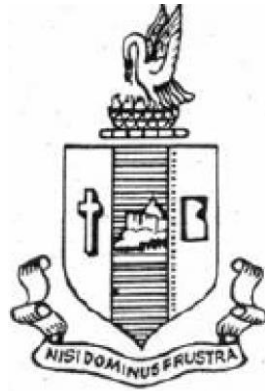# B.Sc., ACTUARIAL MATHEMATICAL SCIENCE SYLLABUS

(Under Choice Based Credit System)

(For the students admitted in the academic year 2018-19)

PG DEPARTMENT OF ACTUARIAL SCIENCE

BISHOP HEBER COLLEGE (AUTONOMOUS)

(Nationally Reaccredited with A+ Grade by NAAC)

Tiruchirappalli – 620017

DEPARTMENT OF ACTUARIAL SCIENCE

B.Sc., ACTUARIAL MATHEMATICAL SCIENCE - 3 YEARS FULL TIME COURSE

Sem.	Part	Course	Course Title	Course Code	Hours / week	Credits	Marks		
							CIA	ESE	Total
I	I	Language I	Tamil I	U18TM1L1	6	3	25	75	100
	II	English I	English Communication Skills - I	U16EGNL1	6	3	40	60	100
	III	Core I	Introduction to Algebra	U17AS101	5	4	25	75	100
		Core II	Differential Calculus and its Applications	U17AS102	5	4	25	75	100
		Allied I	Mathematical Statistics - I	U17AS1Y1	4	4	25	75	100
	IV	Env. Studies	Environmental Studies	U16EST11	2	2	25	75	100
		Val. Edu.	Value Education (RI/MI)	U15VL1:1/ U15VL1:2	2	2	25	75	100
II	I	Language - II	Tamil II	U18TM2L2	6	3	25	75	100
	II	English II	English Communication Skills - II	U16EGNL2	6	3	40	60	100
	III	Core III	Introduction to Integral Calculus	U17AS203	6	5	25	75	100
		Core IV	Differential Equation & Its Application	U17AS204	6	5	25	75	100
		Allied II	Mathematical Statistics - II	U17AS2Y2	6	4	25	75	100
III	I	Language -III	Tamil III	U18TM3L3	6	3	25	75	100
	II	English III	English for Competitive Examinations	U16EGNL3	6	3	40	60	100
	III	Core V	Business Economics	U17AS305	5	4	25	75	100

		Elective I	Basic Accounting Concepts	U17AS3:1	5	4	25	75	100
		Allied III	Mathematical Statistics - III	U17AS3Y3	4	4	25	75	100
		Allied IV	Introduction to General Insurance	U17AS3Y4	2	2	25	75	100
	IV	NMEC I	Principles of Insurance	U17AS3E1	2	2	25	75	100
IV	I	Language – IV	Tamil IV	U18TM4L4	6	3	25	75	100
	II	English IV	English through Literature	U16EGNL4	6	3	40	60	100
	III	Core VI	Sampling Theory and its Applications	U17AS406	5	4	25	75	100
		Allied V	Financial Management	U17AS4Y5	5	4	25	75	100
		Allied VI	Introduction to Time Series	U17AS4Y6	4	4	25	75	100
	IV	SBEC I	Statistical Software and MS-Excel	U17ASPS1	2	2	40	60	100
		NMEC II	Financial Markets in India	U17AS4E2	2	2	25	75	100
		Soft skills	Life Skills	U16LFS41	2	1	-	-	100
	V	Extension Activities	NSS, NCC, LEO CLUB ETC.,	U16ETA41	-	1	-	-	-

V	III	Core VII	Introduction to Stochastic Process and Markov Model	U18AS507	6	5	25	75	100
		Core VIII	Mathematical Modeling	U17AS508	6	5	25	75	100
		Core IX	Mathematics of Finance - I	U17AS509	6	5	25	75	100
		Elective II	Data Analysis Using MS-EXEL	U18AS5:P	5	4	40	60	100
		Elective III	Group Insurance & Retirement benefit	U17AS5:3	5	4	25	75	100
	IV	SBEC II	Introduction to Life Insurance	U17AS5S2	2	2	25	75	100
VI	III	Core X	Operations Research	U17AS610	6	5	25	75	100

		Core XI	Numerical Methods	U17AS611	6	5	25	75	100
		Core XII	Mathematics of Finance - II	U17AS612	5	5	25	75	100
		Core XIII	Basics of Life Contingencies	U17AS613	6	5	25	75	100
		Elective IV	Insurance Underwriting And Risk Management	U17AS6:4	5	4	25	75	100
		SBEC III	Mathematics for Competitive Examinations	U17AS4S3	2	2	25	75	100
	V		Gender Studies	U16GST61		1			

SBEC : Skill Based Elective Courses   NMEC : Non Major Elective Courses   Total Credits :   140

* Other Languages :   Hindi   Sanskrit   French   Hindi   Sanskrit   French
    Semester I : U14HD1L1   U14SK1L1   U14FR1L1   Semester III : U14HD3L3   U14SK3L3   U14FR3L3
    Semester II : U14HD2L2   U14SK2L2   U14FR2L2   Semester IV : U14HD4L4   U14SK4L4   U14FR4L4

Part I : 4 Core Theory : 13 Allied Theory : 6 NMEC : 2 Env. Studies : 1 Value Education : 1	**Total : 40**
Part II : 4 Elective. : 4 SBEC : 3 Exten. Act. : 1 Gender Studies : 1	

NMEC offered by the Department: 1.Principles of Insurance - U17AS3E1

2. Financial Markets in India - U17AS4E2

SEMESTER - I

CORE I: INTRODUCTION TO ALGEBRA

Semester: I   **Code: U17AS101**

Credits: 4   **Hours/week: 5**

Objectives: To study the characteristic roots of the matrix. To study about the Transformation of equation, Binomial Expansions.

Unit I: Matrices: Rank of Matrix - Consistency of equations - Solving Non- homogeneous linear equations

Unit II: Eigen Values and Eigen Vectors: Characteristic equation- Eigen values and Eigen vectors of matrix- Cayley- Hamilton theorem.

Unit-III: Theory of Numbers: Prime and composite number- The sieve of Eratosthenes- Divisors of given number N- Euler's function $\phi(N)$- Integral part of a real number- The highest power of a prime P contained in n!.

Unit IV: Binomial Theorem: Binomial theorem for rational index – Other forms of Binomial expansion – Summation of series – Expansion of rational fractions approximate values.

Unit V: Summation of Series: Exponential series- Exponential theorem (statement only) – Summation of series, Expansions and approximations. Logarithmic Series – Calculation of Logarithms - Summation of series, Expansions, Limits and approximations - General Summation of Series.

Textbooks:

1. T. K. Manickavasagam Pillay, T. Natarajan and K. S. Ganapathy, Algebra Volume – II,

   S. Viswanathan (Printers & Publishers) Pvt. Ltd., Reprint 2000 (Unit I, II, III)

2. T. K. Manickavasagam Pillay, T. Natarajan and K. S. Ganapathy, Algebra Volume – I. (Unit IV & V)

Reference:

   1.   Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015;

CORE II: DIFFERENTIAL CALCULUS & ITS APPLICATIONS

Semester: I   **Code: U17AS102**

Credits: 4   **Hours/week:5**

Objectives: To study Function and limits, to study Differentiation, to study Partial Differentiation: and Application of simple derivatives

Unit I: Function and limits: Constants and variables – Function- Classification of function- Limit of Function- Limit and value of function- Rules for finding the limit of function- Some general theorem on limits- Certain special limits.(Note: Results only, No proof and Simple Problems)

Unit II: **Differentiation:** Definition- differential coefficient of X^n – product rule- quotient rule- function of function rule- logarithmic differentiation- differentiation of implicit function. Successive Differentiation: The nth derivative – Standard results – Leibnitz formula for nth derivative of product- Maxima & Minima (One variable) (Note: Simple Problem only).

Unit III: Partial Differentiation: Derivation of partial derivation – Successive partial derivation – Homogeneous function- Euler's theorem – Partial derivatives of a function of two functions. (Note: Simple Problem only)

Unit IV: Application of simple derivatives: Differential coefficient and elasticity of demand – Total, Average and Marginal cost curves – Relation between Average and Marginal cost curves – Minimum Average cost – Cost function in cubic form – Total, Average, Marginal revenue curves- Maximum total revenue – Conditions for profit maximization.

Unit V: Monopoly: Multiple productions by monopolistic – Discriminating monopoly – Duopoly.

Textbooks:

UNIT	NAME OF THE BOOK	CHAPTER	SECTION
I		Chapter - 1	1,2,3,4,5,6,7,8,9,10

II	Calculus Vol-I by S. Narayanan & T.K.Manickavasagam Pillay	Chapter - II	1,2.1-2.6,3.1-3.14,4.1-4.3
III		Chapter - III	1.1-1.6,2.1-2.2
IV	Mathematics for Economists – Mehta Madnani	Chapter - VII	Everything
V		Chapter - XI	Everything

Reference:

1. Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015;

ALLIED I: MATHEMATICAL STATISTICS - I

Semester: I   **Code: U17AS1Y1**

Credits:4   **Hours/week: 4**

Objectives: (i) Summarize the main features of a data set (exploratory data analysis).(ii) Explain the concepts of probability. (iii) Explain the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables.

Unit I: Introduction: Introduction-Meaning-Importance-Function-Limitation-Collection of Data - Objectives-Rules and types – Frequency distribution (discrete and continuous) – Frequency (class, two - way, cumulative) – Classification and Tabulation.

Unit II: Diagrammatic and Graphical Representation: Advantages-construction-rules-Diagram - Simple Bar Diagram – Multiple Bar Diagram – Clustered Bar Diagram - Line Diagram – Pie Chart – Graph histogram - Frequency (polygon, curve, ogive) – (time series, z curve, horizontal line, false base lines, component or band graph)

Unit III: Measures of central tendency (Averages): Introduction - Meaning – Definition-Functions – Characteristics – Arithmetic mean – Median – Mode – Geometric Mean - Harmonic Mean

Unit IV: Measures of Dispersion and skewness, kurtosis, moments: Introduction – Meaning -Range – Mean Deviation - Quartile Deviation – Standard Deviation- Skewness - Kurtosis

Unit V: Probability: Introduction - History – Meaning – Mathematical properties- Permutation – Combination – Trial – Event- Sample space- Mutually exclusive cases-Exhaustive events- Dependent and independent events- Simple and compound events -Measurement – Classical – Relative frequency theory – Limitations- Personality view of probability and axiomatic approach of probability – Addition and multiplication theorem – odds – practical problems

Textbook:

UNIT	NAME OF THE BOOK	CHAPTER	SECTION
I	Statistics for Scientific Solutions by Dr. P. Mariappan	1,3	1.1,1.5,3.1-3.4,3.6-3.10
II		3	3.12
III		4	Everything except 4.9
IV		5,6	Everything
V		8	8.1 – 8.3

Reference:

"Fundamentals of Mathematics and statistics" by S.C. Guptha and V.K. Kapoor, S.& Chand Publishers.

SEMESTER - II

CORE III: INTRODUCTION TO INTEGRAL CALCULUS

Semester: II   **Code: U17AS203**

Credits: 5   **Hours/week: 6**

Objectives: To study the properties of definite integrals and methods for solving multiple integrals.

Unit I: Integration by Parts: Integration of the forms (i) $\int [(px+q) /(ax2+bx+c)]dx$ (ii) $\int dx /(a+bcosx)$ (iii) $\int [(px+q) / (\sqrt{} (ax2+bx+c))]dx$ (iv) $\int [(px+q)\sqrt{}(ax2+bx+c)]dx$ – Integration by parts

Unit II: Definite Integral: Definite integral- Properties of definite integral- Reduction formula $+\sin^n x\ dx, +\cos^n x\ dx,\ +\tan^n x\ dx, \int_0^{\pi/2} \sin^n x\ dx$ and $\int_0^{\pi/2} \cos^n x\ dx$ and simple problems

Unit III: Multiple Integral: Multiple integral - Double integral – Triple integral- Change of order of integration

Unit IV: Beta and Gamma Integral: Beta and Gamma functions: Recurrence formula of Gamma function – Properties of Beta function – Relation between Beta and Gamma functions.

Unit V: Applications of Definite Integrals: Introduction- Area between two curves- Some properties of definite integrals- Application- Compound interest, present value or discounted value – Consumer's surplus – Producer's surplus

Textbooks:

UNIT	NAME OF THE BOOK	CHAPTER	SECTION
I	Calculus Volume – II by S.Narayanan and T.K.Manickavasagam Pillay	1	7.3,8,9,11,12
II		1, VII	13.1–13.10, 2.1,2.3,3,4,5
III	A textbook of Analytical Geometry	V	1,2.1,2.2
IV	Mathematics for Economists- Mehta Madnani		FULL
V			

Reference:

1. Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015;

CORE IV: DIFFERENTIAL EQUATIONS AND ITS APPLICATION

Semester: II   **Code: U17AS204**

Credits: 5   **Hours/week: 6**

Objectives: To study differential equations and partial differential equations of first and second order.

Unit I: Linear Differential Equations: Differential Equations - Linear differential equations with constant co-efficient –The operators D and D^{-1} – Particular Integral – Special methods of finding particular integral – Linear equations with variable co-efficient – To find the particular integral –Special method of evaluating the particular integral when x is of the form x^m.

Unit II: First order Linear Differential Equations: Exact differential equations – Conditions of inerrability of Mdx + Ndy = 0 – Practical rule for solving an exact differential equation – Rules for finding integrating factors – Equations of the first order but of higher degree – Solvable for x, y, dy/dx – Clairaut's form – Equations that do not contain x explicitly - Equations that do not contain y explicitly- Equations homogeneous in x & y.

Unit III: Partial Differential Equation: Formation of partial differential equation – General, Particular &complete integrals – Solution of PDE of the standard forms – Lagrange's method of solving – Charpit's method and a few standard forms.

Unit IV: Partial Differential Equations with second and higher order: PDE of second order homogeneous equation with constant coefficients –Particular integrals of $F(D,D^,)z=f(x,y)$, where f(x,y) is of one of the forms $e^{(ax+by)}$, sin(ax+by), cos(ax+by).

Unit V : Applications of differential equations: Applications of differential equations: Cost function- Utility and demand analysis- Market equilibrium- Harrod- Domar Model.

Textbooks:

UNIT	NAME OF THE BOOK	CHAPTER	SECTION
I	Calculus Volume III by	Chapter 2	1,1.2,2,3,4,8,8.1
II	S. Narayanan & T.K.Manickavasagam	Chapter 1	3.1 – 3.3,4.5,5.1-5.5,6.1,7.1-7.3
III	Pillay	Chapter 4	1,2,2.1,2.2,3,4,5,5.1-5.5,6
IV	Ordinary and Partial Differential Equation by M.D.Raisinghania	Chapter 4,5	4.12,5.8,5.13

V	Mathematics for Economists by Mehta Madnani	Chapter 15	15.1,15.3

Reference:

1.Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015

ALLIED II: MATHEMATICAL STATISTICS II

Semester: II   **Code: U17AS2Y2**

Credits: 4   **Hours/week: 6**

Objective: (I) Define basic discrete Distributions. (II) Explain the concepts of independence, jointly distributed random variables and conditional distributions, and use generating functions to establish the distribution of linear combinations of independent random variables. (III) Explain the concepts of conditional expectation.

Unit I: Distribution Function: Bayes' Theorem and Problems – Random Variable – Distribution function – Properties of Distribution function – Discrete Random Variable – Probability Mass Function – Discrete Distribution function – Continuous Random Variable – Probability Density Function – Continuous distribution Function

Unit II : Joint Probability, Conditional and Marginal Distribution Function: Two dimensional random variable - Joint Probability Law – Joint Probability Mass Function – Joint Probability Distribution Function – Marginal Distribution Function - Joint Density Function - The Conditional Distribution Function – Stochastic Independence

Unit III: Mathematical Expectation and Generating Function: Mathematical Expectation – Expectation of a function of random variable – Addition theorem of Expectation – Multiplication theorem of Expectation – Expectation of Linear combination of Random variables – Covariance – Variance of a linear combination of Random Variables –Conditional expectation and conditional variance

Unit IV: Discrete Distribution: Moment generating function, Introduction – Bernoulli distribution – Binomial Distribution – Poisson distribution.

Unit V: Continuous Distribution: Negative Binomial Distribution - Geometric Distribution – Hyper Geometric Distribution.

Textbook:

UNIT	NAME OF THE BOOK	CHAPTER	SECTION
I	Fundamentals of	Chapter 4	4.2,5.2,5.4
II	Mathematical Statistics	Chapter 5	5.5.1 – 5.5.6
III	by S.C.Gupta and	Chapter 6	6.1-6.6,6.8,6.9
IV	V.K.Kapoor	Chapter 7	7.1,8.1-8.5
V		Chapter 8	8.6,8.7,8.8

Reference:

1. Statistics for Scientific Solutions, Dr P. Mariappan, New Century Book House [P] Ltd.,2008, ISBN: 81-234-1404-8

SEMESTER - III

CORE V: BUSINESS ECONOMICS

Semester: III   **Code: U17AS305**

Credits: 4   **Hours/week: 5**

Objectives: To study the concept and nature of economics, to study the utility concept and cost and revenue, to learn Concept of market structure

Unit- I: Definition and Scope of Economics: Definitions of microeconomics and macroeconomics - Differences between Micro and Macroeconomics – Basic economic problems – economic system.

Unit-II: Utility Analysis, Demand and Supply: Characteristics of human wants –Types of wants- Utility analysis –Total utility and marginal utility – Law of diminishing Marginal utility- Consumer's Surplus – Indifference curve analysis- Definition of demand –Law of demand- Assumptions of the law of demand- Demand curve – Factors influencing demand – Changes in demand- Definition of supply- Law of supply- Supply curve- Factors influencing supply - Changes in supply - Equilibrium price- Price discrimination- Pricing strategies- Multiple pricing.

Unit-III: Cost, Revenue and Market Structure: Definition of cost – Fixed cost –Variable cost- Total cost- Definitions of short and long run– Average cost and marginal cost- revenue- Total revenue and marginal revenue – Profit – Features- Price and output determination – Interaction of demand and supply - Market period – Short and long run – Impact of tax and subsidies.

Unit-IV: Macro Economics: Macroeconomic objectives- The circular flow of income- The determination of national income- Difficulties in estimation of National income –importance-Economic growth – Unemployment – Inflation- Demand-side macroeconomic policies- Fiscal policy - Monetary policy.

Unit V: International Trade and Money Supply: Globalization- Merits and Demerits - International trade- Features - Absolute advantage and comparative advantage- Exchange rates-Balance of trade and balance of payments-Disequilibrium in BOP-Measures to correct BOP-IMF and IBRD - Objectives and functions- Meaning of money and its functions - The financial system- The supply and demand of money- Interest rates- Equilibrium in the money market- The effect of a change in the money supply.

Textbook:

 "Micro Economics"-S.Sankaran .

Reference:

1. Dr. Deepashree (2005),Micro Economic Theory and Applications.
2. H.S. Agarwal(2008), Micro Economic Theory. Seventh Edition.
3. S. Sankaran (2004) Micro Economics, Seventh Edition.
4. R. Cauvery, U.K. Sudhanaya, M. Girija, N. Kirupalani and M.Meenakshi (2006), Micro Ecomomic Theory
5. K.K. Dewett (2005), Modern Economic Theory.

ELECTIVE I: BASIC ACCOUNTING CONCEPTS

Semester: III   **Code: U17AS3:1**

Credits: 4   **Hours/week: 5**

Objectives: To study the concepts of accounting and its recording procedures, to study the basics of financial statements and ration analysis

Unit 1: Accounting: Concepts - Types of accounts - Comparisons: Financial, Management and Cost accounting – advantages and limitations of financial, management and cost accounting.

Unit 2: Accounting records and systems: Accounting equation - Accounting mechanics I: Journals Ledger posting and trial balance.

Unit 3: Accounting mechanics II - -Preparation of financial statements – Trading account - Profit and loss account and Balance sheet.

Unit 4:Cash book and Subsidiary books: Single column cash book -Double column cash book -Three column cash book – Petty cash book –Purchase book – Sales book - Purchase Return book- Sales Return book

Unit 5: Bank Reconciliation statement: Bank reconciliation statement – Rectification of errors - Depreciation accounting- Straight line method- Written down value method.

Text Book:

Dalston L. Cecil and Jenitra L. Merwin by "Principles of Accountancy"

Reference:

Jawaharlal and Seema Srivastava "Financial accounting"

ALLIED III: MATHEMATICAL STATISTICS - III

Semester: III   **Code: U17AS3Y3**

Credits:4   **Hours/week: 4**

Objective: (I) Define continuous distributions. (II) State the central limit theorem, and apply it. (III) Explain the concepts of random sampling, statistical inference and sampling distribution, and state and use basic sampling distributions. (IV) Investigate linear relationships between variables using correlation analysis and regression analysis.

Unit I: Continuous Distribution: Uniform Distribution – Normal Distribution – Gamma Distribution.

Unit II: **Continuous Distribution(cont.):** Beta Distribution **-** The Exponential Distribution – Weibul Distribution – Logistic Distribution.

Unit III: Central Limit Theorem: Cauchy Distribution - Central Limit Theorem.

Unit IV: Correlation: Introduction – Scatter Diagram – Karl Pearson's Correlation Coefficient - Problems – Spearman's Rank Correlation – Problems.

Unit V: Regression: Introduction – Lines of regression – Regression Curves – Properties – Problems.

Textbook:

Fundamentals of Mathematical Statistics by S.C. Gupta and V. K. Kapoor
Unit I: Chapter 8 – (8.1 – 8.3)   Unit II: Chapter 8 – (8.4 – 8.8.3)
Unit III: Chapter 8 – (8.9 – 8.10)   Unit IV: Chapter 10 – (10.1 – 10.6.3)
Unit V: Chapter 10 – (10.7 – 10.7.4)

Reference:

1. Statistics for Scientific Solutions, Dr P. Mariappan, New Century Book House [P] Ltd.,2008, ISBN: 81-234-1404-8

ALLIED IV: INTRODUCTION TO GENERAL INSURANCE

Semester: III   **Code: U17AS3Y4**

Credits:2   **Hours/week: 2**

Objectives: To study the concepts of general insurance and its operations

Unit I: An Introduction to General Insurance: General Insurance – Concept and scope – Nationalization of general Insurance in India in 1972 structure of General Insurance in India –Privatization and Globalization of General Insurance in India.

Unit II: Reinsurance: Need for General Insurance – Reinsurance – Importance – Fundamentals – Specific terms used in reinsurance – Ceding – Retrocession – Treaties –Facultative Insurance – Surplus Reinsurance – Quota share- Excess of loss – Excess of loss ratio – Pool Arrangement.

Unit III: Pricing of General Insurance Products: Types of General Insurance –Fire insurance – Definition – Causes of fire – Essential characteristics of fire insurance contracts – Procedures – Rate fixation – Kind of fire insurance policies – Policy conditions - Claim settlement.

Unit IV: Marine Insurance: Marine Insurance – Definition – Marine Risk – Essential Characteristics of marine insurance – Procedures for taking out policy – Types of policy – Cargo & hull – Policy conditions.

Unit V: Miscellaneous Insurance: Miscellaneous Insurance – Fidelity guarantee – Overseas Medical Insurance – Workmen compensation – Engineering Insurance – Aviation Insurance – Other miscellaneous – Motor Insurance – Personal Accident Insurance – Health Insurance – Liability Insurance.

Textbook:

"Principles of Insurance" – IC 01 – III

Reference:

1. Dorfman S. Mark, introduction to risk management and insurance Prentice hall India 2005
2. George E. Rejda, Principles of Risk Management and Insurance
3. Emmett J. Vaughan, Therese M. Vaughan, Essentials of Risk Management and Insurance
4. Edition 2002 Jr., C. Arthur C Williams, Peter C Young, Michael L. Smith, "Risk Management & Insurance".
5. Risk management by Hull.

SEMESTER - IV

CORE VI: SAMPLING THEORY AND ITS APPLICATION

Semester: IV   **Code: U17AS406**

Credits: 4   **Hours/week: 5**

Objectives: (I)Explain the concepts of random sampling, statistical inference and sampling distribution, and state and use basic sampling distributions. (II) Describe the main methods of estimation and the main properties of estimators, and apply them. (III) Construct confidence intervals for unknown parameters. (IV) Test hypotheses. (V) Explain the concepts of analysis of variance and use them.

Unit I: Sampling: Introduction – Types of Sampling – Sampling Distribution – Test of Significance – Null Hypothesis, Alternative Hypothesis – Errors in Sampling – Critical region and Level of Significance-main methods of estimation and the main properties of estimators

Unit II : Hypothesis Testing: Testing of Hypothesis – Test of Significance of Large Samples – Sampling of Attribute – Test for Single proportion – Test for Difference of Proportion – Unbiased estimates for population mean and population variance – Standard error of sample mean – Test of significance for single mean - Test of significance foe difference of means – test of significance of standard deviation

Unit III: Chi-Square Distribution: Chi square Distribution: Introduction – MGF of Chi square distribution – Cumulative Generating Function of chi square distribution – Limiting form of chi square distribution – Mode and skewness   of chi square distribution – Application of chi square distribution – Chi Square for population variance – Chi square test for Goodness of fit – Independence of Attribute

Unit IV: t and F Distribution: Student's "t" Distribution introduction – Deviation of Student's "t" Distribution – Application of t-test – t-test for single mean – t-test for difference of means

Unit V: Fisher's Z Distribution: F- Statistics – Derivation of F Distribution – Constants of F Distribution – Application of F Distribution – F Test for equality of population variance – Relationship between t and F distribution – Relation between F and χ^2 . Fisher's Z distribution – MGF of Z distribution - Fisher's Z transformation - Analysis of Variance

Textbook:

Fundamentals of Mathematical Statistics by S.C. Gupta and V. K. Kapoor

Unit I: Chapter 12 (12.1 – 12.7)   Unit II: Chapter 12 (12.7.1 – 12.1.15)

Unit III: Chapter 13 (13.1 – 13.7.3)   Unit IV: Chapter 14 (14.1 – 14.2.10)

Unit V: Chapter 14 (14.5 – 14.8)

Reference:

1. Statistics for Scientific Solutions, Dr P. Mariappan, New Century Book House [P] Ltd.,2008, ISBN: 81-234-1404-8

ALLIED V: FINANCIAL MANAGEMENT

Semester: IV   **Code: U17AS4Y5**

Credits: 4   **Hours/week: 5**

Objectives: (i) Explain the functions of financial management (ii) Describe the importance of cost of capital and dividend in a company (iii) Calculate the rate of return based on the types of risk and leverage in the financial instruments.

Unit I: Financial Functions of Management: Introduction - Meaning – Objectives- Profit maximization vs wealth maximization – Decision making in financial management – Indian Financial System.

Unit II: Cost of capital: Meaning and concept – Classification – Traditional approach – Modigliani & Miller approach – Computation of cost of capital – Cost of debt- Cost of preference share capital – Cost of equity – Weighted average cost of capital.

Unit III: Dividend Policy: Introduction – Forms of dividend –Dividend theories – Relevance concept as dividend – Irrelevance concept of Dividend

Unit IV: Risk of return and rates: Mean - Variance - Standard Deviation - Expected rate of return and risk - Beta Value - Capital Asset Pricing Model (CAPM)

Unit V: Leverages: Meaning – Types – Operating Leverages - Financial Leverages - Combined Leverages

Textbook:

"Fundamentals of financial Management" by D. Chandra Bose

Reference:

1) Financial Management, Theory and Practice – 10th edition by Prasanna Chandra
2) Financial Management – Twelfth Edition by I.M.Pandey

ALLIED VI: INTRODUCTION TO TIME SERIES

Semester: IV   **Code: U17AS4Y6**

Credits: 4   **Hours/week: 4**

Objective: (I). Define Index Number, (II) To study various methods to calculate Index Number. (III) Define Time series, various methods of Time series.

Unit I: Index Numbers - Introduction – Meaning – Definition – Characteristics – Uses – Types of Index Number – Interpretation of Index Numbers – Problems of Construction – Choice of Formula – Method of Construction – Laspeyre's Method – Paasche's Method – Dorbish and Bowley's Method - Fisher's Ideal Method – Marshall-Edgeworth method – Kelly's Method – Walsh's Method.

Unit II: Application of Index numbers: Quantity Index Numbers - Value Index Numbers – Time Reversal Test – Factor Reversal Test – Circular Test – Chain Base – Fixed Base – Base Shifting – Deflating of Index Numbers – Consumer Price Index – Family Budget – Limitation of Index Numbers.

Unit III: Time Series – Meaning – Definition – Uses of Time Series – Models – Secular Trend – Seasonal Variation – Cyclical Variation – Irregular Variation – Preparation Data for Analysis – Measurement of Secular Trend – Graphic Method – Semi average Method – Moving Average method – Method of Least Square - Parabola Curve - Selecting a type of trend – Choice – Conversion – Shifting to origin.

Unit IV: Variations: Measurement of Seasonal Variation – Method of simple average method – Ratio to trend Method – Ratio to Moving average method – Link relative method – Measurement of Cyclic Variation – Measurement of Irregular Variations.

Unit V: Interpolation and Extrapolation – Meaning - Significance of Interpolation – Assumption – Method of interpolation – Graphic – Algebraic – Binomial Expansion Method – Newton's Method of Advancing Differences – Newton's Gauss (Forward) Method - Newton's Gauss (Backward) Method – Newton's Method of Backward - Newton's divided difference method – Lagrange's method and parabolic curve fitting .

Textbook:

"**Statistics theory and Practice**" By R.S.N. Pillai and Bagavathi, S. Chand Publishers. Reprint 2013

Unit 1 Chapter 14 (Pages 526 – 536)

Unit 2 Chapter 14 (Pages 538 – 555)

Unit 3 Chapter 15 (Pages 591 – 615)

Unit 4 Chapter 15 (Pages 615 – 625)

Unit 5 Chapter 16 (Pages 647 – 668)

Reference:

Practical Time Series Analysis Prediction with Statistics and Machine Learning By Aileen Nielsen · 2019

SBEC: I: STAT LAB – STATISTICAL SOFTWARE & MS-EXCEL (PRACTICAL)

Semester: IV   **Code: U17ASPS1**

Credits: 2   **Hours/week: 2**

Objectives:

1. To learn the uses of Statistical software, as a tool to summarize and aid in the interpretation of research findings.
2. To be comfortable using MS- excel as a data analysis tool (Basic)
3. To learn how to acquire information (Sample)
4. To understand how to effectively summarize research finds using Statistical software and MS-Excel.
5. Learn to choose charts to successfully highlight their research result and interpret charts
6. To understand the basic principles behind inferential statistics
7. Learn to integrate information and build models
8. Learn to edit Statistical software outputs

Unit I: Introduction to Research: Research – Research Design and Planning statistics and Research – Collection of Data – Preparing Questionnaire – Types of Scales – Measurement Scales – Introduction to Statistical Software &Ms-Excel – Creating Data Base using Statistical Software and MS-Excel – Defining Variables

Unit II: Diagrammatic and Graphical representation: Simple Bar Diagram – Multiple Bar Diagram - Sub divided bar diagram – Line Diagram – Histogram – Frequency Curve – Pie chart – Stem and Leaf - Dot Plot - Box Plot

Unit III: Measures of Central Tendency: Arithmetic Mean- Median – Mode – Geometric Mean – Harmonic Mean- **Measures of Dispersion:** Range – Average deviation – Standard Deviation – Skewness- Kurtosis

Unit IV: Correlation Analysis – Scatter Diagram - Karl Pearson's Correlation Coefficient – Spearman's Rank Correlation

Unit V: Testing of Hypothesis: X^2 test - t- test - Paired t- test - Z- test – Anova test

Textbook:

Study Material – Discovering Statistics Using SPSS 2nd Edition, Andy Field, Sage Publications., 2005, ISBN: 10 7619 4451 6.

Reference:

How to Use SPSS®, A Step-By-Step Guide to Analysis and Interpretation, By Brian C. Cronk · 2017

SEMESTER –V

CORE VII: INTRODUCTION TO STOCHASTIC PROCESS & MARKOV MODEL

Semester: V   **Course Code: U18AS507**

Credits: 5   **Hours/week: 6**

Objective:

1. Providing the knowledge to Stochastic process & Poisson process
2. To understanding Markov chains & Models

Unit I: Stochastic Process: Stochastic processes: Introduction – Types – Counting processes – Sample paths - White noise - Stationary – Strict stationary – Weak stationary – Increments – Independent increments. (Concept & Simple problems only)

Unit II: Poisson Process: Poisson process – Sums of Poisson process – Thinning of Poisson process – Inter-event times in a Poisson process. (Concept & Simple problems only)

Unit III: **The life table:** Definition of l_x, p_x, q_x, $_np_x$, $_nq_x$, $_{m/n}q_x$, - concept of force of mortality μ_x - Derivation of $_np_x$ in terms of μ_x – Laws of mortality.

Unit IV: Markov Chain: Markov chains: Markov process – Markov property – The transition Matrix - Random walks. (Concept & Simple problems only)

Unit V: Chapman-Kolmogorov Equations: Chapman-Kolmogorov equations –Time-homogeneous Markov chains - Irreducible chains – Periodicity.

Textbook:

Models – IAI Material – CT- 4

Unit I & II – Chapter 2

Unit III – Chapter 7

Unit IV & V – Chapter 3

Reference:

Stochastic Processes 3rd edition by J.Medhi

CORE VIII: MATHEMATICAL MODELING

Semester: V   **Code: U17AS508**

Credits: 5   **Hours/week: 6**

Objectives: To introduce the basic concepts of modeling, to study the different mathematical models involving differential equations, graph theory etc.

Unit I: Introduction to Linear ODE: Ordinary differential equation – Linear growth model – Growth of science and scientists – Non-linear growth and decay models – Diffusion of glucose or a medicine in the bloodstream.

Unit II: Mathematical Modelling in Population Dynamics: Modeling in population dynamics – Prey-predator models – Competition models – multi-species models – Modeling of epidemics – Simple epidemic models – A model for diabetic-mellitus.

Unit III: Mathematical Modelling through difference equations: Modeling through difference equations – Linear difference equation – Obtaining complementary function by use of matrices – Harrods model – cob-web model – Applications of actuarial science.

Unit – IV: Cash-flow Models: Cash flow process – Net present value and accumulated profit – Internal rate of return – Payback period – Discounted payback period.

Unit –V: Risk Models: Models for short term insurance contracts - Collective risk model- Compound distribution - Surplus process – Linear predictor model.

Textbook:

J. N. Kapur, Mathematical Modelling, Wiley Eastern Limited, New Age International Pvt. Ltd., Reprint 2001.

 Unit I: Chapter 2   Section 2.1 – 2.3, 2.4.2

Unit II: Chapter 3 Section 3.1.1 – 3.1.3, 3.2.1 & 3.5.1

 Unit III: Chapter 5   Section   5.2.1 – 5.2.6, 5.3.1, 5.3.2 & 5.3.4

Unit IV: Chapter 10 – CT1

Unit V: CT6 – Risk models, Ruin theory, generalized linear models.

Reference:

1. J. N. Kapur, Mathematical Models in Biology and Medicine, New Delhi, 1985.

2. R. Olink, Mathematical Models in Social and Life Sciences, 1978.

3. CT1, CT6

CORE IX: MATHEMATICS OF FINANCE-I

Semester: V   **Code: U17AS509**

Credits:5   **Hours/week: 6**

Objectives: Describe how to use a generalized cash-flow model to describe financial transactions. Describe how to consider the time value of money using the concepts of compound interest and discounting. Define and use the more important compound interest functions, including annuities certain.

Unit I: Cash flow Model: Cash Flow Process – Examples of Cash flow Scenarios – Zero Coupon Bond, Fixed Interest Securities, Index Linked Securities, and Cash on Deposit, Equity, Annuity, An Interest Only Loan, and Repayment Loan.

Unit II: The Time Value of Money: Simple Interest, Compound Interest, Simple Discount, Interest Rates: Accumulation Factors – Principles of Consistency.

Unit III: Discounting and accumulating: Present Values– Accumulated values – The Basic Compound Interest Functions.

Unit IV: Level Annuities: Present Values – Payments Made in Arrear, Payment Made in Advance – Accumulations – Perpetuities.

Unit V: Investments: Characteristics of Fixed interest Govt. bonds – Index linked Govt. bonds- Govt. bills – Ordinary Shares – Property – Certificate of deposit.

Textbooks:

1. Act Ed Study Material: Subject - CT1

2. Mathematical basis of life insurance – IC81 – Insurance Institute of India material

Reference:

1. Actuarial Mathematics. Bowers, Newton L et al. – 2nd ed. – Society of Actuaries, 1997.xxvi, 753 pages.

2. Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015.

ELECTIVE II: DATA ANALYSIS USING MS-EXCEL

Semester: V   **Course Code: U18AS5:P**

Credits: 4   **Hours/Week: 5**

Objectives:

1. To learn to work in worksheets.
2. Indicate the names and functions of the Excel interface components.
3. To know about the basic formatting and editing options in MS-Excel.
4. To get deep information about Conditional formatting and its styles using Excel functions.
5. Construct formulas, including the use of built-in functions, and relative and absolute references.
6. To study about creating pivot tables & pivot charts in MS-Excel.
7. To use the Lookup & IF functions for sorting and filtering the data.
8. To study the purpose of using macros function in the workbook.

Unit I: Creating new workbooks – Saving workbooks – Opening Workbook - Closing Workbook – Selecting cells – Entering text into cells – Entering numbers into Cells – Auto Complete – Pick from drop-down list – Using the "Window" Command group – Switching to Full screen view – Renaming workbooks – Working with Excel file Formats.

Unit II: Basic Functions – Mail merge – Conditional Formatting – Finding cells with conditional formatting – Clearing conditional formatting – Using table and cell styles

Unit III: Creating Pivot tables and Pivot charts – Manipulating a pivot table – Changing calculated value fields – Applying pivot table styles – Creating pivot chart – Setting pivot table options – Sorting & Filtering pivot table data.

Unit IV: The Horizontal lookup & Vertical lookup Functions – Using IF, AND, & OR functions

Unit V: Recording Macros – Running & deleting Recorded Macros – The Personal Macro Workbook.

Textbook:
"Microsoft Excel 2010 Data analysis and Business Modeling "By Wayne L. Winston

Reference:
Microsoft Excel 2016 bible: The comprehensive tutorial resource by John, Walken Bach.

ELECTIVE III: GROUP INSURANCE & RETIREMENT BENEFITS

Semester: V   **Code: U17AS5:3**

Credits:4   **Hours/week: 5**

Objectives: Aim of this Subject to give a brief introduction to various Retirement benefits and group Insurance scheme available in Indian Financial Market.

Unit I: Historical background to employee benefits in India: Provident funds - Superannuation - Gratuity schemes

Unit II: Group Insurance Schemes: Segments of group schemes market – Origin and development of group schemes characteristics of groups – group underwriting, rate making and experience rating adjustment.

Unit III: Gratuity and Superannuation Schemes: Different ways of arranging schemes – Unfunded schemes and funded schemes – Trustee administered and insured schemes.

Unit IV: Methods of costing: past service benefits and future service benefits – annual premium and single premium – method of costing, definite funding and indefinite funding and controlled funding.

Unit V: Legal aspects and taxation: Treatment of retirement provisions under provident, gratuity and superannuation funds – Documentation of Trust deeds and Rules. Data processing and Group Schemes.

Textbook:

IC 83 of Insurance Institute of India.

Reference:

1)   P.K. Gupta, Insurance and Risk management, Himalayas book House, 2011
2)   Kaninika Mishra, Life insurance in India, sage publications pvt ltd, 2009.

SBEC II: INTRODUCTION TO LIFE INSURANCE

Semester: V   **Code: U17AS5S2**

Credits: 2   **Hours/week:2**

Objectives: To understand the concepts of risk and its types, to learn insurance market and its contracts

Unit I: Risk Management: Meaning of risk – Types of risks – Risk analysis – Risk Management techniques – Risk retention.

Unit II: The concept of insurance and its evolution: Concept of insurance – Insurance (evolved and works) – Types of insurance – Importance of insurance industry - The Business of Insurance: how risk is managed by individuals and insurers – Premium – Importance of reinsurance- Role of insurance in economic and social development.

Unit III: The insurance market: Indian insurance market – Intermediaries – Specialists – Regulator and other bodies.

Unit IV: The insurance contract: Introduction – Insurable interest – Principle of indemnity – Subrogation and contribution – Utmost good faith- Proximate cause.

Unit V: Life insurance products: Traditional products – Linked products – Annuities and group policies.

Textbook:

"Principles of Insurance" – IC 01 – III.

References:

1.Dorfman S. Mark, introduction to risk management and insurance Prentice hall India 2005

2.George E. Rejda, Principles of Risk Management and Insurance.

3.Emmett J. Vaughan, Therese M. Vaughan, Essentials of Risk Management and Insurance

4.Risk management by Hull Edition 2002 Jr., C. Arthur C Williams, Peter C Young, Michael L. Smith, "Risk Management & Insurance".

SEMESTER - VI

CORE X: OPERATIONS RESEARCH

Semester: VI   **Code: U17AS610**

Credits: 5   **Hours/week: 6**

Objectives: To introduce the field of operations research which has many applications in management techniques, to help students to find optimum solutions in business and management problems.

Unit I: Introduction to O.R: Origin and development of O.R. – Nature and features of O.R. – Scientific method in O.R. – Methodology of operations research – Applications of O.R. – Opportunities and shortcomings of O. R. – Formulation of L.P.P. - Graphical solution -General L.P.P., Canonical and standard forms of L.P.P.

Unit II: Linear Programming Problem: Simplex methods to solve LPP (Ordinary Simplex method, Big-M-method, Two-phase-Simplex method)

Unit III: Duality LPP: Duality in L.P.P.- Introduction, General primal – Dual pair, formulating a dual problem, Dual simplex method – Sequencing

Unit IV: Transportation Problem: Introduction – General transportation problem (theorems are not included) – the transportation problem – Finding an initial basic feasible solution – Degeneracy in transportation problem – MODI method – Some exceptional cases.

Assignment problem: Introduction – Mathematical formulation of the problem – The assignment method.

Unit V: PERT and CPM: Introduction – Network and basic components – Logical sequencing – Rules of network construction – Critical path Analysis – Probability consideration in PERT – Distinction between PERT and CPM.

Textbook:

Operations Research – An Introduction, Dr P. Mariappan, Pearson; 1 edition (May 1, 2013),
Unit I   Chapter-1; Chapter -2 [2.1 to 2.10]

Unit II   Chapter-2 [2.11 to 2.13]

Unit III Chapter-2 [2.14 and 2.15]; Chapter-7

Unit IV Chapter – 4 and chapter-5

Unit V   Chapter - 6[6.1 to 6.5]

References:

1) Introduction to Operations Research by Frederick S Hillier and Gerald J. Lieberman

2) Operations Research by Panneerselvam.R

CORE XI: NUMERICAL METHODS

Semester: VI   **Code: U17AS611**

Credits: 5   **Hours/week: 6**

Objectives: To introduce different numerical techniques to solve Algebraic and differential equations, to develop skills in solving problems using numerical techniques.

Unit I: Numerical Methods – An Introduction: Introduction to numerical analysis-The solution of algebraic and transcendental equations – Bisection method – Iteration method – Regula-Falsi method - Newton-Raphson method.

Unit II: Numerical Methods – Types: Solution of simultaneous linear algebraic equations – Direct methods – Gauss elimination method – Gauss-Jordan method – Iterative methods – Jacobi method – Gauss-seidal method.

Unit III: Finite Differences: Finite differences – Differences of a polynomial - Factorial polynomial - Interpolation for equal intervals – Gregory-Newton interpolation formulae – Interpolation with unequal intervals – Lagrange's interpolation formula – Inverse interpolation.

Unit IV: Integrations and differentiation using Numerical methods: Numerical differentiation and integration – Newton's formulae to compute the derivative – Numerical integration – A general quadrature formula – Trapezoidal rule - Simpson's one third rule – Simpson's three-eighth rule.

Unit V: Numerical Methods for Ordinary differential equation: Numerical solution of ordinary differential equation – Taylor series method – Euler's method – Runge-Kutta methods – Predictor corrector methods.

Textbook:

P. Kandasamy, K.Thilagavathy, K. Gunavathy, Numerical Methods, S. Chand & company limited, New Delhi, 2nd Revised Edition, 2003.

Unit I   Chapter 3 Section   3.1, 3.1.1, 3.2, 3.2.1, 3.2.2, 3.3, 3.3.1, 3.4, 3.4.1, 3.4.3, 3.4.4

Unit II   Chapter 4 Section 4.1, 4.2, 4.2.1, 4.7, 4.8, 4.9

Unit III Chapter 5   Section 5.1, 5.2, 5.3, 5.4.

Chapter 6 Section 6.1, 6.2, 6.3.

Chapter 8   Section 8.7, 8.8

Unit IV Chapter 9 Section   9.1, 9.2, 9.3, 9.7, 9.8, 9.9, 9.10, 9.13, 9.14

Unit V   Chapter 11 Section 11.5, 11.9, 11.12, 11.13, 11.16, 11.17

Reference:

1) An Introduction to Numerical methods and Analysis by James F. Epperson

2) Numerical Methods: Fundamentals and Applications by Rajesh Kumar Gupta

CORE XII: MATHEMATICS OF FINANCE – II

Semester: VI   **Code: U17AS612**

Credits: 5   **Hours/week: 5**

Objectives: Define an equation of value**,** Describe how a loan may be repaid by regular installments of interest and capital

Unit I: Annuities: Deferred and increasing annuities: - Introduction - Deferred annuities - Annual payments (arrear and Advance) - Increasing annuities- Annual payments (arrear and Advance) - Decreasing payments

Unit II: Equations of value: Equations of value: -The equation of value and the yield on a transaction- The theory -Solving for an unknown quantity -Solving for the amount of a payment (I or R)- Solving for the timing of a payment (n)- Solving for the interest rate (i)

Unit III: Loan Schedules: Loan Schedules-Introduction-An example- Calculating the capital outstanding – Introduction-The theory - Prospective loan calculation -Retrospective loan calculation

Unit IV: Loan Schedules(cont.): Calculating the interest and capital elements of the Loan schedule:-single payment – series of payments –Forming the loan schedule -Consumer credit: flat rates and Annual Percentage Rate

Unit V: Project Appraisal: Project appraisal: - MWRR, TWRR, LIRR

NB: The force of interest and the nominal rate of interest is **not** used for this paper

Textbook:
1. **ActEd Study Material:** Subject - CT1

Reference:
1. **Actuarial mathematics.** Bowers, Newton L et al. – 2nd ed. – Society of Actuaries, 1997. xxvi, 753 pages.
2. **An introduction to the mathematics of finance.** McCutcheon, John J; Scott, William F. London: Heinemann, 1986. 463 pages.
3. **Mathematics of compound interest.** Butcher, M V; Nesbitt, Cecil J. Ulrich's Books, 1971. 324 pages.
4. **Theory of financial decision making.** Ingersoll, Jonathan E. Rowman& Littlefield, 1987. 474

CORE XIII: BASICS OF LIFE CONTINGENCIES

Semester: VI   **Code: U17AS613**

Credits:5   **Hours/week:6**

Objectives:(i) Define simple assurance and annuity contracts, and develop formulae for the means and variances of the present values of the payments under these contracts, assuming constant deterministic interest. (ii) Describe practical methods of evaluating expected values and variances of the simple contracts defined in objective (i). (iii) Describe and calculate net premiums and Gross premium of simple insurance contracts.

Unit I: Assurance Benefits: Introduction – Whole life assurance – Term Assurance- Pure endowment Assurance- Endowment Assurance – Commutation Functions Dx, Cx,Mx and Rx

Unit II: Annuity Benefits: Introduction – Whole life annuity (due and arrear)-Temporary annuity (Due and Arrear)-deferred whole life annuity- Variable life annuity-Increasing life annuity- Commutation functions Nx and Sx.

Unit III: Net Premiums for Assurance Plans: Natural premiums- Level Annual Premiums-Actuarial Notations-Mathematical expressions for level annual premium under various Assurance plans – Net Premiums- Problems on net Premiums.

Unit 4: Net Premiums for Annuity Plans: Actuarial Notations-Mathematical expressions for level annual premium under various Annuity plans – Net Premiums- Numerical Illustrations on net Premiums

Unit 5: Office Premiums: Introduction- Loading in premiums rates for expenses- Expression for office premiums – Bonus loading in premium rates-Consistency of premiums-Select premiums – Numerical illustrations on Office Premiums.

Textbook:

"Mathematical Basis of Life assurance**"** – IC -81 - Insurance Institute of India

Reference:

1. "Actuarial Mathematics for Life Contingent Risks" – Author: David C. M. Dickson, Mary R. Hardy, Howard R. Waters

2. Actuarial mathematics. Bowers, Newton L . – 2nd ed. – Society of Actuaries, 1997. xxvi, 753 pages.

3. Life contingencies. Neill, Alistair. – Heinemann, 1977. vii, 452 pages.

4. Life insurance mathematics. Gerber, Hans U. – 3rd edition – Springer. Swiss Association of Actuaries, 1997.217 pages.

ELECTIVE IV: INSURANCE UNDERWRITING AND RISK MANAGEMENT

Semester: VI   **Code: U17AS6:4**

Credits: 4   **Hours/week: 5**

Objectives:

1. To understand the risk management concept in insurance field.
2. To study the different types of insurance underwriting.
3. To develop the current scenario of insurance.
4. To know the concept of insurable interest and insurable values.
5. To understand the reinsurance concept and solvency position of insurance companies.
6. To incorporate the various financial and nonfinancial risks in insurance industry to hedge the risks.
7. To know the various risk arising in life insurance and general insurance.
8. To mitigating the risk by appropriate financial tools.

Unit I: **Risk Management:** Risk management in insurance – Meaning of Risk – Types of Risk – Objective risk - Risk management – Risk management Strategies - Risk management process- Risk financing.

Unit II: **Financial Underwriting**: Purpose of financial underwriting - Objectives of financial underwriting - Concept of Insurable interest & Insurable value - Personal Insurance Cover- Human Life Value.

Unit – III: **Risk Transfer Mechanism:** Role of surveyors in non-life insurance – Operational risks – Disaster risk financing – non-insurance transfers.

Unit – IV: **Risk Management Techniques:** Risk management matrix – Risk management techniques – Professionals in risk management –Emerging risks –Challenges in risk management.

Unit – V: **Reinsurance:** Introduction- Forms of reinsurance – Methods of reinsurance – Reinsurance arrangement – Excess of loss reinsurance with insurer and reinsurer – Proportional reinsurance with insurer and reinsurer.

Textbook:

1. Kaninika Mishra, Life insurance underwriting, Deep and Deep publications, 2009.

     Unit I   Chapter 1   Section 1.1, 1.1.1, 1.2, 1.2.1, 1.2.2, 1.3, 1.3.1, 1.4, 1.4.1,

     Unit II   Chapter 2   Section 2.1, 2.2, 2.2.1, 2.7, 2.8, 2.9

     Unit III Chapter 3   Section 3.1, 3.2, 3.3, 4.4;

2. Michel crohy, Risk Management, McGraw hill publications, 2006.

     Unit IV   Chapter 1   Section 1.1, 1.2, 1.3, 1.7, 1.8, 1.9, 1.10, 1.13, 1.14

     Unit V   Chapter 2   Section 2.5, 2.9, 2.12, 2.13, 2.16, 2.17

References:

- Elements of Insurance by Dr E. Dharmaraj, SIMERS Publication.

- Reinsurance management IC- 85 by III.

- CT-6

SBEC III: MATHEMATICS FOR COMPETITIVE EXAMINATIONS

Semester: VI   **Code: U17AS4S3**

Credits:2   **Hours/week:2**

Objectives:

1. To develop Arithmetic and Aptitude skills.
2. To become able to solve the problems with shortcuts.
3. To become capable to appear all the competitive exams.
4. To understand the problem-solving skills with given time constrain.
5. To have the confidence to face all campus drives and screening tests for all government jobs.
6. To make fast decision in workplace using presence of mind.
7. To handle the critical situation using the problem-solving skills.
8. To develop the analytical skills.

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Unit I: Types of Competitive Examinations: Civil Service examinations-UPSC, SSC, Railway, Defence, Public & Security, Bank Recruitment, and other Miscellaneous examinations.

Unit II: Logical Reasoning: Numerical ability tests, intelligence tests, reasoning tests – Statistical analysis – figural relation – Behavioral ability – Comprehension – Evaluation, Retention.

Unit III: Number System: Numbers- HCF & LCM-Decimal Fractions-Simplification – Square roots and Cube roots - Percentage-Average-Ratio and Proportion –Profit and Loss.

Unit IV: Problems related to Time: Time and Work - Time and Distance-Problems on Trains – Problems on Numbers-Problems on ages-Simple Interest-Compound interest.

Unit V: Problems related to Area and Volume: Area-Volume & Surface Areas-Chain Rule-Calendar-Stock & Shares-Banker's Discount-Data analysis-odd man out & Series.

Textbook:

R.S. Aggarwal, Objective Arithmetic, S. Chand and Company Ltd., New Delhi, 2003.

Reference:

Abhijith Guha, Quantitative aptitude for all competitive exams, McGraw Hills, 2018

NMEC I: PRINCIPLES OF INSURANCE

Semester: III   **Code: U17AS3E1**
Credits:2   **Hours/week:2**

Objectives: To learn the fundamentals of risks and its types, to understand the insurance contract.

Unit I: Risk Management: Meaning of risk – Types of risks – Risk analysis – Risk Management techniques – Risk retention

Unit II: The concept of insurance and its evolution: Concept of insurance – Insurance (evolved and works) – Types of insurance – Importance of insurance industry.

Unit III: The Business of Insurance: How risk is managed by individuals and insurers – premium – importance of reinsurance- role of insurance in economic development and social

Unit IV: The insurance contract: Introduction – Insurable interest – Principle of indemnity – Subrogation and contribution – Utmost good faith- Proximate cause.

Unit V: Life insurance products: Traditional products – Linked products – Annuities and group policies.

Textbook:
"Principles of Insurance" – IC 01 - III

References:
1. Dorfman S. Mark, introduction to risk management and insurance prentice hall India 2005.
2. George E. Rejda, Principles of Risk Management and Insurance.
3. Emmett J. Vaughan, Therese M. Vaughan, Essentials of Risk Management and Insurance.
4. Edition 2002 Jr., C. Arthur C Williams, Peter C Young, Michael L. Smith, "Risk Management & Insurance".
5. Risk management by Hull.

NMEC II: FINANCIAL MARKETS IN INDIA

Semester: IV   **Code: U17AS4E2**

Credits: 2   **Hours/week: 2**

Objectives: To enable the students to acquire basic understanding of the structure, organization and functioning of the Financial System in India. The course also aims at exposing the students to new financial instruments and their implications in the existing regulatory framework.

Unit I: Financial system: Meaning - role and functions of a financial system - Organized and Unorganized financial system - Components: Financial Assets - Financial Intermediaries.

Unit II: Primary Markets: Meaning – Instruments - New Issue Market – Features - Objectives - functions, Constituents or players, Problems and Recent Developments including the concept of book building - Modes of procuring long term funds: Public issue, Rights issue, Bonus issue, Private placement.

Unit III: Secondary Markets: Meaning - Functions of the stock exchange - Benefits to the community- investors - companies - Listing of securities and its benefits - Stock market indices - Types of dealings - types of securities - Traded on the Indian stock exchanges, - Comparison of the three exchanges (BSE, NSE, OTCEI)

Unit IV: Money Markets: Meaning - features of organized instruments -Unorganized money markets Instruments - Treasury Bills, Certificate of Deposits - Commercial Paper - Call money Commercial bills - Inter-corporate deposits - Inter-bank participation certificates.

Unit V: Money market institutions: Meaning - Role of the Central Bank (RBI) in money markets - Commercial banks - Meaning - Functions Indigenous Financial Agencies -Bankers, Money lenders, Discount houses, accepting houses (only meaning and features).

Textbooks:

Unit I: The Indian financial system and Development- Vasant Desai, Himalaya Publishing House.

Unit II, III & IV: Financial Markets and Institutions-Dr. S. Gurusamy, Tata McGraw Hill.

Unit V: The Indian Financial System-Dr. Bharti Pathak, Pearson.

Reference:
"Financial Services" – B.Santhanam