – sequential sampling plan and their properties.

Unit IV: Quality system standards – ISO 9000- Elements of ISO – 9000 – Benefits of ISO 9000-Elements of a quality system – Documentation ISO 9000 accreditation

Unit V: Reliability concepts and measures, components and systems, reliability function, hazard rate, common life distribution viz, exponential, gamma and weibull.

Books for study:

1. *Fundamentals of Applied statistics* by Gupta S.C and Kapoor, V.K
2. *Quality control and Industrial Management* by Dunkan A.J.(Richard D.Irwin Inc.USA)
3. *Statistical Quality Control* by R.S. Leaven worth (Mc Graw Hill)
4. *Statistics of Quality control*, Sampling Inspection and Reliability by Biswas S (1996)(New Age Intl)
5. *Statistical Analysis of Reliability and Life Testing Models* by Bain, L.J and Englehard, M. (1991) (Maral Dekker).

Semester	Subject code	Title	Hour	Credit
V	14U5STCPL2	MAJOR PRACTICAL - II (USING CALCULATOR)	4	4

Problems:

UNIT-I Statistical inference-1:

1. Estimation of parameters of the distribution by the methods of moments and maximum likelihood with regard to discrete and continuous distributions
2. Confidence intervals based on Normal, χ^2, t and F distributions
3. Determination of partial and multiple correlation coefficients-Multiple linear regression line and linear prediction involving three variables when the sums of squares and products are given.

UNIT-II Basic sampling theory:

1. Estimation of mean and variance of the population and the variance of the estimator of the mean using Simple random procedure.
2. Stratified random sampling –Estimation of mean and variance of the population and of the variance of the estimator of the mean under proportional and optimum allocation.
3. Systematic sampling.

UNIT-III Design of experiments:

1. Analysis RBD and LSD lay outs
2. Missing plot techniques in RBD and LSD
3. Analysis of 2^2, 2^3 and 3^2 factorial designs with and without confounding.
4. Analysis of covariance with one concomitant variable to RBD.

UNIT-IV: Statistical inference-II:

1. Standard Normal and exact tests of significance with regard to mean, variance, proportion, correlation and regression coefficients and partial multiple correlation coefficients
2. Test for homogeneity several variances-Bartlett test

UNIT-V: Statistical quality control:

1. Control chat for attributes and variables**:***X, R, p, np* and *c* charts
2. Single sampling plan for attributes: OC, ATI, AOQ curves.

Three questions to be answered out of five questions. **One question to be asked from each unit.**

Semester	Subject code	Title	Hour	Credit
V	14U5STEL1A	ELECTIVE - DEMOGRAPHIC METHODS	4	3

Subject description: This course introduces the concepts, methods and analysis of data relating to vital events such as births, deaths… marriage… migration ….

Goal: To enable the students to have an exposure on the application of Statistical methods to analyze the demographic problems.

Objective: On successful completion of the course the students should have understood about registered information of vital events, measurement of the events such as birth and death rates, life tables and population projection techniques.

Unit-I:

Mortality measurements: crude death rate- specific death rates-standardized death rates-direct and indirect methods.

Unit- II:

Comparative mortality index-infant mortality rate-maternal mortality rate-cause- of- death rate-case fatality rate-force of mortality- graduation of mortality rates–Gompertz and Makeham's laws.

Unit- III:

Assumptions, description and construction of various columns of a life table and their relationships- uses of a life table- age pyramid.

Unit- IV:

Construction of an abridged life table –Reid and Merrell method - Greville's method –migration-factors effecting migration-gross and net migration rates.

Unit -V:

Population projection –population estimates and projection –arithmetic, geometric and exponential growth rates- logistics curves-Pearl and Reed method –method of Rhodes-Basic ideas of stationary and stable population.

Books for study:

1. Indian Population Problems by Agarwala, S.N (Tata Mc Graw Hill, Bombay) 2. Fundamentals of Applied Statistics by Guptha ,S.C and Kapoor ,V.K (S.Chand &Co)
3. An introduction to the study of population by Mishra D.E (South India publishers, Madras)
4. Fundamentals of Demography by DR.Hansraj (Surjeet publications Delhi)

Semester	Subject code	Title	Hour	Credit
V	14U5STEL1B	ELECTIVE - ECONOMETRICS	4	3

Unit – I

Introduction to Econometrics – Nature and scope of Econometrics – Limitations

Unit – II

Concepts of price, Demand, supply, elasticity of demand, elasticity of price, elasticity of supply – simple problem

Unit – III

Simple linear model and general linear models – Simple application

Unit – IV

Ordinary Least Square (OLS) estimation – Prediction – Simple illustrations

Unit – V

Statistical problems of Econometric methods – Hetroscedasiticity and Multi colinearity

Reference Books:

1. J. Johnston (1985) Econometric methods, John Wiley & Inc, New York.

2. S. P. Singh, Anil. K, Parashar and H. P.Singh (1984). Econometrics, S.Chand and Company Ltd, New Delhi.

Semester	Subject code	Title	Hour	Credit
V	14U5STEL2A	ELECTIVE - SIMULATION AND PROBABILISTIC MODEL	4	3

Objectives:

- To introduce the techniques of constitution of Probabilistic Model.
- To introduce the simulating techniques of Model.

Unit I: Probabilistic Model-I – single period model with uniform rate of demand without setup cost (discrete and continuous units) – simple problems only.

Unit II: Probabilistic Model-II – Single period model with instantaneous demand without setup cost (discrete and continuous units) – simple problems only.

Unit III: Replacement problems – definition – replacement of equipment that deteriorates gradually – simple problems only.

Unit IV: Replacement policy when value of money does not change with time and money charges with time – simple problems only.

Unit V: Individual replacement policy – Group replacement policy – ABC analysis – Simple problems only.

Books for Study:

1. Kanthi Swarup, Gupta P.K. and Man Mohan, - *"Operations Research",* Sultan and Chand and Sons, New Delhi.

Semester	Subject code	Title	Hour	Credit
V	14U5STEL2B	ELECTIVE - MATLAB	4	3

Unit – I:

Starting with Matlab - Creating arrays - Mathematical operations with arrays

Unit – II:

Script files - Functions and function files

Unit – III:

Two-dimensional plots - Three-dimensional plots

Unit – IV:

Programming in MATLAB

Unit – V:

Polynomials, Curve fitting and interpolation - Applications in numerical analysis

Text Book:

"MATLAB An Introduction with Application" by **A. Gilat,** John Wiley & Sons, Singapore, 2004.

Unit – I : Chapter 1, Chapter 2, Chapter 3.
Unit - II : Chapter 4, Chapter 6.
Unit - III : Chapter 5, Chapter 9.
Unit - IV : Chapter 7.
Unit - V : Chapter 8, Chapter 10.

Reference Books:

1. *Getting Started with MATLAB – A Quick Introduction for Scientists and Engineers"* by **R. Pratap**, Oxford University Press, New Delhi, 2006.
2. "*Introduction to Matlab 7 for Engineers"* by **W.J. Palm,** McGraw-Hill Education, New York, 2005.
3. "*Introduction to MATLAB 7"* by **D. M. Etter, D. C. Kuncicky and H.Moore**, Prentice Hall, New Jersy, 2004.

Semester	Subject code	Title	Hour	Credit
V	14U5STNME	NON MAJOR ELCTIVE MATRIX ALGEBRA	2	2

Unit- I

Definition of Matrix – Addition, Subtraction, Multiplication of Matrices

Unit-II

Transpose of a Matrix – Adjoint of a Matrix – Inverse of the Matrix.

Unit-III

Symmetric, Skew symmetric, Hermitian and Skew Hermitian Matrix – Problems.

Unit-IV

Rank of the Matrix- Definition – Finding Rank of the Matrix – Problems up to 3x3 Matrix.

Unit-V

Cayley Hamilton Theorem (Statement only) – Problems only

Text Books:

1. Dr.P.R. Vittal -Allied Mathematics - Margham Publications, Chennai-17 (2000)

Semester	Subject code	Title	Hour	Credit
VI	**14U6STC10**	**NUMERICAL ANALYSIS**	**6**	**6**

Subject description: This course introduces the concepts and methods to analyze numerical data.

Goal: To enable the students to establish mathematical functions using numerical data.

Objective: On successful completion of the course, the students will be able to estimate functional relationship, interpolate and extrapolate the value of dependent variable of the estimated function.

Unit I:

Iteration method or Method of successive approximation – Newton's method (or) Newton-Raphson method- Solution of simultaneous linear algebraic equations: Gauss Elimination Method – Gauss-Jordan Method – Jocobi's (or Gauss-Jocobi's) Iteration Method.

Unit II:

Interpolation: Newton's Forward Interpolation formula – Backward Differences – Newton's Backward Interpolation formula – Central Differences: Gauss 's Forward Formula – Gauss's Backward Formula – Stirling's Formula.

Unit III:

Interpolation with unequal intervals: Divided differences– Newton's divided difference interpolation formula for unequal intervals– Lagrange's Interpolation formula.

Unit IV:

Quadrature formula for equidistant ordinates: Trapezoidal rule-Romberg's method– Simpson's *1/3*rd and *3/8*th rules Rule– Truncation error in the Trapezoidal rule –Truncation error in Simpson's rule.

Unit V:

Runge-Kutta method for simultaneous first order differential equations - Predictor Corrector methods: Milne's Predictor Corrector formulae–Adam Bashforth(or Adam's) Predictor Corrector formulae.

Books for study:

1. *Numerical Methods* by Kandasamy. P. Thilagavathy,. K and Gunavathy.K (2003), S.Chand & Co, New Delhi.
2. *Numerical Methods* by A.Singaravelu, Meenakshi Agency, Chennai-2.

Semester	Subject code	Title	Hour	Credit
VI	**14U6STC11**	**DESIGN OF EXPERIMENTS**	**7**	**7**

Subject description: This course introduces various experimental designs, selection of appropriate designs in planning a scientific experimentation

Goal: To enable the students to understand the principles of experimentation and employ suitable designs in experiments

Objective: On successful completion of this course the students should have understood the concept of analysis of v**a**riance, to compare more than two treatments with the help of F distribution for various designs employed, to estimate missing observations, to compare the efficiencies of various designs and the concept of ANCOVA

Unit-I: Linear design models-Least Square estimates of parameters and variance of estimates –Analysis of variance: One way and two way classifications.

Unit-II: Fundamentals of experimentation: Plot and pen techniques –determination of shape and size of plots – Uniformity trials –Replication, randomization and local control techniques

Unit-III: Analysis of different experiments: CRD, RBD and LSD and their efficiencies

Unit-IV: Missing plot techniques (atmost two values)-Analysis of covariance (ANCOVA) with one concomitant variable to CRD and RBD.

Unit-V: Factorial designs -22,23and 32 factorial designs with and without confounding.

Books for study:

1. Experimental designs by Cochran W.G and Cox G.M (john Wiley)
2. Experimental design: Theory and applications by Federar, WT (Oxford and IBH)
3. Statistical theory in research by Anderson RL and Bangrtt TA (McGraw HILL)
4. The design of Analysis of Experiments by Kempthrone,B (Wiley Eastern)
5. Fundamentals of Statistics by Goon, A.M., Guptha M.K and Das Guptha (World press)
6. Design and Analysis of Experiments by Das, M.N., and Giri, N.L (wiley Eastern)

Semester	Subject code	Title	Hour	Credit
VI	**14U6STCPL3**	**MAJOR PRACTICAL - III (Using Statistical Software Package)**	**4**	**4**

UNIT I: Essential terminology for all SPSS users-getting to SPSS for windows - the components of window - SPSS for windows screens – crucial preliminaries-entering data into SPSS-editing data-saving data file-retrieving data file.

Unit II: Merging data files –adding scores to existing cases –add variables – running a simple analysis and obtaining the output.

Unit-III: Checking the data –Box plots of score distributions –listing of the data using case summaries –graphs –bar, line, pie chart, scatter plots and histograms.

Unit IV: Frequency distribution-measures of frequency distributions-cross tabulations – obtaining two sample chi-square tests-log linear analysis –parametric statistical tests –comparing means- paired and unpaired t-tests

Unit V: Correlation and multiple regession-analysing nominal and ordinal data-non parametric analysis- Wilcoxon, mann-whitney, Kruskal Wallis tests –ANOVA: Analysis of CRD,RBD and LSD.

Books for study and reference

1. Clifford E.Lunneborg (2000). "*Data analysis by resampling: concepts and applications"*. Dusbury Thompson learning .Australia.
2. Everrit ,B.S and Dunn,G(2001). "*Applied multivariate data analysis*". Amol London.
3. Jeremy J.foster(2001). "*Data analysis using spss for windows*". New edition. Versions 8_10.sage publications .London
4. Michael S, Louis-Beck (1995). "*Data analysis an introduction, Series: quantitative applications in the social sciences*". Sage publications. London.

Semester	Subject code	Title	Hour	Credit
VI	14U6STEL3A	ELECTIVE - ACTUARIAL STATISTICS	4	3

Unit - I:

Present value and accumulated value at fixed rate and varying rates of interest – effective rate of interest corresponding to a nominal rate of interest and vice-ersa – Simple problems – annuity – types of annuities excluding perpetuity – derivation of the formula for an%, sn%, a..n% and s..p% simple problems.

Unit – II:

Derivation of the formula for a(p) n%, s(p) n%, a..(p) n% and s..(p) n% simple problems – redemption of loan by uniform early payment – definitions of sinking fund – redemption of loan by a sinking fund (uniform early payment) simple problems.

Unit – III

Mortality table: Definition- Uses – mentioning the types and the construction of a mortality table – complete and incomplete mortality table – computing the probabilities of survival and death using LIC (1970-1973) Mortality table- defining expectation of life, complete expectation of life and central death rate – simple problems.

Unit – IV

Principles of Insurance – Types of assurance – temporary assurance, pure endowment assurance, endowment assurance and whole life assurance – Expressions for present values of assurance benefits under temporary assurance, pure endowment assurance, endowment assurance and whole life assurance plans – simple problems

Unit – V:

Definitions of premium, Natural premium level, Annual Premium, Net Premium and Office Premium – Expressions for level annual premium under temporary assurance, pure endowment assurance, endowment assurance and whole life assurance plans – simple problem involving the calculations of level annual present annual premium, office premium and the four types of plans only.

Reference Books:

1.Mathematics Basis of Life Insurance – Insurance Institute of India.

2.Mathematics of Finance – Scheme Series.

Semester	Subject code	Title	Hour	Credit
VI	**14U6STEL3B**	**ELECTIVE - GENETICAL STATISTICS**	**4**	**3**

Unit – I

Chromosomes and Genes – meaning of basic terms

Unit – II

Genotype and phenotype, dominance & recessiveness

Unit – III

Autosomal linkage-crossing over–sex–linked inheritance sample space–Random events–probability

Unit – IV

Compound events – Laws of probability – conditional probability – Rendel‟s laws (I & II)

Unit – V

Genotypes and phenotypes in experimental populations – No.of genotypes and phenotypes – Evaluation of phenotypic ratios in the off spring of inter crosses and back crosses, using generating function.

Books For Study:

1. Ragira C. Elandt: Probability models and Statistical methods in Genetics, John – Wiley and Sons Inc, New Delhi.

Semester	Subject code	Title	Hour	Credit
VI	**14U6STEL4A**	**ELECTIVE - TIME SERIES AND INDEX NUMBERS**	**4**	**4**

Objectives:

- To introduce the techniques of Statistic tools
- To solve the numerical problems using time series index numbers an vital statistics

Unit I: Concept of time series – additive and multiplicative models, uses of time series, measurement of trend – graphic method, method of semi-averages – method of moving averages, method of least squares (linear quadratic and exponential) – simple problems.

Unit II: Measurement of seasonal fluctuations – method of simple averages – ratio to trend method – ratio to moving average and link relative method – concept of cyclic variations and irregular movements.

Unit III: Definition and types of index numbers – construction and used of index numbers – calculations of index numbers – fixed base and chain base index numbers.

Unit IV: simple aggregate method and weighed aggregate method – Laspeyre's, Paasche's, Bowley's, Marshall – Edge worth and Fisher's ideal index numbers – simple problems.

Unit V: Weighted average of price relative method (by using A.M. and G.M.) – construction of chain indices - The criteria of a good index number – time reversal and factor reversal methods and family budget method – simple problem

List of books for study / reference:

1. S.C.Gupta and V.K.Kapoor – *"Fundamentals of Applied Statistics",* Sultan Chand and Sons, New Delhi.

2. Goon.A.M.M.A Gupta and Das Gupta B – *"Fundamentals of Statistics",* Vol. II, World Press, Calcutta.

Semester	Subject code	Title	Hour	Credit
VI	14U6STEL4B	ELECTIVE - STATISTICAL DATA ANALYSIS	4	4

Unit I: Collection of statistical data - primary and secondary – methods - preparation of questionnaire and schedules.

Unit II: Classification and tabulation – bar diagrams – pie diagram – histogram – frequency polygon – frequency curve – merits and demerits.

Unit III: Measures of central tendency – mean, median, mode – measures of dispersion – range, mean deviation, standard deviation and coefficient of variation.

Unit IV: Measures of skewness – definition – types – methods – Karl Pearson's skewness – Bowley's skewness – merits and demerits – simple problems only.

Unit V: Correlation analysis – Karl Pearson's coefficient of correlation – Spearman's rank correlation coefficient – simple problems only.

List of books for study / reference:

S.P.Gupta – *"Statistical Methods",* Sultan and Chand and Sons, New Delhi.

Semester	Subject code	Title	Hour	Credit
-	-	**Core Optional** **VITAL STATISTICS**	5	5

Unit I:

Introduction – definition of vital statistics, uses of vital statistics , method of obtaining vital statistics, registration method, census enumeration – analytical method.

Unit II:

Measurement of fertility – CBR (crude birth rate) – SFR (specific fertility rate) – ASFR (age specific fertility rate) – GFR (general fertility rate) – TFR (total fertility rate)

Unit III:

Reproduction rate – gross reproduction rate – net reproduction rate.

Unit IV:

Measurement of mortality – specific death rate – standardized death rate – infant mortality.

Unit V:

Life tables – uses of life table – construction of a life table.

List of books for study / reference:

1. S.P.Gupta – *"Statistical Methods",* Sultan and Chand and Sons, New Delhi.

Semester	Subject code	Title	Hour	Credit
-	-	**Core Optional** **Game Theory**	5	5

Unit I:

Introduction game theory – Definition of game, Application of game and its uses, properties

Unit II:

Method of solving game theory problems - maximin, minimax principle, saddle point

Unit III:

Two person Zero sum game - games with mixed strategies – problems

Unit IV:

Dominance property- game with dominance – games with Arithmetic method – problems

Unit V:

Linear programming in solving a game – graphical solution to a game (mx2 and 2xn) - approximate solution of a game- problems

TEXT BOOK: *Operations Research*, Sultan Chand & Sons, New Delhi (2006) P.K.Gupta and Man Mohan Kanti Swarup, P.K.Gupta and Man Mohan.

Books for Reference:

- *Problems in Operations Research*, Sultan Chand & Sons, New Delhi (2006). - P.K.Gupta and Man Mohan.
- *Operations Research-An Introduction*, Mac Millan Publishing Company, New York (1982). – Hamdy A.Taha.

Semester	Subject code	Title	Hour	Credit
-	-	**Core Optional** **NON-PARAMETRIC TESTS**	5	5

Unit – I

Introduction of non-parametric test – its comparison with parametric test – Advantage and limitations of non-parametric tests

Unit – II

Test for randomness – Run test – Test for rank correlation co-efficient – Sign test.

Unit – III

Comparison of two populations: median test – Mann Whitney U test – Wilcoxon signed rank test for paired observations.

Unit – IV

Comparison of several populations: Median test for several samples – Kruskal Walli"s test – Friedman ANOVA.

Unit – V

Testing of goodness of fit by Kolmogorov – Smirnov test – chi-square test for uniformity of data – Distinction between non-parametric and distribution free tests.

References Books:

1. J.D.Gibbons (1976): Non-parametric methods for quantitative analysis, New York.
2. J.V.Desphande, A.P.Gune, A.Shanubhogur : Statistical Analysis of non-normal data.
3. Richard I. Lerin: Statistics for Management, Practice Hall of India, New Delhi.

Semester	Subject code	Title	Hour	Credit
-	-	**Core Optional** **APPLIED STATISTICS**	5	5

Unit – I

Concept of time series – Source of time series data – Component of time series – Additive and Multiplicative models – Resolving the components of time series – Trend – Methods of measuring trend – Semi average method – Method of moving average – Method of least squares – First order & second order polynomials and logistic curves.

Unit – II

Seasonal variation – Seasonal index – Methods of measuring seasonal index – Simple average method – Ratio to moving average - Ratio to trend method – Link relatives method – Cyclical variation – Measurement of cyclical variation – Method of periodogram analysis – Auto regression series of first order and second order – Auto correlation and correlogram analysis – Random components -Variate difference method.

Unit – III

Basis of Index Numbers – Definition – uses - Problems in the construction – Different types of Index Numbers – Simple Index Numbers – Weighted Index Numbers – Laspeyre‟s Index Numbers – Paasche‟s Index Numbers – Fisher‟s Index Numbers – Marshall & Edge worth Index Numbers – Dorbish & Bowley‟s Index Numbers.

Unit – IV

Optimum tests of Index Numbers – Time reversal test – Factor Reversal Test – Circular Test – Chain base Index Number – Conversion of FBI into CBI and Vice versa – Uses of Index Numbers - Wholesale price Index Numbers (Concept only).

Unit – V

Cost of living Index Numbers – Methods of construction – Aggregate method – Family budget method – splicing and deflating – Base shifting – Uses of cost of living Index Numbers.

Reference Books:

1. A.M.Goon M.K.Gupta and B.Das Gupta (1994), Fundamentals of Statistics V-II, The world press Ltd., Culcutta.
2. Croxton : Applied General Statistics.
3. S.C.Gupta, V.K.Kapoor, (2007):Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi

Semester	Subject code	Title	Hour	Credit
-	-	**Core Optional** **COMPUTATIONAL STATISTICS**	6	5

Unit I:

Primary and secondary – preparation of questionnaire and schedules merits and demerits.

Unit II:

Classification and tabulation –Types of bar diagrams – pie diagram – histogram – frequency polygon – frequency curve – merits and demerits.

Unit III:

Measures of central tendency – mean, median, mode – measures of dispersion – range, mean deviation, standard deviation and coefficient of variation simple problems.

Unit IV:

Measures of skewness – definition – types – methods – Karl Pearson's skewness – Bowley's skewness – merits and demerits – simple problems only.

Unit V:

Correlation analysis – Karl Pearson's coefficient of correlation – Spearman's rank correlation coefficient – simple problems only.

Books for study / reference:

1. S.P.Gupta – *"Statistical Methods",* Sultan and Chand and Sons, New Delhi.

Semester	Subject code	Title	Hour	Credit
-	-	**Core Optional** **BIO – STATISTICS**	6	5

UNIT I

Biostatistics – definition – types of data – Quantitative, Qualitative data – Sources of data in life science – Limitation and uses of statistics.

UNIT II

Collection of data–primary data, designing questionnaire and schedule– Secondary data – Methods of collection of data – classification of data – Tabulation and presentation of data

UNIT III

Measures of Central Tendency – Mean, Median, Mode, Geometric Mean – Merits and Demerits. Measures of dispersion – Range, Standard deviation, Mean deviation, Quartile deviation, Merits and demerits, coefficient of variations

UNIT IV

Correlation – Types and methods of correlation, Rank – Correlation, Regression, Simple regression equation, fitting, Prediction.

UNIT V

Sampling Methods – population. Sample–Simple Random sample – concept of sampling distributions – standard error – Test of significance – Hypothesis – Simple hypothesis – Tests based on large samples and small samples – Chi-square test.

References:

1. P.S.S. Sundar Rao, J. Richard (2012). An introduction to Biostatistics and Research methodology. Fifth Edition, Prentice Hall of India Learning Private Ltd, New Delhi. Price RS.275/-.
2. Gurumani N (2005). An introduction to Biostatistics. 2nd Revised Edition, MJP Publishers, Chennai. PriceRs.160/-.
3. Daniel WW, (1987). Biostatistics, John Wiley and Sons, New York.
4. Dr. Pranab Kumar Banarjee. An Introduction to Biostatistics (A text book of Biometry). Revised and 4th enlarged Edition 2011,S. Chand and Company Ltd, Ram Nagar, New Delhi. Price RS.175/-.
5. A.Indrayan, L.Sathyanarayana (2006). Biostatistics for Medical, Nursing and Pharmacy students. Prentice Hall of India Private Ltd, New Delhi.