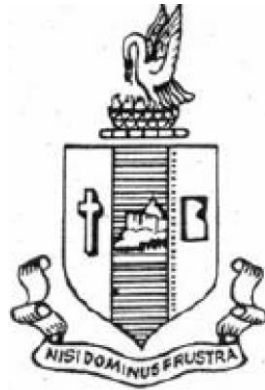


B.Sc., ACTUARIAL MATHEMATICAL SCIENCE SYLLABUS

(Under Choice Based Credit System)

(For the students admitted in the academic year 2019-20)



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

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		
							CI A	ES E	Total
I	I	Tamil I /*	செய்யுள், இலக்கிய வரலாறு, உரைநடை, மொழிப்பயிற்சியும் படைப்பாக்கமும்	U18TM1L1	6	3	25	75	100
	II	English I	English Communication Skills – I	U16EGPL1	6	3	40	60	100
	III	Core I	Introduction To Business Mathematics	U19AS101	5	4	25	75	100
		Core II	Differential Calculus And Its Applications	U19AS102	5	4	25	75	100
		Allied I	Descriptive Statistics	U19AS1Y1	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	
Sem. I Credits :						22			
II	I	Tamil II /*	செய்யுள், இலக்கிய வரலாறு, சிறுகதைத் திரட்டு, மொழிப்பயிற்சி மற்றும் படைப்பாக்கமும்	U18TM2L2	6	3	25	75	100
	II	English II	English Communication Skills - II	U16EGPL2	6	3	40	60	100
	III	Core III	Introduction to Integral Calculus	U19AS203	6	5	25	75	100
		Core IV	Differential Equation & Its Application	U19AS204	6	5	25	75	100
		Allied II	Probability Theory & Discrete Distribution	U19AS2Y2	6	4	25	75	100
Sem. II Credits :						20			
III	I	Tamil III /*	காப்பியம்இ புராணம்இ சிற்றிலக்கியம்இ இலக்கிய வரலாறுஇ நாவல்இ மொழிப்பயிற்சி	U18TM3L3	6	3	25	75	100
	II	English III	English for Competitive Examinations	U16EGPL3	6	3	40	60	100
	III	Core V	Business Economics	U19AS305	5	4	25	75	100
		Elective I	Basic Accounting Concepts	U19AS3:1	5	4	25	75	100
		Allied III	Continuous Distributions & Estimation Theory	U19AS3Y3	4	4	25	75	100
		Allied IV	Introduction to R – Stat	U19ASPY4	2	2	40	60	100
IV	NMEC I	Introduction to Insurance	U19AS3E1	2	2	25	75	100	
Sem. III Credits :						22			
IV	I	Tamil IV /*	செய்யுள்(மேற்கணக்கு,கீழ்கணக்கு)இ இலக்கிய வரலாறு இ நாடகம், மொழிப்பயிற்சி	U18TM4L4	5	3	25	75	100
	II	English IV	English through Literature	U16EGNL4	5	3	40	60	100
	III	Core VI	Sampling Theory and its Applications	U19AS406	5	4	25	75	100
		Allied V	Actuarial Profession	U19AS4Y5	5	4	25	75	100

		Allied VI	Introduction to Time Series	U19AS4Y6	4	4	25	75	100
	IV	SBEC I	Statistical Software and MS-Excel	U19ASPS1	2	2	40	60	100
		NMEC II	Financial Markets in India	U19AS4E2	2	2	25	75	100
		Soft Skills	Life Skills	U16LFS41	2	1	--	--	100
	V	Extension Activities	NSS, NCC, Rotaract, Leo club, etc ...	U16ETA41	--	1	--	--	--
Sem. IV Credits :						24			
V	III	Core VII	Introduction to Stochastic process & Markov Model	U19AS507	6	5	25	75	100
		Core VIII	Mathematical Modelling	U19AS508	6	5	25	75	100
		Core IX	Mathematics of Finance – I	U19AS509	6	5	25	75	100
		Elective II	Data Analysis using MS – Excel	U19AS5:P	5	4	40	60	100
		Elective III	Group Insurance & Retirement benefit	U19AS5:3	5	4	25	75	100
	IV	SBEC II	Principles of Insurance	U19AS5S2	2	2	25	75	100
Sem. V Credits :						25			
VI	III	Core X	Operations Research	U19AS610	6	5	25	75	100
		Core XI	Numerical Methods	U19AS611	6	5	25	75	100
		Core XII	Mathematics of Finance – II	U19AS612	5	5	25	75	100
		Core XIII	Basics of Life Contingencies	U19AS613	6	5	25	75	100
		Core XIV	Insurance Underwriting And Risk Management	U19AS614	5	4	25	75	100
		SBEC III	Mathematics for Competitive Examinations	U19AS6S3	2	2	25	75	100
	V	Gender Studies	Gender Studies	U16GST61	--	1	--	--	100
Sem. VI Credits :						27			
Total Credits :						140			
* Other Languages :									
Hindi		Sanskrit		Hindi		Sanskrit		French	
U17SK3L3		Semester I : U18HD1L1 U18FR3L3		U17SK1L1		U18FR1L1		Semester III : U18HD3L3	
U17SK4L4		Semester II : U18HD2L2 U18FR4L4		U17SK2L2		U18FR2L2		Semester IV : U18HD4L4	
Part I : 4 1		Core Theory : 14 Value Education : 1		Allied : 6		NMEC : 2		Env. Studies :	
Part II : 4 1		Elective : 3 Gender Studies : 1		SBEC : 3		Soft Skills : 1		Extension Activities :	
									Total : 40
NMEC offered by the Department: 1. Introduction to Insurance - U19AS3E1									
2. Financial Markets in India - U19AS4E2									

SEMESTER - I

INTRODUCTION TO BUSINESS MATHEMATICS

Semester: I

Core: I

Hours: 5

Code: U19AS101

Credits: 4

Course Objective:

O1: To know the real time applications in business situations.

O2: To study the characteristic roots of the matrix.

O3: To investigate about the Transformation of equation

O4: To know the applications of mathematics.

O5: To study the binomial expansion.

O6: To study the different types of progression.

O7: To study the exponential series.

O8: To investigate the summation of series.

Unit I: Introduction to Business Mathematics: Introduction to Business Mathematics – Scope and Importance – Steps in Quantitative Analysis Approach – Set theory applications to Business - Matrix application to Business.

Unit II: Mathematical Induction to Binomial Theorem: Principle of Mathematical Induction – 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 – Its Application to Business: Arithmetic Progression – Geometric Progression – Harmonic Progression -Its application to Business.

Unit IV: Exponential and Logarithmic 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.

Unit-V: Summation of Series: General Summation of Series.

Textbooks:

1. Dr P. Mariappan, Business Mathematics, Pearson – First Edition, 2015, ISBN 978-93-325-3634-0
Unit I Chapter 1 : 1.1 and 1.2; Chapter 3: 3.16 and Chapter 16: 16.1, 16.2
Unit II Chapter 8
Unit III Chapter 9 : 9.5, 9.6, 9.7
2. T. K. Manickavasagam Pillay, T. Natarajan and K. S. Ganapathy, Algebra Volume – I, S. Viswanathan (printers publishers) Pvt. Ltd.2015.
(Unit IV & V)

Reference:

1. B.M. Aggarwal, Business Mathematics and Statistics, Ane Books Pvt. Ltd., ISBN 978-81-8052-285-7.

Course Outcomes:

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: Analyze the progression.

CO5: Identify the real problems related to matrices.

CO6: Compute the binomial theorem for rational index.

CO7: Compute the different types of summation of series.

CO8: Identify the exponential and logarithm series.

DIFFERENTIAL CALCULUS & ITS APPLICATIONS

Semester: I

Core: II

Hours: 5

Code: U19AS102

Credits: 4

Course Objectives:

1. To remember Function & Limits and to understand the rules for finding limits.
2. Able to find the derivative of a function at a chosen input value.
3. Differential calculus is concerned with finding the instantaneous rate at which one quantity changes with respect to another.
4. It helps us to calculate rates of change even when those rates of change are not constant.
5. To study various methods of differentiation and can able to find the nth derivative of a given function.
6. To study Euler's method of finding partial derivatives.
7. To study the concept of some simple derivatives in economics.
8. To make understand the concepts of monopoly, duopoly.

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: Multiple productions by monopolistic – Discriminating monopoly – Duopoly.

Text Books:

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

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) B.C. Mehta and G.M.K. Madnani, Mathematics for economists, Sultan Chand & Sons, 2016 (ISBN 81-7014-173-7)

Unit IV Chapter 7

Unit V Chapter 11

Reference:

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

Course Outcomes:

1. Compute the value of the derivative at a point algebraically using the (limit) definition.
2. Use the differential to determine the error of approximations.
3. Sketch the graph of the derivative from the given graph of a function.
4. Differentiate exponential, logarithmic, trigonometric and inverse trigonometric functions.
5. Obtain expressions for higher order derivatives of a function using the rules of differentiation.
6. Compute the expression for the derivative of a function using the rules of differentiation including the power rule, product rule, and quotient rule and chain rule.
7. Compute the expression for the derivative of a composite function using the chain rule of differentiation.
8. Identify the extrema of a function on an interval and classify them as minima, maxima using the first derivative test.

DESCRIPTIVE STATISTICS

Semester: I

Allied: I

Hours: 4

Code: U19AS1Y1

Credits: 4

Course Objectives:

1. To know about the importance and scope of statistics.
2. To learn the limitations of statistics.
3. To know the various data sources and its types.
4. To make a clear understanding about the various types of representation of data.
5. To have a depth knowledge in the measures of central tendency & dispersion.
6. To study about the univariate data.
7. To analyze the bivariate data using correlation.
8. To analyze the data by Fitting Mathematical Models.

Unit I: Data Structures, Data Sources & Data Collection: Introduction – Data Structures – Univariate data – bivariate data – Multivariate data – Data Source.

Unit II: Data Presentation: Introduction – Classification of Data – Data presentation – Type of Variable – Levels of Measurements – Frequency – Types of Class interval – Tally Mark – Construction of a Discrete frequency distribution – Construction of a Continuous frequency distribution – Cumulative and relative frequencies – Diagrammatic representation of data.

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.

Text Book:

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

Unit I : Chapter 2

Unit II: Chapter 3

2. S.C. Gupta and V.K. Kapoor, “Fundamentals of Mathematics and statistics”, 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:

Study Material: Core Technical -3, Institute and Faculty of Actuaries (IFOA), 2018

Course Outcomes:

1. Utilize a comprehensive set of descriptive data, in order to organize & summarize.
2. Display all kinds of data in a meaningful way for the better understanding of the given information.
3. Use probability theory in order to evaluate the probability of real world events.
4. Perform correlation analysis, in order to estimate the nature and the strength of the linear relationship that may exist between two variables.
5. Perform regression analysis, in order to predict the value of one variable based on the value of the other variable.
6. Apply a comprehensive set of statistical tools in making practical decisions
7. Creating reports in workplace situations.
8. Can lay the groundwork for more complex statistical analysis.

SEMESTER - II

INTRODUCTION TO INTEGRAL CALCULUS

Semester: II

Core: III

Hours: 6

Code: U19AS203

Credits: 5

Course Objective:

- O1: To study the properties of definite integrals.
- O2: To compute different methods of multiple integrals.
- O3: To know real time applications of definite integrals.
- O4: To study the methods for solving multiple integrals.
- O5: To know the reduction formula for sine and cosine functions.
- O6: To investigate the properties for beta functions.
- O7: To know the discounted value.
- O8: To study the consumer's surplus.

Unit I: Integration by parts: Integration of the forms (i) $\int [(px+q)/(ax^2+bx+c)]dx$ (ii) $\int dx/(a+b\cos x)$ (iii) $\int [(px+q)/(\sqrt{ax^2+bx+c})]dx$ (iv) $\int [(px+q)\sqrt{ax^2+bx+c}]dx$ – Integration by parts.

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

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

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

Unit –V: Application of Multiple 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:

1. S. Narayanan and T. K. Manickavasagam Pillay, Calculus Volume – II, S. Viswanathan printers and publishers private limited, Reprint 2003.

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

Unit II Chapter 1 §13.1 – 13.10

Chapter 7 §2.1, 2.3, 3.4, 5

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

2. B.C. Mehta and G.M.K. Madnani, Mathematics for economists, Sultan Chand & Sons, 2016 (ISBN 81-7014-173-7)

Unit V

Reference:

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

Course Outcomes:

CO1: Apply the real time application.

CO2: Identify the double integrals

CO3: Compute the different applications in definite integrals.

CO4: Identify the different types of integrals.

CO5: Compute the discounted value.

CO6: Analyze the different types of integrals.

CO7: Compute the consumer's surplus.

CO8: Analyses the properties of beta functions.

DIFFERENTIAL EQUATIONS AND ITS APPLICATION

Semester: II

Core: IV

Hours: 6

Code: U19AS204

Credits: 5

Course Objectives:

1. To identify the type of a given differential equations.
2. To apply the appropriate analytical technique for finding the solution of differential equations.
3. To solve second order and higher order linear differential equations.
4. To evaluate differential equations including separable, homogeneous, exact, and linear.
5. To show existence and uniqueness of solutions.
6. To create and analyze mathematical models using differential equations to solve application problems.
7. To solve nonhomogeneous equations.
8. To apply the concepts of differential equations in real life situations.

Unit I: Introduction to 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: Exact 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 Equations: 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 of Second 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 $e^{(ax+by)}$, $\text{Sin}(ax+by)$, $\text{Cos}(ax+by)$.

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

Textbooks:

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

Unit I Chapter 2 § 1, 1.2, 2, 3, 4, 8, 8.1

Unit II Chapter 1 § 3.1 – 3.3, 4, 5, 5.1 – 5.5, 6.1, 7.1 - 7.3

Unit III Chapter 4 § 1, 2, 2.1, 2.2, 3, 4, 5, 5.1 – 5.5, 6

2. M.D. Raisinghania, Ordinary and Partial Difference Equation, S. Chand Publishing, 2013.

Unit IV Chapter 4.12, 5.8, 5.13

3. B.C. Mehta and G.M.K. Madnani, Mathematics for economists, Sultan Chand & Sons, 2016 (ISBN 81-7014-173-7)

Unit V Chapter 15-15.1, 15.3

Reference:

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

Course Outcomes:

Students will be able to:

1. Distinguish between linear, nonlinear, partial and ordinary differential equations.
2. Recognize and solve an exact differential equation.
3. Make a change of variables to reduce a differential equation to a known form.
4. Recognize and solve a linear differential equation by use of an integrating factor.
5. Solve basic application problems described by second order linear differential equations with constant coefficients.
6. Find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.
7. Find the complete solution of a homogeneous differential equation with constant coefficients by examining the characteristic equation and its roots.
8. Solve basic application problems described by first order differential equations.

PROBABILITY THEORY & DISCRETE DISTRIBUTION

Semester: II

Allied: II

Hours:6

Code: U19AS2Y2

Credits: 4

Course Objectives:

1. To learn basic probability
2. To understand discrete Distributions.
3. To learn random variables and conditional distributions,
4. To know the generating functions to establish the distribution
5. To understand the concepts of conditional expectation
6. To apply distribution concepts in real life situation
7. To estimate the central tendency and deviation of the distribution
8. Estimate moments of the 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 Distributions 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. S.C. Gupta and V.K. Kapoor, “Fundamentals of Mathematics and statistics”, Sultan Chand & Sons Publishers, 11th Edition, 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]

References:

- 1) Study Material: Core techniques – 3 (CT 3), Institute of faculty of actuaries, UK, 2016.
- 2) Dr P. Mariappan, “Statistics for Scientific Solutions”, New Century Book House [P] Ltd., 2008, ISBN: 81–234–1404–8.

Course outcomes:

1. Identify the random variables
2. Apply probability concept in uncertainty
3. Easily find the average value of any data
4. Estimate the deviation of the data
5. Apply the conditional probability concept
6. Outline the discrete distribution properties
7. Apply the properties of discrete distribution in any situation
8. Using Alternative methods to solve central tendency of the random variables

SEMESTER - III

BUSINESS ECONOMICS

Semester: III

Core: V

Hours: 5

Code: U19AS305

Credits: 4

Course Objectives:

1. To understand the basic concepts of Business Economics.
2. To know the dynamics of a market.
3. To ascertain the importance of international trade and the financial system.
4. To know the different market structure under different economic conditions.
5. To incorporate the economic concepts in insurance field to enhance the solvency position and promotion of products.
6. To attain the profit maximization of an organization using different economic concepts.
7. To get the freedom of choice in production sector for the betterment of public.
8. To know the Indian economy status and the financial service sector in it.

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 – Equimarginal Principle – Objectives of Business Firms – Role and Responsibilities of Business Economics.

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 Practices – 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:

S. Sankaran, Business Economics, Margham Publications, 2018.

References:

1. Dr. Deepashree, Micro Economics, Cengage Learning India Pvt Ltd, 2019
2. H.S. Agarwal, Micro Economic Theory, Vishal Publications, 2017.
3. S. Sankaran, Business Economics, Margham Publications, 18th Edition.
4. R. Cauvery, U.K. Sudhanaya, M. Girija, N. Kirupalani and M. Meenakshi, Micro Economic Theory, New Saraswathi House India pvt Ltd, 2018.

Course Outcomes:

1. To understand the core economic concepts, like inputs, technology, location and competition.
2. To understand the reaction of changes in demand and supply.
3. To understand the risk and uncertainty about future market movements.
4. Able to link the economic changes in to insurance sector.
5. Knowing the economic condition to launch the products to earn more profit.
6. Handle the difficult situation in insurance sector, due to economic changes.
7. To incorporate the fiscal and monetary policy for the growth of the industry.
8. Able to analyze the utility level of consumers for further product development.

BASIC ACCOUNTING CONCEPTS

Semester: III

Elective: I

Hours: 5

Code: U19AS3:1

Credits: 4

Course Objective:

1. To introduce the basic accounting concepts.
2. To study the concepts of accounting and its recording procedures.
3. To identify the different types of accounts.
4. To study the basics of financial statements.
5. To understand the financial position of the company.
6. To analysis the different types of cash books.
7. To identify the errors and the omission in the financial statement.
8. To know the different types depreciation methods.

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 – Rectification of errors - Depreciation accounting- Straight line method- Written down value method.

Textbook:

Dalston L. Cecil and Jenitra L. Merwin, “Principles of Accountancy”, Learntech Press, 2008.

Reference:

Jawaharlal and Seema Srivastava, “Financial accounting”,

Course Outcomes:

1. Analysis the different types of accounts.
2. Compute the accounting equation.
3. Compute the financial statement.
4. Implement the basic accounting recording procedures.
5. Analyze the various kinds of financial statements.
6. Compute the different types of ratio analysis.
7. Discuss the rectification of errors.
8. Discuss the different types of depreciation method.

CONTINUOUS DISTRIBUTIONS & ESTIMATION THEORY

Semester: III

Allied: III

Hours: 4

Code: U19AS3Y3

Credits: 4

Course Objectives:

1. To compute probabilities using Continuous Distribution.
2. To identify the characteristics of Continuous Distributions.
3. To understand various Continuous Distributions and its applications.
4. To identify the type of statistical situation to which different distributions can be applied.
5. To evaluate the maximum likelihood estimator.
6. To calculate a confidence interval estimate.
7. To develop Basic skills for quantitative application in business situations.
8. To impart knowledge to the students about statistical tools and its applications.

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

Unit II: Discrete Distribution(cont.): Beta distribution – Exponential distribution – Weibull Distribution– Logistic distribution.

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

Unit I : Chapter 9 [Section: 9.2, 9.3, 9.5]

Unit II: Chapter 9 [Section: 9.6 to 9.8, 9.10, 9.11]

Unit III : Chapter 9 [Section: 9.12, 9.13 (9.13.1 to 9.13.4)]

2. “Study Material: Subject – Core Technical 3 [CT3]”, Institute and Faculty of Actuarial Science [IFOA], 2018.

Unit IV : Chapter 10

Unit V : Chapter 11

Reference:

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

Course Outcomes:

Students will be able to:

1. Understand the properties of probability density functions and cumulative distribution functions.
2. Define expectation, and be introduced to its important linearity property.
3. Calculate raw moments and central moments, including their special cases, the mean and variance.
4. Understand the effect of linear transformation on mean, variance and density.
5. Calculate the moment generating function, and appreciate its link to moments.
6. Describe about Maximum Likelihood Estimator and its applications.
7. Interpret a confidence interval and confidence level.
8. Identify features that determine the width of a confidence interval.

INTRODUCTION TO R - STAT

Semester: III

Allied: IV

Hours: 2

Code: U19AS3Y4

Credits: 2

Course Objective:

1. A working familiarity with R language
2. The ability to perform basic data transformation.
3. The ability to perform basic analysis and visualization with R.
4. A framework for applying R to their own domain-specific problems.
5. An introduction to resources for continuing to develop their R skill set
6. Be able to compute descriptive analysis
7. Be able to compute basic statistical inference
8. To learn over all atmosphere about R programming

Unit I: Introduction to R

Introduction to R – Introduction to R studio – Overview of R environment – R editor – Workspace – Data structures: vectors – matrices – lists and data frames –**Unit II**
Matrix determinants – Inverse – Transpose – Trace – Eigen values and Eigen Vectors
(Application – Arrangements of data for calculation)

Unit II: Packages in R

Getting help and loading packages – Importing and exporting data – Accessing data – Manipulating data frames – Basic computational ideas – Merges in R (Application – Knowledge on working with R)

Unit III: Frequency Diagrams

Graphics: Construction of Bar, Pie, Histogram, Stem-and-leaf, line chart, Box plot, Scatter plot
(Application – Diagrams and graphical representation of data)

Unit IV: Measures of Central Tendencies

Descriptive data analysis – Measures of central tendencies (Application – calculating average values of survey data)

Unit V: Measures of dispersion

Descriptive data analysis – Measures of dispersion (Application – Calculating dispersion of survey data)

Textbooks:

1. John Verzani, Using R for Introductory statistics, CRC Press, 2014, ISBN: 13:978-1-4665-9073-1

Reference:

1. Randall E. Schumacker, Learning statistics using R, Sage Publications Inc, 2014

Course Outcomes:

1. Use R studio to write and R code
2. Write syntactically correct R expressions that involve variables, variable assignment, operators and functions.
3. Identify basic R data types (character, double, integer and logical)
4. Identify basic R data structures relevant to modern data analysis (atomic vectors and data frames)
5. Apply the basic verbs of data transformation (filtering, selecting, mutating, renaming and arranging)
6. Create statistical graphics with gg plot
7. Apply descriptive analysis tools
8. Real life case studies and simulated projects to sharpen your skill sets.

INTRODUCTION TO INSURANCE

Semester: III

NMEC: I

Hours: 2

Code: U19AS3E1

Credits: 2

Course Objective:

1. To introduce the concept of insurance.
2. To study different types of insurance.
3. To identify the different types of market.
4. To develop the current scenario of insurance.
5. To study the life insurance product
6. To identify the marine insurance risk
7. To introduce the concept of reinsurance
8. To design a group insurance policy

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 social.

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

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.

Course Outcomes:

1. Analyze the situation of the risk.
2. Identify the different types of general insurance.
3. Discuss the different types of risk.
4. Design the life insurance products
5. Analyze the insurance market.
6. Identify the claim procedures.
7. Understand the concept of reinsurance.
8. Identify the types of risk.

SEMESTER - IV

SAMPLING THEORY AND ITS APPLICATION

Semester: IV

Core: VI

Hours: 5

Code: U19AS406

Credits: 4

Course Objective:

1. To understand the meaning and utility of sampling in actuarial field.
2. To learn about the various types of sampling
3. To demonstrate the concepts of parameter, statistic, sampling distribution of a statistic and their utility in large sample tests.
4. To develop a framework of significance and their importance in testing of hypothesis
5. To learn about the procedure for testing of hypothesis for large samples.
6. To review and appreciate the various tests of significance (for large samples in actuarial field) for attributes and variables.
7. To learn various concepts like moment generating function, characteristic function, etc., for various distributions.
8. Learn to construct confidence intervals for unknown parameters.
9. Learn to describe the main methods of estimation and the main properties of estimators, and apply 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 for 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-test 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:F-test 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:

S.C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan and Chand Publishers, 2002

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:

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

Course Outcomes:

1. To apply various sampling methods for actuarial data
2. To draw a conclusion about the best sampling procedure
3. To use practical application of preparing questionnaire to applying statistical techniques.
4. Able to explain and apply critical region, test functions, kinds of errors, size function and power function
5. Understand the problem of statistical inference, problem of point estimation.
6. Understand the problem of statistical inference, problem of interval estimation.
7. Able to construct confidence interval (one and two parameter case)
8. Students will have ability to manage actuarial data by applying statistical techniques and infer about the data.

ACTUARIAL PROFESSION

Semester: IV

Allied: V

Hours: 5

Code: U19AS4Y5

Credits: 4

Course Objectives:

1. To study the different types of insurance.
2. To develop the current scenario of profession.
3. To understand the method of calculations while pricing the products.
4. To relate the different economic condition with actuarial calculations.
5. To predict the future interest rates and inflation rates.
6. To incorporate the risk management techniques in insurance industry.
7. To understand the underwriting works for life and general insurance.
8. To make the sensible approach for hedging the risks in financial sector.

Unit-1: 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-2: Self-Regulatory Measures in Actuarial profession - Need for self-regulation - Definition – Introduction - Classification of guidance notes – Procedures - Criteria for insurance of guidance notes.

Unit-3: 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-4: Role of Actuary in General Insurance - Premium rating-Estimation of Liabilities-Collection and Presentation of information - Reinsurance requirements.

Unit-5: 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:

Business Awareness Module (Core Technical - 9), Institute and Faculty of Actuarial Science [IFOA], 2018.

Chapter: 4.1 and 4.2.

Course Outcomes:

1. Able to understand the Actuary's responsibilities.
2. Able to calculate the pricing for the products.
3. Understood the demand and supply level of insurance products.
4. Incorporating the business cycle process in insurance business.
5. Understood the feasibility of selling the products in economic crisis.
6. Approach in prudent way of risk mitigating through financial tools.
7. Able to reach the profit maximization in perfect competition market.
8. Incorporating the fiscal and monetary policy in insurance business.

INTRODUCTION TO TIME SERIES

Semester: IV

Allied: VI

Hours: 4

Code: U19AS4Y6

Credits: 4

Course Objectives:

O1: To define Index Numbers.

O2: To study various types of Index Numbers.

O3: To define Time Series and study various methods of it.

O4: To learn about living index

O5: Measure the relative changes in prices, production and employment.

O6: Adjust wage levels, compare standard of living estimate the future in economic planning.

O7: To learn about the interpolation method and its application.

O8: To find out the interpolated value by using different methods.

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-Edge worth method – Kelly’s Method – Walsch’s Method.

Unit II: Types 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: Seasonal Variation: 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)

Course outcomes:

CO1: ability to handle the different kind of price index numbers

CO2: ability to handle the different kind of quantity index numbers

CO3: knowledge to understand about time series and its external factors.

CO4: learned to identify the trend.

CO5: knowledge to analyses the trend value by using different methods

CO6: Ability to calculate the value for each external factors that affect the time series.

CO7: To learned to calculate the intermediate value by using interpolation method.

CO8: ability find out the interpolated value by using different methods.

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

Semester: IV

SBEC: I

Hours: 2

Code: U17ASPS1

Credits: 2

Course 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 (Application – Generating survey questionnaire, Creating data base in statistical software and MS-excel)

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 (Application – Draw various types of graphs and diagrams using software and MS-Excel)

Unit III: Measures of Central Tendency: Arithmetic Mean- Median – Mode – Geometric Mean – Harmonic Mean- **Measures of Dispersion:** Range – Average deviation – Standard Deviation – Skewness- Kurtosis (Application - Calculation of various types of averages and dispersion)

Unit IV: Correlation Analysis: Correlation Analysis – Scatter Diagram - Karl Pearson's Correlation Coefficient – Spearman's Rank Correlation (Application – Calculating the strength of relationship between the variables)

Unit V: Testing of Hypothesis: X^2 test - t- test - Paired t- test - Z- test – Anova test (Application – Testing and inference on testing of significance)

Textbooks:

1. **Statistical software:** Keith McCormick, „SPSS for dummies, Wiley Publishing Inc 2015
2. **MS-Excel:** Wayne L. Winston, “Microsoft Excel 2010 Data analysis and Business Modeling” Microsoft press, 2011.

Reference:

John Walkenbach, Microsoft excel 2016 bible: The comprehensive tutorial resource, Wiley Publishers, 2016

Course Outcomes:

1. Able to define the statistical terms and its measures
2. Able to compute descriptive statistical measure
3. Will have capacity to recognize the applications of Statistical measure
4. Able to compare using descriptive measures (Statistical Software and Ms-Excel)
5. Able to analysis the data relationship using correlation
6. Able to predict the variation using regression
7. Able to Demonstrate the procedure to compute statistical measure using statistical software tool
8. Able to apply basic functions using MS-Excel

FINANCIAL MARKETS IN INDIA

Semester: IV

NMEC: II

Hours: 2

Code: U19AS4E2

Credits: 2

Course Objective:

1. To acquire basic knowledge of the financial system.
2. To know the new financial instruments.
3. To ascertain the importance of the financial markets.
4. To analysis the role on intermediates
5. To study the concepts share market
6. To identify the different types of stock exchange.
7. To identify the role of RBI
8. To understand the financial position of the company.

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).

Text Books:

1. Vasant Desai, “The Indian financial system and Development”, Himalaya Publishing House. [Unit I]
2. Dr. S. Gurusamy, “Financial Markets and Institutions”, Tata McGraw Hill. [Unit II, III & IV]
3. Dr. Bharti Pathak, The Indian Financial System, Pearson. [Unit V]

Course Outcomes:

1. Apply the theoretical base into practical fields.
2. Identify the different financial markets.
3. Follow the functioning of the commercial banks and central bank
4. Identify the type's financial assets in the stock market.
5. To know the procedures of listing in stock exchange.
6. Understand the functions of commercial banks.
7. Identify the money market intermediates.
8. Analyze the various kinds of money market instrument.

SEMESTER – V

INTRODUCTION TO STOCHASTIC PROCESS & MARKOV MODEL

Semester: V

Core: VII

Hours: 6

Code: U19AS507

Credits: 5

Course Objective:

O1: To study Stochastic process.

O2: To compute different methods Stochastic process.

O3: To know real time applications of Stochastic process.

O4: To study the methods for solving Stochastic process & Poisson process.

O5: To know the Markov process.

O6: To investigate the properties Markov process.

O7: To know the Chapman- Kolmogorov equations.

O8: To study the Time-homogeneous Markov chains.

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

Unit III: Definition of l_x , p_x , q_x , ${}_n p_x$, ${}_n q_x$, $m/{}_n q_x$, - Concept of force of mortality μ_x - Derivation of ${}_n p_x$ in terms of μ_x – Laws of mortality.

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

Unit V: Chapman - Kolmogorov equations – Time-homogeneous Markov chains - Irreducible chains – Periodicity. (Concept & Simple problems only)

Textbook:

Models – IAI Material – CT- 4

Unit I & II – Chapter 2

Unit III – Chapter 7

Unit IV & V – Chapter 3

Course Outcomes:

CO1: Apply the real time application of stochastic process.

CO2: Identify the methods stochastic process.

CO3: Compute the different applications of stochastic process & Poisson process.

CO4: Identify the different kinds of Markov process.

CO5: Compute the transition Matrix & Random walks.

CO6: Analyze the Chapman- Kolmogorov equations.

CO7: Compute the Time-homogeneous Markov chains.

CO8: Analyses the Irreducible chains & Periodicity.

MATHEMATICAL MODELING

Semester: V

Core: VIII

Hours: 6

Code: U19AS508

Credits: 5

Course Objectives:

1. To study mathematical models of empirical or theoretical phenomena in domains such as the physical, natural, or social science.
2. To create variables and other abstractions to solve college-level mathematical problems in conjunction with previously-learned fundamental mathematical skills such as Differential equations, Difference Equations, Integration, etc.
3. To analyze the effectiveness of any differential equation in modelling specified situations.
4. To evaluate Difference Equations and its applications.
5. To find the complete solution of difference equation as a combination of the complementary function and a particular solution.
6. To draw inferences from models using college-level mathematical techniques including problem solving, quantitative reasoning, and exploration using multiple representations such as equations, tables, and graphs;
7. To take an analytical approach to problems in their future endeavors.
8. To study about cash flow process and Collective risk models.

Unit I: Introduction to 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: 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: 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 process: 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 § 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

Course Outcomes:

Students will be able to:

1. Apply mathematical concepts, including Calculus, Linear Algebra and Differential Equations to analyse specific problems and identify the appropriate mathematics to realise a solution.
2. Recognise the connections between mathematics and other disciplines, and how mathematical ideas are embedded in other contexts.
3. Represent real-world systems from science and technology in a mathematical framework.
4. Employ appropriate methods to analyse, solve and evaluate the performance of mathematical models.
5. Identify relevant disciplinary material and sources to pursue independent mathematical learning and deepen understanding of the behaviour of a system reasoning.
6. Relate the behaviour of the output of the mathematical model to the underlying physical or conceptual model of interest.
7. Extend their experiences of working both independently and collaboratively within the discipline to other contexts.
8. Relate professional and disciplinary information and ideas to varied audiences in effective and appropriate ways.

MATHEMATICS OF FINANCE-I

Semester: V

Core: IX

Hours: 6

Code: U19AS509

Credits: 5

Course Objective:

1. To identify the positive and negative cash flow in any financial contract
2. To learn the cash flow process
3. To understand the interest rate concepts in financial contract
4. To learn the discount rate concepts in financial contract
5. To learn the discount and accumulated value in financial contract
6. To understand the financial contract.
7. To predict the initial investment of any financial contract
8. To apply cash flow model in any financial contract

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. Study Material: Core techniques – 1 (CT1), Institute of faculty of Actuaries, UK, 2016.
2. Mathematical basis of life insurance–IC 81, Insurance Institute of India material, 2006.

References:

1. Actuarial Mathematics. Bowers, Newton L et al. – 2nd ed. – Society of Actuaries, 1997.xxvi, 753 pages. ISBN: 0 938959 46 8.
2. Business Mathematics, Dr P. Mariappan, Pearson Indian Education Service Pvt. Ltd., 2015; ISBN: 978-93-325-3634-0

Course Outcomes:

1. Develop the financial contract
2. Identify the positive and negative cash flow
3. Solve present value of cash flow

4. Solve the accumulated value of cash flow
5. Solve the series of cash flow using actuarial calculation
6. Understand the interest rates and discount rates role in financial contract
7. Learn Different types of investments
8. Solve the investment problem in any financial sectors

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 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: Basics of MS-Excel: 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: Conditional Formatting: Basic Functions – Mail merge – Conditional Formatting – Finding cells with conditional formatting – Clearing conditional formatting – Using table and cell styles

Unit III: Pivot Table: 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: Lookup Functions: The Horizontal lookup & Vertical lookup Functions – Using IF, AND, & OR functions

Unit V: Macro Function: 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, Walken Bach, Microsoft Excel 2016 bible: The comprehensive tutorial resource Wiley, 2016

Course Outcomes:

1. Use Microsoft Excel to create personal and/or business spread sheets following current professional and/or industry standards.
2. Communicate in a business setting using spread sheet vocabulary.
3. Use critical thinking skills to design and create spread sheets.
4. Provides skills and knowledge which will allow the attendee to create and use all sorts of keys & functions of their own.
5. Excel working options, enhance charts, protect worksheet data, perform advanced data operations using summarizing.
6. Creating lookup functions.
7. Pivot Tables, data consolidations, goal seeking, and solver create and use Macros.
8. Able to run a Macro with Relative References.

Group Insurance & Retirement benefit

Semester: V

Elective: III

Hours: 5

Code: U19AS5:3

Credits: 4

Course objectives:

- O1- To introduce the concepts of group insurance and pension plans
- O2- To understand the government provision of social welfare benefits
- O3- To make sensible allocation of fund for retirement benefits
- O4- To understand the real time risks arising in accumulation of funds
- O5- To differentiate the defined benefits schemes and defined contribution schemes.
- O6- To understand the investment pattern guided by the PFRDA
- O7- To make smoother benefits to insurer and reinsurer.
- O8- To apply the fiscal and monetary policy in pension calculations.

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.

Text Book:

IC 83- Group insurance and retirement benefits- Insurance Institute of India.

Reference:

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

Course Outcomes:

CO1 -Understand the retirement benefits.

CO2 -Relate the pension benefits with foreign countries

CO3- Distinguish the types of various pension and group insurance plan.

CO4 -Understand the methodology calculating the various pension schemes.

CO5 -Apply those concepts in actuarial perspective.

CO6 -Differentiate the superannuation from provident fund benefits

CO7: Illustrate the definite funding and indefinite funding.

CO8: Able to apply the PFRDA s instructions in deriving the retirement benefits.

PRINCIPLES OF INSURANCE

Semester: V

SBEC: II

Hours:2

Code: U19AS5S2

Credits: 2

Course Objective:

1. To introduce the concept of insurance.
2. To study different types of insurance.
3. To identify the different types of market.
4. To develop the current scenario of insurance.
5. To study the life insurance product
6. To identify the marine insurance risk
7. To introduce the concept of reinsurance
8. To design a group insurance policy.

Unit I: Risk Management: Meaning of risk – Types of risks – Risk analysis – Risk Management techniques – Risk retention - **Insurance:** Insurance – Concept and scope – Nationalization of Insurance in India in 1972 structure of Insurance in India –Privatization and Globalization of Insurance in India.

Unit II: The Insurance market: Indian insurance market – Intermediaries – Specialists – Regulator and other bodies. **The insurance contract:** Introduction – Insurable interest – Principle of indemnity – Subrogation and contribution – Utmost good faith- Proximate cause.

Unit III: General Insurance: Need for General Insurance – Reinsurance – Importance – Fundamentals – Specific terms used in reinsurance – 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: Life insurance products: Traditional products – Linked products – Annuities and group policies.

Text Book:

1. “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. Arthur C Williams, Peter C Young, Michael L. Smith, "Risk Management & Insurance", Edition 2002.
5. Hull, Risk management.

Course Outcomes:

1. Analyze the situation of the risk.
2. Identify the different types of general insurance.
3. Discuss the different types of risk.
4. Design the life insurance products
5. Analyze the insurance market.
6. Identify the claim procedures.
7. Understand the concept of reinsurance.
8. Identify the types of risk.

SEMESTER – VI

OPERATIONS RESEARCH

Semester: VI

Core: X

Hours: 6

Code: U19AS610

Credits: 5

Course Objectives:

1. To formulate mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
2. To apply the concept of simplex method and its extensions to dual simplex algorithm.
3. To understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand.
4. To identify the relationship between a linear program and it's dual.
5. To solve the problem of transporting the products from origins to destinations with least transportation cost and Assignment problems.
6. To introduce the field of operations research this has many applications in management techniques.
7. To find optimum solutions in business and management problems.
8. To formulate a real-world problem as a mathematical programming model

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: Simplex Method: Simplex methods to solve LPP (Ordinary Simplex method, Big-M-method, Two-phase-Simplex method).

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

Textbook:

Dr P. Mariappan, Operations Research – An Introduction, Pearson; 1 edition, 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]

Course Outcomes:

Students will be able to:

1. Understand the meaning of Operations Research and how to use it.
2. Write linear program in the event of minimum cost or maximum profit.
3. Solve linear programming problem using Graphical Method, Simplex Method, Big-M-Method and Two Phase Simplex Method.
4. Explain dual simplex method.
5. Understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
6. Build and solve Transportation Models and Assignment Models.
7. Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.
8. Use CPM and PERT techniques, to plan, schedule, and control project activities.

NUMERICAL METHODS

Semester: VI

Core: XI

Hours: 6

Code: U19AS611

Credits: 5

Course Objective:

- O1: To introduce different numerical techniques.
- O2: To solve Algebraic and differential equations.
- O3: To develop skills in solving problems using numerical techniques.
- O4: To solve the forward differences problems.
- O5: To solve Taylor series problems.
- O6: To know solving predictor problems.
- O7: To Solve corrector problems.
- O8: To know Jacobi techniques.

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

Unit II: Linear Algebraic Equations: 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: Newton’s differentiation and integration: 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: Newton’s formula to ODE: Numerical solution of ordinary differential equation – Taylor series method – Euler’s method – Runge-Kutta methods – Predictor corrector methods.

Textbook:

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

Unit I	Chapter 3	§ 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	§ 4.1, 4.2, 4.2.1, 4.7, 4.8, 4.9
Unit III	Chapter 5	§ 5.1, 5.2, 5.3, 5.4;

	Chapter 6	§ 6.1, 6.2, 6.3;
	Chapter 8	§ 8.7, 8.8
Unit IV	Chapter 9	§ 9.1, 9.2, 9.3, 9.7, 9.8, 9.9, 9.10, 9.13, 9.14
Unit V	Chapter 11	§ 11.5, 11.9, 11.12, 11.13, 11.16, 11.17

Reference:

1. Eugene Isaacson and Herbert Bishop Keller, Analysis of Numerical methods, Doever Publications, 2012, ISBN: 13:9780486137988.

Course Outcomes:

CO1: Analyze the different algebraic and numerical techniques.

CO2: Solve problems using numerical techniques.

CO3: Discuss the best method for suitable problems.

CO4: Solve problems using transcendental problems.

CO5: Analyze the different types of forward techniques.

CO6: Discuss the newton methods.

CO7: Analyze simultaneous linear algebraic equations.

CO8: Discuss the difference of polynomial.

MATHEMATICS OF FINANCE – II

Semester: VI

Core: XII

Hours: 5

Code: U19AS612

Credits: 5

Course Objective:

1. To understand the equation of value
2. To learn how a loan is repaid by regular installments of interest and capital
3. To understand the income and expenses of insurance company
4. How to choose the profitable project
5. To learn methods to choose the project
6. Methods to learn the rate of return from the project
7. To identify the increasing and decreasing cash flow
8. To solve the series of varying cash flow

Unit I: 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: -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-Introduction-An example- Calculating the capital outstanding – Introduction-The theory - Prospective loan calculation -Retrospective loan calculation.

Unit IV: 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- MWRR, TWRR, LIRR.

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

Textbook:

1. **Study Material:** Study Material: Core techniques – 1 (CT1), Institute of faculty of actuaries, UK, 2016.

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

Course Outcomes:

1. Solve the varying cash flow model by increasing and decreasing
2. Always income must equal to expenses
3. Predict the premium based on expenses
4. Solve the outstanding loan amount
5. Find the loan repayment
6. Identify the profitable project
7. Apply project appraisal techniques in any financial contract
8. Identify which project give the maximum return

BASICS OF LIFE CONTINGENCIES

Semester: VI

Core: XIII

Hours: 6

Code: U19AS613

Credits: 5

Course Objective:

O1: To study Life table.

O2: To compute different methods of Life table functions at non-integers ages.

O3: To know real time applications of Using the life table.

O4: To study the methods for constructing Select & Ultimate life tables.

O5: To know the Life Assurance Contract.

O6: To know the Life Annuity Contract.

O7: To know the Net Premiums and Reserves.

O8: To study the Mortality, selection and standardization.

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)

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 III: 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 IV: Net Premiums and Reserves: Introduction - Premiums - Frequency Of Payment – The Net premium- Definition – Notation – The Insurer's loss Random variable – Retrospective accumulation – Reserves – Net Premium Reserves – Recursive calculation of reserves

Unit 5: Mortality, selection and standardization: Principal factors contributing to variation in mortality and morbidity – Selection – Selection in life assurance and pensions business – Life assurance – Pension funds – Why it is necessary to have different mortality tables for different classes of lives – How decrements can have a selective effect – Risk classification in life insurance – Impact of genetic information on risk classification in life insurance – Single

figure indices – Crude mortality rate – Directly standardized mortality rate – Indirectly standardized mortality rate – Standardized mortality ratio.

Text Book: Unit 1 – CT-5 – Chapter – 3 (only from Material)

Unit 2 – IC 81 – (III Book)

Unit 3 – IC 81 – (III Book)

Unit 4 – CT 5 - Chapter – 5 (only from Material)

Unit 5 – CT 5 - Chapter – 14 (only from Material)

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, 452 pages. 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.

Course Outcomes:

CO1: Apply the real time application of Life table.

CO2: Identify the Life table functions at non-integers ages.

CO3: Compute the different applications of UDD & CFM.

CO4: Identify the sum Assured is payable not on death in Life Assurance Contract.

CO5: Compute the Life Annuity Contract and its types.

CO6: Analyze the Net Premium and Reserve methods.

CO7: Compute the calculation of reserves.

CO8: Analyses the selection and standardization.

INSURANCE UNDERWRITING AND RISK MANAGEMENT

Semester: VI

Core : XIV

Hours: 5

Code: U19AS614

Credits: 4

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 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: Surveyors in Non-Life Insurance: 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 § 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 § 2.1, 2.2, 2.2.1, 2.7, 2.8, 2.9

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

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

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

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

References:

- Dr. E. Dharmaraj, Elements of Insurance, SIMERS Publication, 2016
- Reinsurance management (IC- 85) by Insurance Institute of India.

- Christopher J Bojer, Property and casualty insurance concepts, Wells Media Group, 2018

Course Outcomes:

1. Able to understand the managing or risks in insurance sector.
2. Handle the step by step risk management process cycle.
3. Understand the need and importance of underwriting works.
4. Able to forecast the risk in underwriting works.
5. Workout the calculations for risk prediction and mitigating.
6. Categorize the financial and non-financial risks in life insurance.
7. Knowing the real time risk factors arising in underwriting job.
8. Able to manage the unexpected risks arising life insurance.

MATHEMATICS FOR COMPETITIVE EXAMINATIONS

Semester: VI

SBEC: III

Hours: 2

Code: U19AS6S3

Credits:2

Course 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.

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. Agarwal, Quantitative aptitude for competitive exams, S Chand Publishing, 2017.

Reference:

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

Course Outcomes:

1. Able to work out aptitude problems in competitive exams.
2. To get through all type of competitive exams and interview process.
3. Making great achievements through competitive exams.
4. Able to get through the UPSC and TNPSC exams.
5. Developing the individual confidence to appear for screening process.
6. To connect the real time problems in solving the mathematical problems.
7. Using the analytical skills in corporate risk management.

8. Developing the knowledge based skills for the development of profession.