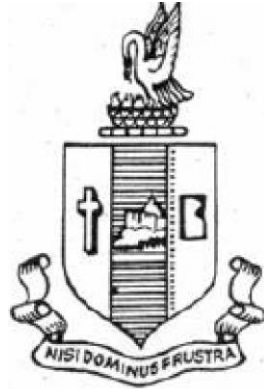


B.Sc., ACTUARIAL MATHEMATICAL SCIENCE SYLLABUS

(Under Choice Based Credit System)

(For the student admitted in the academic year 2020-21)



**PG DEPARTMENT OF ACTUARIAL SCIENCE
BISHOPHEBERCOLLEGE (AUTONOMOUS)**

Tiruchirappalli – 620017

Sem .	Part	Course	Course Title	Course Code	Hours/Week	Credits	M	
							CIA	E
I	I	Tamil I /*	செய்யுள், இலக்கியவரலாறு, உரைநடை, மொழிப்பயிற்சியும்படைப்பாக்கமும்	U18TM1L1	6	3	25	
	II	English I	Literature and Language : Proses and Short Stories	U20EGNL1	6	3	40	
	III	Core I	Introduction to Actuarial Mathematics	U20AS101	5	4	25	
		Core II	Differential & Integral Calculus	U20AS102	5	4	25	
		Allied I	Descriptive Statistics	U19AS1Y1	4	4	25	
	IV	Env. Studies	Environmental Studies	U16EST11	2	2	25	
		Val. Edu.	Value Education (RI/MI)	U15VL1:1/ U15VL1:2	2	2	25	
						Sem I Credits:	22	
II	I	Tamil II /*	செய்யுள், இலக்கியவரலாறு, சிறுகதைத்திரட்டு, மொழிபெயர்ச்சி, படைப்பாக்கம்.	U18TM2L2	6	3	25	
	II	English II	Literature and Language: Poetry and Shakespeare	U20EGNL2	6	3	40	
	III	Core III	Mathematics of Finance – I	U20AS203	6	5	25	
		Core IV	Principles of Insurance	U20AS204	6	5	25	
		Allied II	Probability Theory & Discrete Distribution	U20AS2Y2	6	4	25	
						SemII Credits:	20	
III	I	Tamil III /*	செய்யுள் - காப்பியங்கள், இலக்கியவரலாறு, நாவல், மொழிபெயர்ச்சி	U18TM3L3	6	3	25	
	II	English III	English for Competitive Examinations	U16EGNL3	6	3	40	
	III	Core V	Mathematics of Finance – II	U20AS305	5	4	25	
		Elective I	Business Economics	U20AS3:1	5	4	25	
		Allied III	Continuous Distributions & Estimation Theory	U19AS3Y3	4	4	25	
		Allied IV	Programming Using R	U20ASPY4	2	2	40	
	IV	NMEC I	Students have to opt from other major / Introduction to Insurance	U19AS3E1	2	2	25	

				SemIII Credits:		22	
IV	I	Tamil IV /*	செய்யுள் -நாடகம், இலக்கியவரலாறு, மொழிபெயர்ச்சி	U18TM4L4	5	3	25
	II	English IV	English through Literature	U16EGNL4	5	3	40
	III	Core VI	Life and Health Contingencies - I	U20AS406	5	4	25
		Allied V	Sampling Theory & its applications	U20AS4Y5	5	4	25
		Allied VI	Insurance Underwriting	U20AS4Y6	4	4	25
	IV	SBEC I	Stat Lab - Statistical Software	U20ASPS1	2	2	40
		NMEC II	Students have to opt from other major /Financial Markets in India	U19AS4E2	2	2	25
		Soft Skills	Life Skills	U16LFS41	2	1	--
V	Extension Activities	NSS, NCC, Rotaract club, LEO club, etc.	U16ETA41	--	1	--	
				SemIV Credits:		24	
V	III	Core VII	Stochastic process	U20AS507	6	5	25
		Core VIII	Mathematical Modelling	U19AS508	6	5	25
		Core IX	Life and Health Contingencies – II	U20AS509	6	5	25
		Elective II	Data Analysis using MS – Excel	U19AS5:P	5	4	40
		Elective III	Basic Accounting Concepts	U20AS5:3	5	4	25
	IV	SBEC II	Actuarial Profession	U20AS5S2	2	2	25
				SemV Credits:		25	
VI	III	Core X	Operations Research	U19AS610	6	5	25
		Core XI	Numerical Analysis	U20AS611	6	5	25
		Core XII	Group Insurance & Retirement benefit	U20AS612	5	5	25
		Core XIII	Reinsurance management	U20AS613	6	5	25
		Core XIV	Introduction to Time Series	U20AS614	5	4	25
		SBEC III	Mathematics for Competitive Examinations	U19AS6S3	2	2	25
V	Gender Studies	Gender Studies	U16GST61	--	1	--	

						SemVI Credits:	27	
						Total Credits:	140	
* Other Languages: Hindi		Sanskrit	French	Hindi	Sanskrit	French		
Semester I:U18HD1L1		U17SK1L1	U18FR1L1	Semester III:U18HD3L3		U17SK3L3	U18FR3L3	
Semester II:U18HD2L2		U17SK2L2	U18FR2L2	Semester IV:U18HD4L4		U17SK4L4	U18FR4L4	
Part I: 4	Core Theory: 14	Allied: 6	NMEC: 2	Env. Studies: 1	Value Education: 1			
Part II: 4	Elective: 3	SBEC: 3	Soft Skills: 1	Extension Activities: 1	Gender Studies: 1			
		NMEC offered by the Department						
		1. Introduction to Insurance - U19AS3E1						
		2. Financial Markets in India -U19AS4E2						

SEMESTER - I

INTRODUCTION TO ACTUARIAL MATHEMATICS

Semester: I

Core: I

Hours: 5

Code: U20AS101

Credits: 4

COURSE OUTCOMES

At the end of this course, the students will be able to

CO1: Apply the real time application.

CO2: Identify the different types of Binomial expansions.

CO3: Compute the value of the summation of Logarithmic and Exponential series

CO4: Compute the different forms of binominal theorems.

CO5: Compute the value of summation of series.

CO6: Apply the progression in the field of business.

Unit I: Introduction to Algebra: Mathematical Notation - Greek Symbols – Convention – Proof – Expression, Equations & Formulae – Terms & Factors - Mathematical Induction – Indices – Logarithms – Fractions – Quadratic Equation – Simultaneous equation - Inequalities – Arithmetic & Geometric Mean Inequalities - Π Notation – Σ notation – Convergence – Standard summations – Swapping the order of notation – Permutation – Combination.

Unit II: Mathematical Induction to Binomial Theorem: – Binomial Theorem for a positive integer index- Properties of binomial coefficients – General term in the binomial expansion - Middle term in the binomial expansion – Greatest term in the binomial expansion – Binomial theorem for any index.

Unit III: Progression: Arithmetic Progression – Geometric Progression – Harmonic Progression

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

Unit V: Vectors & Matrices: Notations & Arithmetic – Magnitude – Scalar Product – Matrices – Matrix Multiplication – Determinants - Inverses – Eigen Vectors – Eigen Values.

TEXTBOOKS:

1. “Introduction to Actuarial Mathematics” – ActEd Company

Unit I Chapter 1, Chapter 4
Unit V Chapter 8

2. Business Mathematics - Dr P. Mariappan – Pearson – First Edition – ISBN 978-93-325-3634-0

Unit II Chapter 8
Unit III Chapter 9 : 9.5, 9.6, 9.7

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

REFERENCE:

- 1) FAC – Institute of Actuaries of India

DIFFERENTIAL & INTEGRAL CALCULUS

Semester:I

Core:II

Hours: 5

Code:U20AS102

Credits: 4

COURSE OUTCOMES

At the end of this course, the students will be able to

CO1: Distinguish the various forms of integrals.

CO2: Apply various properties to solve different forms of integrals.

CO3: Identify the techniques to solve various Multiple integral problems.

CO4: Compute the expression for the derivative of a function using the rules of differentiation
Including the power rule, product rule, quotient rule and chain rule.

CO5: Identify the extrema of a function on an interval and classify them as minima, maxima
using the first derivative test.

CO6: To learn Econometric Application of Differential Equations.

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: Integration Techniques : Integration of the forms (i) $\int \frac{(px + q)}{(ax^2 + bx + c)} dx$ (ii) $\int \frac{dx}{(a + b \cos x)}$ - (iii) $\int \frac{(px+q)}{(\sqrt{ax^2+bx+c})} dx$ (iv) $\int \frac{(px+q)\sqrt{ax^2+bx+c}}{ax^2+bx+c} dx$

$ax^2+bx+c)]dx$ - Integration by parts - Definite integral- Properties of definite integral- Reduction formula $\int x dx$, $\int x dx$, $\int x dx$, $\int_0^{\pi/2} x dx$ and $\int_0^{\frac{\pi}{2}} x dx$ and simple problems.

Unit V: Multiple integral: Double integral – Triple integral - Change of order of integration - Improper Integral – Beta and Gamma functions: Recurrence formula of Gamma function – Properties of Beta function – Relation between Beta and Gamma functions.

TEXTBOOKS:

1. S. Narayanan & T. K. Manickavasagam Pillay, Calculus Volume I, S. Viswanathan Pvt. Ltd., 2004.

Unit I Chapter 1 § 1, 2, 3, 4, 6, 7, 8, 9, 10

Unit II Chapter 2 § 1, 2.1, 3.4, 3.6, 3.8, 4.1, 5

Chapter 3 § 1.2, 1.3, 2.1

Chapter 5 § Simple Problems only

Unit III Chapter 8 § 1.1, 1.6, 1.7

2. S. Narayanan and T. K. Manickavasagam Pillay, Calculus Volume – II, S. Viswanathan printers and publishers private limited, Reprint 2016.

Unit IV Chapter 1 §7.3(Rule (ii)), 8 (cases (ii) & (iii)), 9, 11, 12

Chapter 1 §13.1 – 13.10

Unit V Chapter 5 §1, 2.1, 2.2 (problems only), 3.1, 3.2, 4

Chapter 7 §2.1, 2.3, 3.4, 5

REFERENCE:

1. Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015; ISBN:978-93-325-3634-0

DESCRIPTIVE STATISTICS

Semester: I

Allied: I

Hours: 4

Code: U19AS1Y1

Credits: 4

COURSE OUTCOMES

CO1: To study the features, types & representation of data

CO2: To know about the various averages pertaining to data.

CO3: To study the dispersions, skewness & kurtosis

CO4: Summarize the main features of a data set (exploratory data analysis).

CO5: Apply the meaning of the term correlation and significance of its study.

CO6: Apply the meaning of regression (curvilinear/non-curvilinear) by using its properties.

Unit I: Introduction - Origin, growth, meaning, Definition of statistics – **Collection of Data** – Primary and Secondary data – Choice of methods – Direct personal observation – Indirect oral interview – Information through agencies - Mailed questionnaire – Selection and training of field investigators – **Classification and tabulation** - Introduction – Different types of classification – Different types of tabulation.

Unit II: Data Presentation: Diagrammatic presentation Different types of diagrams (One dimensional and Two dimensional) – **Graphic presentation** – Histogram – Frequency curve – Frequency Polygon - Ogives.

Unit III: Analysis of Data (Univariate): Introduction – Measures of Central Tendency (Averages) – Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean – Graphical location of the partition values – Dispersion – Measure of Dispersion – Coefficient of Dispersion – Moments – Skewness – Kurtosis

Unit IV: Analysis of Data (Bivariate): Introduction – Meaning of Correlation – Scatter Diagram – Karl Pearson’s Correlation Coefficient – Rank Correlation – Spearman’s Rank Correlation – Problems.

Unit V: Analysis of Data (Fitting of Mathematical Models): Introduction – Lines of regression – Regression Coefficients – Properties of Regression Coefficients – Angle between Two lines of Regression – Standard Error of Estimate – Correlation coefficient between observed and estimated values.

TEXTBOOKS:

1. “Statistics”, R. S. N. Pillai, S. Chand & Company PVT. LTD, ISBN: 978-81-219-0431-5

Unit I: Chapter 1 and 6

Unit II: Chapter 7 and 8

2. “Fundamentals of Mathematics and statistics” S.C. Gupta and V.K. Kapoor, Sultan Chand & Sons Publishers, 11th Edition, June 2002, ISBN: 81–8054–004–9.

Unit III	: Chapter 2	[Section: 2.4 to 2.9, 2.11 to 2.16]
Unit IV	: Chapter 10	[Section: 10.1 to 10.4, 10.6 to 10.7]
Unit V	: Chapter 11	[Section: 11.1 to 11.2]

REFERENCE:

1. Study Material: Act Ed Statistics Pack, Institute and Faculty of Actuaries (IFOA), 2018
2. John E. Freund’s Mathematical Statistics with Applications, Irwin Miller Marylee’s Miller, 8th Edition, Pearson Publications, ISBN: 978-93-325-1905-3

SEMESTER - II

MATHEMATICS OF FINANCE - I

Semester: II

Core: III

Hours: 6

Code: U20AS203

Credits: 5

COURSE OUTCOMES:

CO1: To know the financial terms of bonds and shares,

CO2: Describe how to use a generalized cash-flow model to describe financial transactions.

CO3: To describe how to take into account the time value of money using the concepts of compound interest, force of interest.

CO4: To know the real rate of interest and its application

CO5: Calculate the present value of cash flow using interest rates

CO6: Accumulated value of cash flow using interest rates.

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

Unit II: 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 III: Interest rates: Simple Interest- Compound Interest-Simple Discount- Compound discount rate -nominal rate of interest - nominal rate of discount - force of interest rate and relationships between effective, nominal and force of interest rates.

Unit IV: Real and money interest rates: Introduction - Definition of real and money interest rates - Deflationary conditions - Usefulness of real and money interest rates.

Unit V: Discounting and accumulating - Present value of cash flows – accumulate Value of cash flows - Interest income.

TEXTBOOKS:

1. ActEd 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,
2. Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015; ISBN: 978-93-325-3634-0

PRINCIPLES OF INSURANCE

Semester: II

Core: IV

Hours: 6

Code: U20AS204

Credits: 5

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: The aim of the principles of insurance subject provides adequate knowledge in basics of insurance, need of insurance, importance and different types of insurance available in the industry.

CO2: Understanding the functions of insurance company, role of regulatory body for the insurance industry, role of insurance in economic development.

CO3: To analyze the various types of risks faced by the insurance industry, solving those risks using the appropriate risk management tools, monitoring the Outcomes.

CO4: Understanding the concepts of products covering the financial losses, earlier death coverage and the cost of premium.

CO5: Analyse how the insurance markets operate today. Estimation of future exposure to the insurance industry, calibration of general insurance.

CO6: Students can be able to work in insurance companies, underwriting jobs, General insurance coverage estimations, risk management industry.

Unit I: Risk Management: Meaning of risk – Types of risks – Risk analysis – Risk Management techniques – Management of risk by individuals – Management of risk by Insurers.

Unit II: Concept of Insurance & its Evolution: The basics and nature of insurance – Evolution of insurance - principles which form the foundation of insurance - how insurance operates today – different classes of insurance – importance of insurance - how insurance takes care of unexpected eventualities - role of insurance in economic development and social security -contribution of insurance to the society.

Unit III: Insurance Business & its Market: fixing of premiums – reinsurance and its importance for insurers - The various constituents of the insurance market – operations of insurance companies - operations of intermediaries – specialist insurance companies – insurance specialists - the role of regulators – other bodies connected with insurance.

Unit IV: General Insurance Products -Risks faced by the owner of assets – exposure to perils – features of products covering fire and allied perils - products covering marine and transit risks - products covering financial losses due to accidents - products covering financial losses due hospitalization - products covering miscellaneous risks.

Unit V: Life Insurance products:The risk of dying early – the risk of living too long - different products offered by life insurers - term plans - pure endowment plans - combinations of plans - traditional products - linked policies - features of annuities and group policies.

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

PROBABILITY THEORY & DISCRETE DISTRIBUTION**Semester: II****Allied: II****Hours: 5****Code: U20AS2Y2****Credits: 4**

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Learn the concept of basic probability and its application

CO2: Understand the concepts of both discrete and continuous univariate random variables and its application

CO3: Understand the concepts of both discrete and continuous bivariate random variables and its application

CO4: Learn the concept of conditional probability and condition expectation

CO5: Understand the discrete distributions and its application

CO6: Apply the concept of central moments and variance in random variables.

Unit I: Theory of Probability: Introduction – Short History – Basic Terminology – Mathematical Probability – Statistical Probability – Subjective Probability – Mathematical Tools (Preliminary notions of Sets) – Axiomatic Approach to Probability – Addition theorem of Probability – Conditional Probability – Multiplication theorem of Probability – Multiplication theorem of Probability of independent – Extension of Multiplication theorem of Probability to ' n ' events – Bayes' Theorem.

Unit II: Random Variables & Distribution functions: Introduction – Distribution Functions – Discrete Random Variable – Continuous Random Variable. **Two-Dimensional random variable:** Joint Probability Mass Function – Joint Probability Distribution Function – Marginal Distribution Function – Joint Density Function – Marginal Density Function – Conditional Distribution Function – Conditional Probability density function – Stochastic Independence.

Unit III: Mathematical Expectation: Introduction – Mathematical Expectation – Expected value of function of a random variable – Properties of Expectation (Addition theorem and Multiplication theorem) – Properties of Variance – Covariance. **Generating Functions:** Moment generating function – Cumulants – Properties of Cumulants.

Unit IV: Bernoulli Distribution, Binomial Distribution and Poisson distribution: Bernoulli Distribution – Introduction to Binomial Distribution – Moments recurrence relation for the moments – mean deviation about mean, mode MGF – Additive property – Cumulants – Recurrence relation for Cumulants – Fitting of Binomial Distribution – Introduction to Poisson distribution – Moments – Mode – Recurrence relation for the moments – MGF – Characteristic function – Cumulants – Additive property – Fitting of Poisson Distribution.

Unit V: Negative Binomial Distribution, Geometric Distribution and Hyper geometric Distributions: Introduction to Negative Binomial Distribution – MGF of Negative Binomial Distribution – Cumulants – Poisson as limiting case – Geometric Distribution – Lack of

memory concept– Moments of Geometric Distribution–Hyper geometric Distribution – Mean and Variance of Hyper geometric Distribution. Approximation to Binomial Distribution.

TEXTBOOK:

1. “Fundamentals of Mathematics and statistics” S.C. Gupta and V.K. Kapoor, Sultan Chand & Sons Publishers, 11th Edition, June 2002, ISBN: 81–8054–004–9.

Unit I	: Chapter 3 & 4	[Section: 3.1 to 3.14, 4.2]
Unit II	: Chapter 5	[Section: 5.1 to 5.4, 5.5.1 to 5.5.6]
Unit III	: Chapter 6	[Section: 6.1 to 6.6, 7.1 & 7.2]
Unit IV	: Chapter 7	[Section: 8.1 to 8.5]
Unit V	: Chapter 8	[Section: 8.6 to 8.8]

REFERENCE:

- 1) Study Material: ActEd Statistics Pack, Institute and Faculty of Actuaries (IFOA), 2018
- 2) John E. Freund’s Mathematical Statistics wit Applications, Irwin Miller Marylees Miller, 8th Edition, Pearson Publications, ISBN: 978-93-325-1905-3

SEMESTER - III

MATHEMATICS OF FINANCE - II

Semester: III

Core: V

Hours: 5

Code: U20AS305

Credits: 4

COURSE OUTCOMES:

CO1: To describe the term annuity and its application

CO2: Find the present value of annuity and accumulated value of annuity

CO3: Increasing and decreasing annuity and its application.

CO4: An equation of value and its application.

CO5: Describe how a loan may be repaid by regular instalments using equation of value.

CO6: Finding the interest payments and capital repayments using methods.

Unit I: Level Annuities: Present Values and accumulation values of Payments Made in Arrear, Payment Made in Advance – Perpetuities.

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

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

Unit V: 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.

TEXTBOOKS:

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

REFERENCE:

1. **Actuarial mathematics.** Bowers, Newton L et al. – 2nd ed. – Society of Actuaries, 1997. xxvi, 753 pages. ISBN: 0 938959 46 8.
2. **An introduction to the mathematics of finance.** McCutcheon, John J; Scott, William F. London: Heinemann, 1986. 463 pages. ISBN: 0 434 91228 x.
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

BUSINESS ECONOMICS

Semester: III

Elective: I

Hours: 5

Code: U20AS3:1

Credits: 4

COURSE OUTCOMES:

At the end of the course the students will able,

CO1: To understand the basic concepts of BusinessEconomics.

CO2: To Know the dynamics of amarket.

CO3: To ascertain the importance of international trade and the financial system.

CO4: To study the different types of costs.

CO5: To understand the structure of Markets.

CO6: To know the basic principles of economics.

Unit I: Definition and Scope of Economics: Definitions of Economics – Differences between Micro and Macro Economics – Basic Economic Problems – Economic Systems.

Unit II: Definition of Business Economics: Application of Economic Concepts in Business – Incremental Concept – Time Perspective – Discounting Principle – Opportunity Cost – Equi-marginal Principle – Objectives of Business Firms – Role and Responsibilities of Business Economists.

Unit III: Liability Analysis of Demand and Supply: Characteristics of Human Wants – Utility Analysis – Law of Diminishing Marginal Utility – Law of Demand – Factors Influencing Demand – Demand Forecasting – Law of Supply – Factors Influencing Supply – Elasticity of Demand – Types – Factors Influencing Elasticity of Demand – Importance – Indifference Curve Analysis – Consumer Surplus.

Unit IV: Cost, Revenue and Market Structure: Definition of Cost – Fixed and Variable Costs – Total Cost – Average Cost and Marginal Cost – Revenue – Average Revenue – Marginal Revenue – Total Revenue – Short-Run and Long-Run Cost Curves – Different Market Forms – Price and Output Determination Under Perfect Competition, Monopoly monopolistic Competition and Duopoly – Price Discrimination – Pricing Strategies.

Unit V: Macro Economics: Objectives – Definition of National Income – Determination – Difficulties in Estimation – Economic Growth and Development – Business Cycles – Unemployment – Inflation – Fiscal and Monetary Policies – Foreign Trade – Features – Globalization – Merits and Demerits – Balance of Trade and Balance of Payments – Disequilibrium – Correcting Measures – IMF and IBRD – Objectives and Functions – Money and its Functions.

TEXTBOOK:

“Business Economics”-S. Sankaran.

REFERENCES:

1. Dr Deepashree (2005), Micro Economic Theory and Applications.

2. H.S. Agarwal (2008), Micro Economic Theory. Seventh Edition.
3. S. Sankaran (2004) Business Economics, 18th Edition.
4. R. Cauvery, U.K. Sudhanaya, M. Girija, N. Kirupalani and M. Meenakshi (2006), Micro Economic Theory
5. K.K. Dewett (2005), Modern Economic Theory.

CONTINUOUS DISTRIBUTIONS & ESTIMATION THEORY

Semester: III

Allied: III

Hours: 4

Code: U19AS3Y3

Credits: 4

COURSE OUTCOMES:

At the end of this course, the students will be able to,

CO1: Demonstrate the Central limit theorem and its applications.

CO2: Understand the properties of probability density functions and cumulative distribution functions.

CO3: Define expectation, and be introduced to its important linearity property.

CO4: Describe about Maximum Likelihood Estimator and its applications.

CO5: Calculate the Maximum Likelihood Estimator of parameter and interpretation of confidence intervals.

CO6: Interpret a confidence interval and confidence level & Identify features that determine the width of a confidence interval.

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

Unit II: Beta distribution – Exponential distribution – Weibull Distribution– Logistic distribution.

Unit III: Cauchy distribution – Central limit theorem.

Unit IV: Point Estimation: Introduction – Methods of moments – one parameter case – two parameter case – MLE – one parameter.

Unit V: Confidence Intervals: Introduction - Confidence Intervals in General - Confidence Intervals for Normal Distribution – Variance.

TEXTBOOK:

1. “Fundamentals of Mathematics and statistics” S.C. Gupta and V.K. Kapoor, Sultan Chand & Sons Publishers, 11th Edition, June 2002, ISBN: 81–8054–004–9.

Unit I	: Chapter 8	[Section: 9.1, 9.2]
Unit II	: Chapter 9	[Section: 9.5 to 9.8]
Unit III	: Chapter 9	[Section: 9.5 to 9.7]

2. “ActEd Study Material: Subject – CT3”

Unit IV	: Chapter 10
Unit V	: Chapter 11

REFERENCE:

1. Study Material: ActEd Statistics Pack, Institute and Faculty of Actuaries (IFOA), 2018
2. John E. Freund’s Mathematical Statistics with Applications, Irwin Miller Marylees Miller, 8th Edition, Pearson Publications, ISBN: 978-93-325-1905-3

PROGRAMMING USING R

Semester: III

Allied: IV

Hours: 2

Code: U20ASPY4

Credits: 2

COURSE OUTCOMES:

At the end of the course the students will be able to,

CO1: Master the use of the R interactive environment

CO2: Understand the different data types in R

CO3: Understand control statements in R and Understand basic regular expressions in R

CO4: To train students in arrangement survey data using R programming

CO5: To train students to deal with data by Diagrams and graphical representation

CO6: To train students to deal with data by doing analysis on basic descriptive analysis, Linear regression and Correlation analysis

Unit I: Introduction – Downloading and installing R – Starting R – Entering commands – Exiting from R - Getting help on a function - Getting help on a package – Searching web for a help – Finding relevant functions and packages - **Some Basics** – Printing something – Setting variables – Listing variables - Deleting Variables - Creating a Vector - Computing Basic Statistics - Creating Sequences - Comparing Vectors - Selecting Vector Elements - Performing Vector Arithmetic

Unit II: Navigating the Software - Getting and Setting the Working Directory - Saving Your Workspace - Viewing Your Command History - **Input and Output** - Reading Fixed-Width Records - Reading Tabular Data Files - Reading from CSV Files - Writing to CSV Files

Unit III: Data Structures - Appending Data to a Vector - Inserting Data into a Vector - **Data Transformations** - Splitting a Vector into Groups - Applying a Function to (Each List Element, Every Row, Every Column, Groups of Data, Groups of Rows, Parallel Vectors or Lists)

Unit IV: Graphics - Creating a Scatter Plot - Adding a Title and Labels - Adding a Grid - Creating a Scatter Plot of Multiple Groups - Creating a Bar Chart - Colouring a Bar Chart - Plotting a Line from x and y Points - Changing the Type, Width, or Colour of a Line - Plotting Multiple Datasets - Adding Vertical or Horizontal Lines - Creating a Histogram

Unit V: Linear Regression -Performing Simple Linear Regression - Understanding the Regression Summary – **Correlation** – Performing correlation analysis - **Probability** - Counting the Number of Combinations - Generating Combinations - Generating Random Numbers - Generating Reproducible Random Numbers - Generating a Random Sample - Generating Random Sequences - Randomly Permuting a Vector - Calculating Probabilities for Discrete Distributions - Calculating Probabilities for Continuous Distributions –

TEXT BOOK:

1. “R Cookbook”, Paul Teetor, O’Reilly Publication, ISBN: 978-0-596-80915-7

Reference Book: Simple R – Using R for Introductory Statistics. John Verzani

INTRODUCTION TO INSURANCE

Semester: III

NMEC: I

Hours: 2

Code: U19AS3E1

Credits: 2

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Introduce concept of insurance.

CO2: Study different types of insurance.

CO3: Develop the current scenario of insurance.

CO4: Analyze the situation in the risk.

CO5: Identify the different types of general insurance.

CO6: Discuss the different types of risk.

Unit 1: Risk Management: Meaning of risk – Types of risks – Risk analysis – Risk Management techniques – Risk retention.

Unit2: The concept of insurance and its evolution: Concept of insurance – Insurance (evolved and works) – Types of insurance – Importance of insurance industry.

Unit 3: The Business of Insurance: How risk is managed by individuals and insurers – premium – importance of reinsurance- role of insurance in economic development and society.

Unit 4: The insurance contract: Introduction – Insurable interest – Principle of indemnity – Subrogation and contribution – Utmost good faith- Proximate cause.

Unit 5: Life insurance products: Traditional products – Linked products – Annuities and group policies.

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

LIFE AND HEALTH CONTINGENCIES - I

Semester: IV

Core: VI

Hours: 5

Code: U20AS406

Credits: 4

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: Define life assurance contracts.

CO2: Describe the formulae for the means and variances of the present values of the payments under assurance contracts.

CO3: Apply life annuity contracts.

CO4: Describe the formulae for the means and variances of the present values of the payments under annuity contracts.

CO5: Apply the concept of Net Premiums and Reserves.

CO6: Apply the concept of Assurances & annuities to evaluate the present values.

Unit I: Life Table: Introduction – Constructing a life table – The force of Mortality – Using the life table – Life table functions at non-integers ages – UDD – CFM – Select Mortality – Constructing Select & Ultimate life tables.

Unit II: Life Assurance Contract: The sum Assured is payable not on death - Introduction – Whole life assurance – Term Assurance- Pure endowment Assurance- Endowment Assurance – Deferred Assurance benefits (Concept & simple problems only)

Unit III: Life Assurance Contract - The sum Assured is payable immediately on death - Introduction – Whole life assurance – Term Assurance- Endowment Assurance – Deferred Assurance Benefits – Other relationships (Concept & simple problems only)

Unit IV: Life Annuity Contract: Introduction – Whole life annuity (due and arrear)- Temporary annuity (Due and Arrear) - Deferred annuities (Due & arrear) - Continuous annuities (Concept & simple problems only)

Unit V: Evaluating Life Assurance & Annuity Contracts – Evaluating Assurance benefits – Evaluating Annuity Benefits – Premium Conversion Formulae.

TEXTBOOK:

ActEd Company Book - CM1

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 et al. – 2nd ed. – Society of Actuaries, 1997. xxvi, 753 pages. ISBN: 0 938959 46 8.
3. Life contingencies. Neill, Alistair. – Heinemann, 1977. vii ISBN 0 43491440 1.
4. Life insurance mathematics. Gerber, Hans U. – 3rd edition – Springer. Swiss Association of Actuaries, 1997. 217 pages. ISBN 3 540 62242 X.

SAMPLING THEORY AND ITS APPLICATION

Semester: IV

Allied: V

Hours: 5

Code: U20AS4Y5

Credits: 4

COURSE OUTCOMES:

CO1: To study sampling theory in terms of statistical inference and testing of hypothesis

CO2: To study on estimation theory and its important properties

CO3: Explain the concepts of random sampling, statistical inference and sampling distribution, state and use the basic sampling distribution.

CO4: Describe the main method of estimation and the main properties of estimators and apply them.

CO5: Construct confidence for unknown parameter

CO6: To study the concept of testing of hypothesis and its applications.

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 : Testing of Hypothesis: Test of Significance of Large Samples – Sampling of Attributes – 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 for difference of means – test of significance of standard deviation.

Unit III: 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 Attributes.

Unit IV: Students “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: 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:

John E. Freund’s Mathematical Statistics wit Applications, Irwin Miller Marylee’s Miller, 8th Edition, Pearson Publications, ISBN: 978-93-325-1905-3

INSURANCE UNDERWRITING

Semester: IV

Allied: VI

Hours: 4

Code: U20AS4Y6

Credits: 4

COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1:** The aim of the insurance underwriting subject provides the adequate knowledge in basics underwriting work, need and importance of underwriting work, how it works as a risk management tool in insurance industry.
- CO2:** Understanding the concepts of life insurance underwriting, mortality and Morbidity risks, role of underwriters, monitoring the underwriting decisions.

CO3: To analyze the limits of acceptance, premium setting, acceptance of extra Hazard risks, assessing the individual risks, underwriting of new business.

CO4: To know the concept of health insurance products, underwriting of health Insurance products, insurable interest, indemnity, numerical rating methods of Underwriting.

CO5: Analyse the general and standard exclusions in underwriting jobs, advantages and disadvantages of numerical rating methods, need of reinsurance in the Industry

CO6: Students can be able to work in insurance underwriting jobs, health insurance Health insurance industry, loss surveyor jobs in general insurance companies.

Unit I:Introduction to Underwriting: What is insurance – Profile of an Underwriter – What is Underwriting – Purpose & Objectives of Underwriting – Why Underwriting is important – The Underwriting Process – Functions of Underwriting – Types of Underwriters – Underwriting Decisions – Policies on Preferred / Standard / Sub-standard Basis – Monitoring Underwriting Decisions.

Unit II:Life Underwriting - Principles & Concepts: Concepts of Life underwriting – Risk assessment - Mortality and morbidity –Assessing individual risks - Selection of lives - Classification of risks - Types of extra risks: Increasing, decreasing and constant extra risks - - Substandard and other extra risks - Level premium - Temporary extra premium - Diminishing Lien - Exclusions - Postponement of acceptance of risk - Declinature of the acceptance of risk.

Unit III:Methodology & Procedures of General insurance Underwriting:Underwriting of New Business – Scrutiny of Proposals – Limits of Acceptance – Acceptance subject to Controlling office Approval – Acceptance of Extra Hazardous Risks – Underwriting Safeguards – New Business Procedure - Underwriting of Renewal Business.

Unit IV:Health Insurance Underwriting:Health Insurance underwriting - What & why of health insurance underwriting –Factors impacting morbidity - Basic principles of underwriting (Uberrima fides - Insurable interest - Indemnity - Contribution clause - Proximate cause)-- Documents used for underwriting - Numerical Rating method of underwriting - Advantages & Disadvantages of the Numerical Rating Method - Types of underwriting decisions taken - General Exclusions & Standard Exclusions - Group Health Insurance.

Unit V: Reinsurance: Need for reinsurance - Types of reinsurance - Facultative reinsurance - Automatic reinsurance - Catastrophe reinsurance - Advantages of reinsurance arrangements - Reinsurance treaty - Underwriting Audits by reinsurers.

TEXTBOOKS:

1. “Life Insurance Underwriting” – IC22
2. “Life and health insurance underwriting” - Mary C. Bickley /Barbara Foxen Berger
Brown / Brown Jane Light cap

REFERENCES:

1. Elements of Insurance by Dr E. Dharmaraj, SIMERS Publication.
2. Advanced underwriting techniques, Joseph Mangan & Harrison Connor

STAT LAB – STATISTICAL SOFTWARE

Semester: IV

Hours: 2

Code: U20ASPS1

SBEC: I

Credits: 2

COURSE OUTCOMES:

At the end of this course, the students will be able to,

CO1: To be able to perform a wide range of data management tasks in application

CO2: Understand the basic workings of Statistical software, and perform basic statistical analyses.

CO3: To perform database management tasks, descriptive statistics and graphics, and basic inferential statistics for comparisons and correlations.

CO4: To perform data checking and create simple tables and charts.

CO5: To perform advanced analysis in Statistical software

CO6: Be able to integrate information and build models.

Unit I: Research – Research Design and Planning statistics and Research – Collection of Data – Preparing Questionnaire – Types of Scales – Measurement Scales – Introduction to Statistical Software – Creating Data Base using Statistical Software – 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 Coefficient – **Regression analysis.**

Unit V:Testing of Hypothesis: t- test - Paired t- test - Chi- square test - – ANOVA test.

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

FINANCIAL MARKETS IN INDIA

Semester: IV

NMEC: II

Hours: 2

Code: U19AS4E2

Credits: 2

COURSE OUTCOMES:

At the end of this course, the students will be able to,

CO1: Identify the different types of market.

CO2: Know the rules and regulation of financial market.

CO3: Classify the primary market and secondary market

CO4: Know the rules and regulation of SEBI

CO5: Analyzes the procedure for issuing shares.

CO6: Users of different types of interest rate in the financial market

Unit1: Financial Systems: Meaning - Role and functions of a financial system - Organized and Unorganized financial system – Components - Financial Assets - Financial Inter - Medians.

Unit2:Financial Instruments:Meaning – Instruments - New Issue Market - Features- Objectives - Functions-Constituents or players and problems.

Unit3: Secondary Markets: Meaning - Functions of Stock Exchange - Benefits to the Community – Investors – Companies - Listing of Securities and its benefits - Companies of BSE, NSE, OTCEI.

Unit4: Money Markets: Meaning - Features of Organized and Unorganized Money Markets - GRS instruments of money market.

Unit5: 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 & Features).

Text Books:

1. “Financial Markets and Services” – DrL. Natarajan

2. “Financial Services” – B. Santhanam

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

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

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

SEMESTER - V

For the candidates admitted in the academic year 2020 onwards

STOCHASTIC PROCESS

Semester: V

Core: VII

Hours: 6

Code: U20AS507

Credits: 5

COURSE OUTCOMES:

At the end of this course, the students will be able to,

CO1: Examine the concept of stochastic process.

CO2: Examine the concept of classification of stochastic process.

CO3: Examine the concept of Basic limit theorem.

CO4: Examine the concept of Markov chain.

CO5: Apply the concept of Stationary distribution of a Markov chain.

CO6: Apply the concept of Continuous time Markov chains.

Unit I: Elements of Stochastic Processes-Classification of general Stochastic Processes (definition and examples)

Unit II: Markov chains-Recurrent and transient rates-Periodicity-Random walk (definition and examples)

Unit III: Basic limit theorem and its applications-Irreducible Markov chain (definition and examples)

Unit IV: Stationary distribution of a Markov chain- Existence of a Stationary distribution (Illustrations)

Unit V: Continuous time Markov chains- Poisson Process –Marginal distribution of a Poisson Process –Pure birth Process - Marginal distribution of a Pure birth Process.

TEXTBOOK:

1) J.Medhi,” Stochastic Processes”, Wiley Eastern Limited, New Delhi.

REFERENCE:

1) S.M.Ross,” Stochastic Processes”, John Wiley, New York.

MATHEMATICAL MODELLING

Semester: V

Core: VIII

Hours: 6

Code: U19AS508

Credits: 5

COURSE OUTCOMES:

At the end of this course, the students will be able to,

CO1: To know the mathematical application in differential and growth model

CO2: To know the mathematical application in actuarial science

CO3: To learn the cash flow model in financial investments

CO4: To learn the compound distribution application in insurance products

CO5: To learn the surplus process model

CO6: To learn the linear predictor model

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

Unit III: Modelling 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 process – Net present value and accumulated profit – Internal rate of return – Payback period – Discounted payback period.

Unit –V: 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 § 2.1 – 2.3, 2.4.2

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

Unit III: Chapter 5 § 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(S):

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

LIFE AND HEALTH CONTINGENCIES – II

Semester: V

Core: IX

Hours: 6

Code: U20AS509

Credits: 5

COURSE OUTCOMES:

At the end of this course, the students will be able to,

CO1: Examine the various benefits pertaining to the different types contract

CO2: Able to differentiate the with profit and without profit contracts.

CO3: Evaluate the Gross premium calculations using the basic assumptions.

CO4: Gross premium reserves can be evaluated using different methods& able to find the difference between Gross Premium & Net premium.

CO5: Mortality profit of the single policy or portfolio of policies can be calculated using death strain at risk.

CO6: Mortality profit of the life assurance policies can be determined for benefits payable on survival as well as payable at the time of death with different premium.

Unit I: Variable Benefits and Conventional with Profit Contract: Introduction – Variable Payments– Payments varying at a constant Compound interest rate – Payment varying at a constant Monetary rate – Conventional with profit contract.

Unit II: Gross Premium: Introduction – The Gross Premium – Gross Future Loss random variable – Principle of Equivalence – Calculating Gross premium using simple criteria.

Unit III: Gross Premium Reserves:Introduction –Why hold Reserves? – Prospective Reserves – Retrospective reserves – Equality of Prospective & Retrospective Reserves – Recursive relation Between reserves – Net Premium Reserves for conventional without profit contracts.

Unit IV: Mortality profit: Introduction - Mortality profit on a single policy - Mortality profit on a portfolio of policies

Unit I: Mortality profit (Cont.): Allowing for death benefits payable immediately - Allowing for survival benefits - Allowing for different premium or annuity payment frequencies.

TEXTBOOK:

ActEd Company Book – CM1

For the candidates admitted in the academic year 2018 onwards

DATA ANALYSIS USING MS-EXCEL

Semester: V

Elective: II

Hours: 5

Code: U19AS5:P

Credits: 4

COURSE OUTCOMES:

At the end of this course, the students will be able to,

CO1: Do the basic formatting and editing options

CO2:To get deep information about Conditional formatting and its styles using Excel

CO3: Create pivot tables & pivot charts in MS-Excel

CO4:To use the Lookup & IF functions for sorting data

CO5:To understand 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:

1. Wayne L. Winston, Microsoft Excel: Data Analysis & Business Modeling, 2010

REFERENCE:

1. John, Walkenbach, Microsoft excel 2016 bible: The comprehensive tutorial resource wiley, 2016

BASIC ACCOUNTING CONCEPTS

Semester: V

Elective: III

Hours: 5

Code: U20AS5:3

Credits: 4

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1:Implement the basic accounting recording procedures.

CO2: Analyse the various kinds of financial statements.

CO3: Compute the different types of techniques.

CO4: Distinguish the different concepts of accounting.

CO5: Apply the different types of ledger posting.

CO6: Examine the forms of bank reconciliation statement.

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

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

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

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

TEXTBOOK:

Dalston L. Cecil and Jenitra L. Merwin by “Principles of Accountancy”

REFERENCE:

Jawaharlal and Seema Srivastava “Financial accounting”

ACTUARIAL PROFESSION

Semester: VI

SBEC: II

Hours: 2

Code: U20AS5S2

Credits: 2

Course Outcomes:

At the end of this course, the students will be able to,

CO1: Identify the different types of general insurance.

CO2: Discuss the different types of risk

CO3: Examine the role of actuary

CO4: Discuss the current scenario of the profession.

CO5: Apply the various roles in Life insurance.

CO6: Examine the duties and responsibilities of an actuary.

Unit I: Actuarial Profession Overview - Introduction to profession and professionalism - Evolution of Actuarial Profession - Characteristics of the ideal profession - characteristics of Actuarial profession - Skills required for the Actuary.

Unit II: Self-Regulatory Measures in Actuarial profession - Need for self-regulation - Definition – Introduction - Classification of guidance notes – Procedures - Criteria for insurance of guidance notes.

Unit III: Role of Actuaries - Role of Actuary in Life Insurance Business - Valuation of Liabilities - Profit distribution - Product Design and Product pricing - Assessment of solvency - Investigation of Investment policy - Investigation of New Business Risks.

Unit IV: Role of Actuary in General Insurance - Premium Rating-Estimation of Liabilities-Collection and Presentation of information - Reinsurance requirements.

Unit V: Role of Actuary in Health Insurance & Other Area - Health Insurance-Demography - Economics-Climate - State provision of Health and care services - Valuation of Insurance Companies - Investment Actuary - Advisors of Brokers - Financial Consultant - Corporate Finance – Academics - Capital Projects.

TEXTBOOK:

CT 9 - Business Awareness Module.

Chapter: 4.1 and 4.2.

SEMESTER - VI

OPERATIONS RESEARCH

Semester: VI

Core: X

Hours: 6

Code: U19AS610

Credits: 5

COURSE OUTCOMES:

At the end of the course, the student will be able to,

CO1: To impart knowledge in concepts and tools of Operations Research.

CO2: To understand mathematical models used in Operations Research.

CO3: To apply these techniques constructively to make effective business decisions.

CO4: To Identify and develop operational research models from the verbal description of the real system.

CO5: To understand the mathematical tools that are needed to solve optimisation problems.

CO6:To use mathematical software to solve the proposed models.

Unit I: Origin and development of O.R. – Nature and features of O.R. – Scientific methods 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: Simplex methods to solve LPP (Ordinary Simplex method, Big-M-method, Two-phase-Simplex method).

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

Unit IV: 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: 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), ISBN-10: 8131799344, ISBN-13: 978-8131799345, ASIN: B00FJVEVEQ

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]

NUMERICAL ANALYSIS

Semester: VI

Core: XI

Hours: 6

Code: U20AS611

Credits: 5

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: To introduce different numerical techniques.

CO2: To solve Algebraic and differential equations.

CO3: To develop skills in solving problems using numerical techniques.

CO4: To solve the forward differences problems.

CO5: To Solve Taylor Series problems.

CO6: To Know solving predictor problems.

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

Unit II: Linear System of Equations– Gauss elimination method – Gauss-Jordan method – Iterative methods – Jacobi method – Gauss-Seidal method.

Unit III: Finite differences –Interpolation - Introduction – Gregory-Newton interpolation formulae – Interpolation with unequal intervals – Lagrange’s interpolation formula.

Unit IV: 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 solution of ordinary differential equation – Taylor series method – Euler’s method – Runge-Kutta methods – Adam’s Moulton Method – Milne’s Predictor corrector method.

TEXTBOOK:

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

GROUP INSURANCE & RETIREMENT BENEFIT

Semester: VI

Core: XII

Hours: 5

Code: U20AS612

Credits: 5

COURSE OUTCOMES:

At the end of this course, the students will be able to

CO1: The aim of the Group insurance and retirement benefit paper is to provide sufficient knowledge in group insurance schemes and its benefits. Various types of products available.

CO2: Understanding the benefits of group insurance products and its risk factors.

CO3: Underwriting and eligibility criteria of group insurance products. Estimating Mortality risk and moral hazard risks.

CO4: Knowing about various types of pension schemes and gratuity funds.

CO5: Calculation of premium setting in defined benefit schemes and defined Contribution schemes and its investment portfolio.

CO6: Coverage of accidental benefits, premature death benefits, and family pension Plans.

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.

REINSURANCE MANAGEMENT

Semester: VI

Core: XIII

Hours: 6

Code: U20AS613

Credits: 5

COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1:** The aim of the reinsurance management subject provides adequate knowledge in basics of reinsurance, needs of reinsurance, importance of reinsurance in the insurance market.
- CO2:** Understanding the functions reinsurance, retention limits, factors influencing Reinsurance business, Indian reinsurance industry before and after the Globalization.
- CO3:** To analyze the usage of reinsurance in various types of industry in accordance with their risk levels, like life, health, engineering insurance, accident and Liability insurance industry.
- CO4:** Understanding the role of regulatory bodies for reinsurance business in India, and the concepts of cross border reinsurance, alternative risk transfer.
- CO5:** Analyse the retention limits, insurance ceding, proportional and non - Proportional reinsurance types and its application to reduce the risks of Insurance companies.
- CO6:** Students can be able to work in various reinsurance companies in and outside of India, reinsurance outsourcing companies operating in India.

Unit I - Introduction to reinsurance: Nature of reinsurance – Analysis of factors that influence results – Historical background – Reinsurance in India before & after nationalization and liberalization – GIC Re – Regional co-operation – Functions of reinsurance - Advantages, **Forms of Reinsurance:** Facultative reinsurance – Treaty reinsurance – Facultative Obligatory Treaty – Considerations for facultative placements.

Unit II - Methods of Reinsurance - Proportional reinsurance: – Surplus – Quota Share – Proportional Treaty – Bordereaux – Premiums – Ceding Commission – Claims – Quota Share Treaty – Quota Share & surplus combined – Specimen Treaty Slip.

Unit III -Methods of Reinsurance – Non-Proportional reinsurance: Excess of Loss – Working (Per Risk) XL - Catastrophe XL – Stop Loss XL – Aggregate XL – Non-proportional Treaty – Ultimate Net Loss – reinsured Retention – Premium – Burning Cost – Exposure Rating / Pareto Loss Distribution – Reinstatement – Claims – Inception & Termination - Specimen Treaty Slip.

Unit IV - Retentions: Setting Retentions – General Considerations – Factors influencing retentions – Types of retentions – Accumulations within and between branches – Retentions for Property insurance – Engineering insurance – Accident & Liability insurance – Marine Cargo & Hull insurance – Aviation insurance – Life insurance – Special factors for different classes of Reinsurance

Unit V - IRDA Reinsurance Regulations: Applicability - Reinsurance Programme - Retention Policy - Reinsurance Arrangements - Maintenance of Records - Cross Border Reinsurer (CBR) - Procedures for Reinsurance Placements - Alternative Risk Transfer (ART).

TEXTBOOK:

IC85 - Insurance Institute of India

INTRODUCTION TO TIME SERIES

Semester: VI

Core: XIV

Hours: 5

Code: U20AS614

Credits: 4

COURSE OUTCOMES:

At the end of the course, the students will be able to,

CO1: To define Index Numbers.

CO2: To study various types of Index Numbers.

CO3: To define Time Series and study various methods of it.

CO4: Measure the relative changes in prices, production and employment.

CO5: Adjust wage levels, compare standard of living estimate the future in economic planning.

CO6: Able to extrapolate & interpolate using different methods in the numerical analysis.

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

Unit II: 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 – Limitations 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 Squares - Parabola Curve - Selecting a type of trend – Choice – Conversion – Shifting to origin.

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

Unit V: Interpolation and Extrapolation – Meaning - Significance of Interpolation – Assumptions – Methods 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)

MATHEMATICS FOR COMPETITIVE EXAMINATIONS

Semester: VI

SBEC: III

Hours: 2

Code: U19AS6S3

Credits:2

COURSE OUTCOMES:

At the end of the course, the students will be able to,

CO1:Make themselves involved to attend civil service examinations

CO2: Compete themselves to the current demand in the job market

CO3: By using various techniques to solve logical maths efficiently.

CO4: Solving the Reasoning questions with full confidence.

CO5: Able to take up the exams on time with no fear.

CO6: To enhance the Aptitude level of thinking.

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

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

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

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

Unit V: 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.