# University of Mumbai

**B.Sc. (Actuarial Science) Programme
Three Year Integrated Programme- Six
Semesters**
*Proposed Course Structure*
**Under Choice Based Credit, Grading and Semester**
*System*
**To be implemented from Academic Year- 2019-2020**

## UNIVERSITY OF MUMBAI

## Syllabus for Approval for
## B.Sc. (Actuarial Science)

| | |
|---|---|
| Eligibility for Admission | H.S.C with Mathematics as one of the subjects |
| Passing Marks | As per norms of University of Mumbai for undergraduate programme |
| Ordinances / Regulations (if any) | As per the norms |
| No. of Years / Semesters | 3 years (6 Semesters) |
| Level | UG |
| Pattern | Semester |
| Status | New |
| To be implemented from Academic Year | From Academic Year 2019 - 2020 |

Date:                                    Signature:

# -B.Sc. (Actuarial Science) Programme

*Under Choice Based Credit, Grading and Semester System*
*Course Structure*
**F.Y.B.Sc. (Actuarial Science)**
**(To be implemented from Academic Year- 2019-2020)**

| | Semester I | | Semester II |
|---|---|---|---|
| 1 | Business Awareness Module | 1 | Stochastic models |
| 2 | Probability and Mathematical Statistics-I | 2 | Probability and Mathematical Statistics-II |
| 3 | Financial Mathematics – I | 3 | Financial Mathematics – II |
| 4 | Business Economics – I | 4 | Actuarial Modelling |
| 5 | Practical I | 5 | Practical II |

**S.Y.B.Sc. (Actuarial Science)**
**(To be implemented from Academic Year- 2020-2021)**

| | Semester III | | Semester IV |
|---|---|---|---|
| 1 | Business Economics II | 1 | Statistical Methods I |
| 2 | Life & health Contingencies I | 2 | Finance and Financial Reporting I |
| 3 | Group insurance | 3 | Marketing of Services |
| 4 | Retirement Benefits | 4 | Communications (Theoretical) |
| 5 | Project Work I | 5 | Communications (Practical) |

**T.Y.B.Sc. (Actuarial Science)**
**(To be implemented from Academic Year- 2021-2022)**

| | Semester V | | Semester VI |
|---|---|---|---|
| 1 | Actuarial Risk Management I | 1 | Statistical Methods II |
| 2 | Life & health Contingencies II | 2 | Finance and Financial Reporting II |
| 3 | Finance & Investments | 3 | Actuarial Risk Management – II |
| 4 | General Insurance | 4 | Industry Project work II |
| 5 | Presentation & Viva | 5 | Viva |

# Semester I

## 1. Business Awareness Module

### Unit I
Financial system: Financial environment: - Real Assets Vs Financial Assets – Role of Financial System- Market Structure – Recent Trends: - Globalization – Securitization – Financial Engineering – Computer Networks – Derivatives – ADRs and GDRs – GDRs: - Advantage for Issuers- Benefit for Investors - Securitization – Jargons – Features of securitization – Jargons – Features of securitization – Current securitization activity in India

### Unit II
Financial Markets & Instruments – Financial Markets – Functions of Financial Markets – Organization of Financial Markets – Types of Financial Markets : - Primary & Secondary Markets – Short term ( money ) and Long Term ( Capital) Market : - Money Market Instruments : Call money – Repos - Collateralized Lending  and Borrowing – treasury Bills – Commercial paper – certificate of Deposit - Commercial Bills – Capital Market Instruments  :- Central Government Securities – State Government securities  and Public Sector bonds- Corporate bonds and debentures – Equity Shares- Preference shares – Warrants- Spot & Deferred Delivery Market – Derivative Products  : Forwards – Futures Options – Regulation of Financial Markets, Primary & Secondary Markets : Introduction – Primary Markets :- Classifications of Issue  :- On the basis of Price - On the basis of subscribers – A Preferential Issue – Issue to the existing shareholders - Pricing of  an Issue – Book Building process – Auction of  T – bills and GOI securities –Offer Document - steps involved in Public & Rights Issue – Listing and delisting – Secondary Market  : Trading on Stock Exchanges : Screen Based Trading – Contract Note – depository -  Settlement – Custodian – Technology in trading and settlement – Trading on Over the Counter / Dealer Market –Stock Market Indices-  Index Construction – Equity Indices – BSE Indices- NSE Indices – Debt Market Indices.

### Unit III
Macro Economy & Financial Service Industry: Aspects of Global Economy and Politics – Economic factors - National Income – Gross National Product (GNP) - Gross Domestic Product (GDP)- Per Capita Income – Savings as a % of GDP- Inflation and Recession – Monetary & Fiscal Policy – Life Insurance – General Insurance – Challenges and Issue: Challenges facing Insurance Industry- Issues in Insurance Industry

### Unit IV

Actuarial Profession – Overview – Introduction to profession and professionalism –Evolution of Actuarial profession – Characteristics of the ideal profession – Characteristics of the Actuarial profession. Actuary in Financial Services Industry : - Role of Actuaries :- Insurance Business - valuation of liabilities- profit distribution- product design and product pricing – profit testing – Assessment of solvency - Investigation of investment policy- investigation of new business risks – General Insurance : - Premium rating – Estimation of liabilities – collecting and presentation of information – Reinsurance requirements – Health insurance – Investment policies – Financial supervision – Role of an appointed Actuary – Role of an Actuary – other areas- Skills required for the Actuary – Acquiring Knowledge about the Aspects of the Company where Actuary is employed.

# 2.Probability and Mathematical Statistics - I

## Unit I
Grouped Frequency Distribution – Stem and Leaf Diagrams - Line Plots - Cumulative Frequency tables Measures of Location- The Mean - The Median - The Mode - Measures of Spread – The Standard Deviation- Moments – The Range – The Interquartile Range – Symmetry and Skewness ( Bowley's Pearson's & moments )- Box Plots- Probability-  definition- Basic Properties – addition rule for probability – conditional probability definition – derivation of baye's theorem for events – probabilities for  situations involving independence.

## Unit II
Random Variables : Discrete Random Variables- Random Variables – Probabilities – Probability Functions – Cumulative Distribution Functions – Continuous Random Variables- Definition- Probability Density Function – Cumulative Distribution Function- Expect Values – Mean- Variance and Standard Deviation – Linear Functions of X- Moments- Important Discrete Distributions – Uniform Distribution – Bernoulli Distribution- Binominal Distribution- Geometric Distribution – Negative Binomial Distribution – Hyper Geometric Distribution – Poisson Distribution-Important Continuous Distributions – Uniform Distribution- Exponential Distribution – Gamma Distribution – Beta Distribution- Normal Distribution – Functions of a Random Variables – Discrete Random Variables – Continuous Random Variables.

## Unit III
Generating Functions: Probability Generating Functions – General Formula – Important Examples - Evaluating Moments – Moment Generating Functions - General Formula – Finding Moments - Uses of Moment Generating Functions – Important Examples. Joint Distributions: Joint Probability ( Density) Functions – Discrete Case – Continuous Case-Marginal Probability ( Density) Functions – Discrete Case – Continuous Case- Conditional Probability ( Density) Functions – Continuous Case – Independence of Random Variables – Discrete Case- Continuous Case – Functions of Random Variables – Expectations of Functions  of Two Variables- Expectations- Expectation of a Sum- Expectation of a Product – Covariance and Correlation Coefficient –
Useful Results on Handling Covariance – Variance of a Sum –Using Generating Functions to Derive Distributions of Linear Combinations of Independent Random Variables - Probability Generating Functions –Moment Generating Functions

## Unit IV

Conditional Expectation: The Conditional Expectations E [Y/X]- The Random Variables E [Y/X]- The Random Variables V[Y/X] and the "E[V]+V[E]". Result- Moment Generating Functions – Compound Distributions – Moments of Compound Distributions – Generating Functions of Compound Distributions – The Central Limit Theorem and its applications – Definitions – Practical Uses – Normal Approximation for Binomial Distribution, Poisson Distribution, Gamma Distribution – The Continuity Correction- Examples.

# 3.Financial Mathematics – Paper I

## Unit I:

Cash flow Models: Cash Flow Process- Examples of Cash Flow Scenarios – Zero Coupon Bond, Fixed Interest Securities, Index Linked Securities, Cash on Deposit, Equity, Annuity, An Interest Only Loan, Repayment Loan, The Time Value of Money: Simple Interest, Compound Interest, Present Values Simple Discount, Investing Over a Period.

Interest Rates: Nominal Rate of Interest – Accumulation Factors – Principles of Consistency, The Force of Interest- Present Values – The Basic Compound Interest Functions – Interest Payable pthly. Real and Money rates of interest: Definition of real and money interest rates – Deflationary conditions - Usefulness of real and money interest rates.

## Unit II

Discounting and Accumulation: Present Values of Cash flows- Discrete Cash Flows, Continuous Cash Flows – Valuing Cash Flows – Constant Interest Rates, Sudden Changes in Interest Rates – Interest Income.

Level Annuities: Present Values – Payments Made in Arrear, Payment Made in Advance- Accumulations – Perpetuities – Continuously Payable Annuities- Annuities Payable pthly: Present Values, Accumulations, Perpetuities- Annuities Payable monthly where p is less than 1 – Non-Integer value of n.

## Unit III

Deferred and Increasing Annuities: Deferred Annuities- Annual Payments - Continuously payable Annuities, Annuities Payable monthly,Non-Integer Values of n- Varying Annuities- Annual Payments- Continuously Payable Annuities Relationship – Decreasing Annuities – Special Cases- irregular Payments – Sudden Changes in Interest Rates.

Equation of Value : The Equation of Value and the Yield on the Transaction – The Theory – Solving for an Unknown Quantity – Uncertain Payment or Receipt – Probability of Cash flows, Higher Discount rate, Loan Schedules : Calculating the Capital Outstanding – Introduction, the Theory and the retrospective  Loan Calculation – Calculating the Interest and Capital Elements – The Loan Schedule- Installment Payable More Frequently than Annually- Consumer Credit  : Flat Rates and APRs.

## Unit IV

Investments :  Introduction – fixed interest government borrowings – fixed interest government bonds, cash flows, variations, tax, security, marketability and return – government bills- fixed interest borrowings by other bodies-

characteristics of corporate debt, debentures, unsecured loan stocks, Eurobonds, Certificates of Deposit- convertibles – property – derivatives- future, range of Futures, clearing house, margin, bond futures, short interest futures, stock index futures- options, swaps- interest rate swaps, Currency swaps.

# 4.Business Economics – I

## Unit I

Economics concepts: What Economists study – Business economics – The Microeconomic Environment – Business Economics – Microeconomics Choices.
Demand and Supply: Demand – Supply – Price and Output Determination – Business in a Competitive Market.
Elasticity and Uncertainty: Price Elasticity of Demand- The importance of PED to Business Decision Making – Other Elasticity – The time Dimension of Market Adjustment - Dealing with Uncertainty.

## Unit -II

Consumer demand and Uncertainty: Marginal Utility Theory – Demand under condition of risk and uncertainty – utility and insurance
Production and Cost: The meaning of cost – production in the short run – cost in the short run- production in the long run – cost in long run.
Revenue and Profit: Revenue – Profit Maximization.

## Unit III

Prefect competition and monopoly: Alternative market structures – perfect competition – monopoly – Comparing monopoly with perfect competition.
Imperfect competition: Monopolistic competition – comparing monopolistic competition with other market structures – oligopoly- collusive oligopoly - Non – collusive oligopoly- game theory.

## Unit –IV

Products, marketing and advertising: Product differentiation – Marketing-Advertising.
Pricing strategies: Pricing and market structure – alternative pricing strategies – price discrimination – multiple product pricing – transfer pricing

# 1. Practical – I

**This paper will consist of numerical problems based on all the papers during Semester I.**

# Semester II

# 1. Stochastic Models

### Unit I(Problem only)
Introduction on Stochastic Processes: Markov chains, A model of a no claims discount policy- transition probability matrix, classification of states- transient, recurrent, ergodic - ergodic theorems. The long - term distribution of a Markov Chain – The Stationary probability distribution and applications

### Unit II
Survival Models : A simple model of survival ( Model I ) – Future lifetime – Probabilities of death and survival The force of mortality – Survival probabilities – The probability density function of Tx – Initial rates and central rates of mortality – complete and curate expectation of life - Complete expectation of life - Curate expectation of life - The relationship between and ex- future lifetime – variance – Uses of the expectation of life – Some important formulae- A formula for tPx– Simple laws of mortality – Gompertz' and Makeham's Laws – Calculating the parameter values – Survival probabilities.

### Unit III (Problem only)
Estimating the Life Time Distribution Function $F_x(t)$: The Karplan – Meier and Nelson – Aalen models – The Kaplan – Meier estimate – Nelson – Aalen estimate – Relationship between the Kaplan – Meier and Nelson – Aalen estimates.

### Unit IV (Problem only)
The Cox Regression Model: Fully parametric models – parametric models for the hazard function – Covariates – The Cox Model – Introduction – Hazards of Different lives – The utility of the Cox model – Estimating the regression parameters

# 2.Probability and Mathematical Statistics – II

## Unit I
Sampling and statistical inferences : Sample inference – Population inference – Statistical inference - statistic and its sampling distribution – Mean and variance of sample mean – Use of t – statistic for random samples from a normal distribution – using F distribution for the ratio of two sample variances from normal distributions (definitions and applications only without derivations for F and t distribution)

Point estimation: Constructing estimators of population parameters using method of moments – Method of Maximum likelihood – unbiasedness- means square error of an estimator – asymptotic distribution of maximum likelihood estimators.

## Unit II
Hypothesis Testing: null and alternative hypothesis – simple and composite hypothesis- type I error type II error – likelihood ratio- level of significance – Probability value and power of test- basic tests for one sample and two sample situations – Chi- squared test – contingency table. Confidence Intervals: Deriving confidence intervals for mean and variance of normal distribution – for binomial and Poisson – for two sample distribution – confidence interval for a difference between two means from paired data.

## Unit III
Correlation and Regression: scatter plots for bivariate data – calculation of correlation coefficient of bivariat data – performing statistical inference – response and explanatory variables- simple regression model- least squares estimate – statistical inference on slope parameter—calculation of R2 coefficient of determination – predict a mean or individual response – multiple linear regression method.

## Unit IV
Analysis of Variance – one-way analysis of variance – the model - estimation of the parameters - partitioning the variability – checking the model -examining the treatment means – confidence intervals for a single treatment means – confidence intervals for a pair of treatment means – analyzing likement means using a least significant difference approach.

# 3.Financial Mathematics –II

## Unit I
Project Appraisal: Introduction – Estimating cash flows – fixed interest rates-accumulated value, net present value, internal rate of return, the comparison of two investment projects – different interest rates for lending and borrowing – payback period- other   considerations – measurement of investment performance –money weighted rate or return, time weighted rate of return, linked internal rate of return .

## Unit II
Simple compound Interest Problems : Fixed Interest Securities – Calculating the price, allowing for income tax perpetuities, calculating yields- the effect of the term to redemption on the yield  - part  loan purchases – optional redemption dates – deferred income tax- uncertain income securities – equities – property- real rate of interest – inflation adjusted cash flows – calculating real yield using an inflation index – calculating real yields given constant  inflation assumption – payments related to the rate of inflation – the effects of inflation – index linked bonds – capital gains tax- valuing a loan with allowance for capital gains tax – finding the yield when there is capital gains tax – optional redemption rates- offsetting capital losses against capital gains – the indexation of capital gains.

## Unit III
Arbitrage and Forward Contracts : The no arbitrage assumption – why do we assume no arbitrage - forward contracts – calculating the forward price for a security with no income – calculating the forward price for a security with fixed cash income – calculating the forward price for a security with drawn dividend yield – hedging – the value of a forward contract – fixed cash income.

## Unit IV
Time structure of interest rates: discrete time – discrete time spot rates- discrete time forward rates – continuous time rates –continuous time spot rates – continuing time forward rates – instantaneous forward rates – theories of time – term structure of interest rates – why interest rates vary over time - theories – yield curve – yields to maturity – par yields – duration – convexity and immunization - interest rate risk- effective duration – duration – convexity – immunization. Stochastic interest rate models:  simple models – preliminary remarks – fixed interest rate model - carrying interest rate model –moment of Sn –moments of an – log normal distribution.

# 4.Actuarial Modelling

## Unit I

Binominal and Poisson Models: Binominal – type models – The binomial models – Estimating qx from the data- Generalization of the model – Maximizing the likelihood – The actuarial estimate – Findings a simple estimate for qx – Strengths and weakness of the binomial model- The Poisson model – Estimating the underlying force of mortality.

Exposed to Risk (Problem Only)**:** Calculating the exposed to risk – Exact calculating of Central exposed to risk census approximations to Central exposed to risk.

## Unit II

Graduation and Statistical Tests : Introduction – Graduation of Observed Mortality Rates – The Underlying Assumptions – Comparison with other Tables – Standard tables Graduation – The need for Graduation – Reasons for Graduation – The Theoretical Argument- The practical Argument – Desirable Features of a Graduation – Smoothness Versus Adherence to Data – Suitability for purpose in Hand – Testing the Smoothness of a Graduation – Smooth Graduation

## UNIT III (Problem only)

Graduation and Statistical Tests: Chi- Square Test – Standardized Deviations Test – Signs Test Cumulative Deviations- Grouping of Sign Test- Serial Corrections Tests- Testing Actual Versus Expected Rates.

## UNIT IV

Methods of Graduation: Graduation by Parametric Formula – The Graduation Process- Graphical Graduation – The Graphical Graduation Process – Comparison of Different method- Graduation by Parametric Formula – Graduation by Reference to a Standard Table Statistical Tests of a Graduation- Testing a Graduation – The Effect of Duplicate Policies.

# 1. Practical II

**This paper will consist of numerical problems based on all the papers during Semester II.**

# Semester III

# 1. Business Economics – II

### Unit – I
Growth strategy and globalization: Growth and profitability – constraints on growth alternative growth strategies – internal growth – external growth through merger – external growth through strategic alliance – explaining external growth – a transaction cost approach- globalization.

Government intervention in markets: The objectives of government intervention – types of market failure – types of Government intervention – the case for less Government intervention.

### Unit –II
Government and the firm: competition policy- policies towards research and development.

Supply – side policy: the supply – side problems – market – oriented supply – side policies - industrial policy.

International trade: trading patterns – the advantages of trade – arguments for restricting trade – the world trading system and the WTO.

### Unit –III
Balance of payments and exchange rates: the balance of payments account – the exchange rate- exchange rates and balance of payments – fixed versus floating exchange rate.

The macroeconomics environment: macroeconomics objectives – the circular flow of income – the measurements of national income- the determination national income – economics growth – unemployment – inflation.

### Unit – IV
Money and interest rates: the functions and meaning of money – the financial system- the supply of money – the demand for money – equilibrium in the money market- the effect of a change in the money supply.

Business activity, unemployment and inflation: unemployment and inflation - the disappearance of the Phillips curve – business cycles.

Demand side macroeconomics policy: fiscal policy – monetary policy – demand management general- current demand side policy in the UK- the supply side problems.

# 2. Life & Health Contingencies – I

## Unit I
The life table : Constructing a life table – Using the life table – The pattern of human mortality -Life table functions at non - integer ages – Method I – uniform distribution of deaths (UDD)- Methods 2- constant force of mortality (CFM)- The general patterns of mortality- Mortality characteristics – The shape of qx, lx, dx – Using the life table to evaluate means and variances - Evaluating means and variances without use of the life table – Select mortality – Displaying select rates – Constructing select and ultimate life tables- Using tabulated select life table functions – Evaluating means and variances using select mortality.

## Unit II
Life assurance contracts: Pricing of life insurance contracts – Equations of value- Allowance for investment income – Present value random variables – Expected present value – Variance of the present value random variables for life assurance contracts-Life assurance benefits payable immediately on death-Claim acceleration approximation. Life annuity contracts immediate annuity-Present value random variable – Expected present value – Variance of the present value random variables- Annuity-due – Temporary annuity – Temporary annuity-due – Deferred annuities – Deferred    annuities-due – continuous annuities.

Evaluation of assurance and annuities: Evaluating assurance benefits – Evaluating annuity benefits – Premium conversion equations – Discrete version – Continuous version – Variance of benefits – Expected present values of annuities payable m times each year – Retrospective accumulations – Pure endowment – Term assurance – Annuity.

## Unit III
Net premium and provisions  : Premiums – Frequency of payment – the net premium definition – Notation – The insurer's loss random variables – Provisions – Prospective provision- retrospective provision- Conditions for equality of prospective and retrospective Provisions - Provision conventions – Net premium provisions – definition – Some notation and results for net premium provisions – Whole life policies – Continuous functions- Non-annual premiums - term assurances – Other contracts – Recursive calculation  of provisions – conditions for recursive calculations – Net premium provisions at successive durations.

The Equations of equilibrium for a whole life assurance - General reasoning – Mortality profit Dead stain at risk (DSAR) – Expected death strain (EDS)-

Actual death strain (ADS) - Mortality Profit – Mortality profit on a portfolio of policies – Allowing for survival benefits annuities – Thiele's differential equation.

## Unit IV

Variable benefits and with – profit polices : Variable payments – Payments varying at a constant compound  rate – Payments changing by a constant monetary amount – Whole life assurance – Term assurance- Whole life annuity payable annually in arrears- Whole life annuity payable annually in advance – Temporary annuities – With-profit contracts – Types of bonus – Calculating net premiums and net premium provisions for with - profit contracts – Net future loss random variables – Net premiums – Net premium provisions.

Gross premiums and provisions for fixed and variables benefit contract : Types of expenses incurred in writing a life insurance Contract- Measuring and allocating costs – charging for expenses – The influence  of inflation on expenses – Gross future loss random variables for standard Contracts- determining gross premium using the  equivalence principle – Annual premium contracts – With – Profit contract- Premiums payable m times per year- Gross premium using simple criteria other than the equivalence principle – Gross premium prospective and retrospective provision — Equality  of gross premium prospective  and retrospective provisions – Recursive  relationship between provisions for annual premium contracts.

# 3. Group Insurance

**Unit 1:**

Special Legal / other Features of Group Insurance / Superannuation Schemes- Group Insurance Schemes – EDLI and Non- EDLI - Group Gratuity Schemes: - Payment of Gratuity Act, 1972

**Unit 2**

Other Group Insurance Schemes: a) Fixed or graded cover schemes on the lives of employees b) Creditor – Debtor   Group Insurance Schemes for Housing Loans, Vehicle Loans etc.
Superannuation Schemes – Pension Schemes

**Unit 3:**

Group Savings Linked Insurance Schemes
a) Weaker section Schemes – b) Rural Schemes

# 4.Retirement Benefits

**Unit 1:**
Accounting Standards – Indian AS- 15, US GAAP, International Accounting
Standards – Actuarial Valuation of Retirement benefits.
Taxation Aspects

# 5.Project Work – I

Project work shall be completed by working outside the regular teaching hours under the supervision of a teacher in the concerned department in a reputed insurance company or industry/Research Institute. There should be an internal assessment and external assessment for the project work. The external evaluation of the Project work is followed by presentation of work including dissertation and Viva-Voce.

# 1. Statistical Methods – I

## Unit I

Decision theory: Introduction – zero – sum two player games – domination – the minimum criterion – saddle points – randomized strategies – statistical - The Bayes criterion Bayesian Statistics: Bayesian theorem prior and posterior distribution: Notation – determination the posterior density – continuous prior distribution – conjugate priors –improper prior distribution. The loss function: quadratic loss absolute error loss- all- or- nothing loss.

## Unit II

Loss distributions: the exponential distribution – the gamma distribution – normal distribution – pareto and generalized Pareto distribution – lognormal distribution – the weibull  distribution the burr distribution. Estimation – the method of moment –MLE for gamma, exponential distribution.
Reinsurance: Introduction – proportional reinsurance arrangements – excess of loss reinsurance for prior and reinsurer- proportional reinsurance lognormal distribution and examples –normal distribution and examples – inflation – estimation – policy excess.

## Unit III:

Risk model (I):The basic model – discussion of the simplification in the basic model – notation and assumption. The collective risk model: - the collective risk model – distribution function and convolution- Moments of compound distribution – the compound Poisson distribution – the compound binominal distribution – the compound negative binomial distribution. Risk model (2): aggregate claim distribution order proportional and excess of loss reinsurance: proportional reinsurance – excess of loss reinsurance. The individual risk model parameter variability /uncertainty: - introduction – variability in isterogeneous portfolio- variability in homogeneous portfolio – variability in claim Numbers and claim amounts and parameter uncertainty.

## Unit IV

Credibility theory: Introduction – credibility: the credibility premium formula the credibility prior. Bayesian credibility: introduction – the Poisson / gamma model – numerical illustrations of the Poisson / gamma model – the normal / normal model – dissuasion of the Bayesian approach to credibility.

# 2. Finance and Financial Reporting – I

## Unit I
Key principles of finance  : Introduction to finance – finance and real resources of an organization- finance and the organization objectives- responsibilities for financial decisions – the importance of capital budgeting – financial analysis – business objectives – the stakeholder – conflicting objective provides of finance – ways of managing conflicts- business objectives – a  re- statement  -the maximization of shareholders wealth – the goal of the financial managers- the opportunity cost of capital – the capital markets. Company ownership: types of business entity – sole trader – partnership limited companies – limited liability partnerships – private & public limited companies – pros & cons of limited companies – medium term finance – hire purchase – credit sale – leasing – bank loans – short term finance – bank overdrafts – trade credit – factoring- bills of exchange – commercial paper.

## Unit II
Financial instruments: loan capital – introduction – debenture stock – unsecured loan stock - subordinate debt- Eurobond loan capital – floating rate notes – share capital – ordinary shares – preference capital – convertibles – warrants – options issued by companies – winding up of a company. Issue of shares : obtaining stock exchange quotation – reasons for quotation – methods to obtain quotation – offer for sale at fixed price – offer for sale by tender – concessionary methods –offer for  subscription – placing – introduction – role of underwriting – Issue made by companies already quoted right issue – purpose – impact – theoretical price – scrip issue – purpose – impact – scrip dividend

## Unit III
Taxation: Introduction – personal taxation – considerations – taxable income – tax rates – corporation of- accounting profits & taxable profits – rates of tax – uses of corporation tax system- capital gain of- chargeable gains – indexation allowance – taper relief – capital losses – rates of tax- other taxes – stamp duty – inheritance taxes – property taxes – sales tax – custom and excise duties – double taxation relief. Use of derivatives: introduction – financial futures – bond futures- short interest rate future - work index futures –options – meaning –margins & premium – types – put option- call option – uses of option –interest & currency swaps – pricing – risk – uses of swaps.

## Unit IV

Capital structure and dividend policy : Introduction – capital structure – components of capital structure – asset structure and business –degree of acceptable gearing – the market and capital structure – high growth company that is highly geared – cyclical industry – an industry facing decline - " people " businesses – company in high growth but high risk industries – taxation and capital structure- dividends – shareholder's reward – fundamentals of dividend policy – factors influencing  dividend policy – other methods of reward – scrip and stock dividends – effects on companies and shareholders – share buyback – the market and dividends.  Weighted average cost of capital : introduction – the importance of the discount rate- defining the weighted average cost of capital- Modigliani and miller - their view- CAPM – cost of equity – CAPM and risk – systematic risk – beta as a measure of systematic risk – measuring beta – market derived real discount rate – cost of  debt marginal or average cost-determinants – calculation of WACC. Capital project appraisal : definition of a capital project – definition of project – evaluation of cash flows - methods of project evaluation – net present value – internal rate of return – annual capital charge- other methods- payback period – nominal returns – strategic fit – opportunity cost -  hurdle rates evaluation of risky projects – simulation-sensitivity analysis – scenario testing – Monte Cario stimulation – probability trees – certainty equivalents – results of the evaluation – allowing for systematic risk – calculation of required rate of return for a project – WACC-CAPM based approach - factors influencing beta practice – practical experience – other factors – risk analysis and dealing with risks – identification  of risk – risk matrices – causes of risk – analysis of risk – financial consequences of risk – obtaining a distribution of NPVs – scenario analysis –stochastic modelling – relative merits of the two approaches – unfavourable NPVs – risk mitigation – ways of mitigating risk – financial consequences of risk mitigation – the investment submission.

# 3.Marketing of Services

## Unit I
Services – characteristics & categories – major differences between services & goods classification of different types of services – contribution of services sector to the economy- consumer behaviour - Evaluation of service Alternatives – customer satisfaction.

## Unit II
Marketing mix elements for services – Targeting, segmentation & positioning – Problem areas of segmentation– Importance of pricing– Advertising & sales promotion in services - Role of distribution in services.

## Unit III
Role of people in services marketing – services provider employee – services recipient customer - service quality – measurement of service quality – delivery of quality service.
Management of services – performance measurement – enhancement & control

## Unit IV
Customer encounter management- obligation & duties of service provider. Marketing strategies for service firms – marketing of health care service – customer relationship management – New service opportunities.

# 4. Business Communication (Theoretical) - Paper I

## Unit I:

**Concept of Communication:** Meaning, Definition, Process, Need Feedback Emergence of Communication as a key concept in the Corporate and Global world Impact of technological advancements on Communication

**Channels and Objectives of Communication: Channels-** Formal and Informal- Vertical, Horizontal, Diagonal, Grapevine.

**Objectives of Communication:** Information, Advice, Order and Instruction, Persuasion, Motivation, Education, Warning, and Boosting the Morale of Employees (A brief introduction to these objectives to be given)

**Methods and Modes of Communication:**

**Methods:** Verbal and Nonverbal, Characteristics of Verbal Communication Characteristics of Non-verbal Communication, Business Etiquette

**Modes:** Telephone and SMS Communication 3 (General introduction to Telegram to be given) Facsimile Communication [Fax]

**Computers and E- communication Video and Satellite Conferencing.**

## Unit II:

**Problems in Communication /Barriers to Communication**: Physical/ Semantic/Language / Socio-Cultural / Psychological / Barriers, Ways to Overcome these Barriers.

**Listening**: Importance of Listening Skills, Cultivating good Listening Skills – 4.

**Introduction to Business Ethics:** Concept and Interpretation, Importance of Business Ethics, Personal Integrity at the workplace, Business Ethics and media, Computer Ethics, Corporate Social Responsibility.

Teachers can adopt a case study approach and address issues such as the following so as to orient and sensitize the student community to actual business practices:

Surrogate Advertising, Patents and Intellectual Property Rights, Dumping of Medical/E-waste, Human Rights Violations and Discrimination on the basis of gender, race, caste, religion, appearance and sexual orientation at the workplace.

Piracy, Insurance, Child Labour.

## Unit III:
**Theory of Business Letter Writing:**

Parts, Structure, Layouts—Full Block, Modified Block, Semi - Block
Principles of Effective Letter Writing, Principles of effective Email Writing.

**Personnel Correspondence:**

Statement of Purpose, Job Application Letter and Resume, Letter of Acceptance of Job Offer, Letter of Resignation [Letter of Appointment, Promotion and Termination, Letter of Recommendation (to be taught but not to be tested in the examination)]

**Unit IV:**
**Commercial Terms used in Business Communication.**
**Paragraph Writing:**
Developing an idea, using appropriate linking devices, etc
Cohesion and Coherence, self-editing, etc [Interpretation of technical data, Composition on a given situation, a short informal report etc.]

**Note:**

*One tutorial per batch per week in addition to number of lectures stated above (Batch size as per the University norms)*

# 5.Business Communication – Paper II

## Unit I
Presentations:(to be tested in tutorials only)4 Principles of EffectivePresentation - Effective use of OHP - Effective use of Transparencies - How to make a Power-Point Presentation

## Unit II:
**Interviews:** Group Discussion Preparing for an Interview, Types of Interviews –Selection, Appraisal, Grievance, Exit - **Meetings:** Need and Importance of Meetings, Conduct of Meeting and Group - Dynamics Role of the Chairperson, Role of the Participants, Drafting of Notice,Agenda and Resolutions - **Conference:** Meaning and Importance of Conference Organizing a Conference - Modern Methods: Video and Tele – Conferencing - **Public Relations:** Meaning, Functions of PR Department, External and InternalMeasures of PR.

## Unit III:
**Trade Letters:**  Order, Credit and Status Enquiry, Collection (just a brief introduction to be given) - **Only following to be taught in detail: -**
Letters of Inquiry, Letters of Complaints, Claims, Adjustments Sales Letters, promotional leaflets and fliers Consumer Grievance Letters, Letters under Right to
Information (RTI) Act
[Teachers must provide the students with theoretical constructs wherever necessary in order to create awareness. However, students should not be tested
on the theory.]

## Unit IV: Language and Writing Skills
**Reports:** Parts, Types, Feasibility Reports, Investigative Reports
**Summarisation:** Identification of main and supporting/sub points Presenting
these in a cohesive manner

## *Tutorial Activities:*

*Presentations, Group Discussion, Mock Interviews, Mock Meetings / Conferences, Book Reviews/Summarization, Reading Comprehension: Analysis of texts from the field of Literature [Suggested Books for Book*

*Reviews: Books from the fields of Management, Finance, and Literature Like – Sun Tzu :The Art of War, Eliyahu M. Goldratt : The Goal , Eliyahu M. Goldratt: It's Not Luck , Spencer Johnson: Who Moved My Cheese, Stephen Lundin, Ph.D., Harry Paul, John Christen: Fish, Chetan Bhagat One Night At A Call Center, Chetan Bhagat My Three Mistakes , Arindam Choudhary: Count Your Chickens Before They Hatch ,Stephen Covey :Seven Habits of Successful People, George Orwell: Animal Farm, Dr. Abdul Kalam: Wings of Fire ]*

# 1. Actuarial Risk Management – I

## Units I

Cash flows of simple products :- introduction to cash flows ( cash flow matching , cash flow process )- examples of cash flow scenarios ( annuity, term assurance, endowment assurance, an interest only loan, repayment loan (mortgage), motor insurance) contract design :- introduction – parties involved in contract design ( customer needs and interests, characteristics of other stakeholders involved in contract design) – deciding on the benefits to offer ( the level and form of benefits, option and guarantees, discretionary benefits, benefits taken early/ discontinuance terms, contract conditions ) commercial considerations ( profitability, marketability, competitiveness, statutory/ regulatory requirements) financing considerations ( financing requirements, method of financing the benefits to be provided, risk characteristics )- premiums, contributions and charges ( premium/ contribution pattern, charges vs. expenses, extent of cross – subsidies, consistency with other contracts)- administrative and accounting issues ( administration system, accounting implications)- summary (good contract design, interaction of contract design factors, core reading examples) considering all eventualities ( stochastic modelling , key scenarios)

## Unit II

Project management:- participating in a successful project ( introduction, characteristics of well-run projects, written strategy documents, project management team ) capital project appraisal :- introduction – capital projects and capital project appraisal ( definition of a capital project, key stages in capital project )- methods of initial appraisal – methods of detailed appraisal ( definition of project, evaluation of cash flows ) – choice of risk discount rate ( general considerations, systematic risk and specific risk, choosing the discount rate for projects with a normal degree of systematic risk, choosing the discount rate for projects with a higher than normal degree of systematic risk, other factors to consider )- risk identification – analysis of risks ( distribution of NPVS , core reading examples).

## Unit III

Relationship between returns on asset classes: expected and required returns (requiredreturns, suspected return, requires vs. expected return, determining whether an asset seems cheap)- analyzing historical returns (introduction, equities, conventional bonds, index – linked, cash, earnings) historical figures for the UK. Valuation of asset classes and portfolios:- analysis of expected returns from different assets ( introduction, two definitions, the analysis,

conventional government bonds , corporate loan stocks, equities, property) comparisons between investment sectors ( yield gap and reverse yield gap, dividend yields vs. real yields, property vs. other sectors, corporate bonds vs. government bonds, overseas investments)- other methods ( yields " norms " index levels and price charts, yield ratios)- relationship between the assets and liabilities ( consistency of valuation, consistency of method, consistency of bases )- allowing for the variability of the asset prices – notional portfolios( method, choosing the notional portfolio)

**Unit IV**

Relationship between assets and liabilities : - the principles of investment – asset – liability matching requirements of liabilities ( nature of the liabilities, benefit, payments, expense outgo, premium / contribution income ) – asset – liability matching requirements of assets    ( selecting assets appropriate to the liabilities, guaranteed in money terms, guaranteed in terms  of the prices index or similar ,discretionary benefits, investment linked) - other considerations ( currency, free assets / surplus, regulatory fame work, core reading example)
Asset Management: - portfolio construction (strategic benchmarks and tactical asset allocation) risk budgeting – measuring risk (tracking error, active money, value at risk, stress testing)- liability hedging (definition, unit- linked liabilities)

# 2.Life & Health Contingencies – II

## Units I

Simple annuities and assurances involving two lives : Random variables to describe join life functions – Joint lifetime variables and joint life table functions – Last survivor lifetime random variables – Determining simple probabilities involving two lives – Evaluating probabilities of death or survival of either or both of two lives- evaluating last survivor functions – determining present values involving two lives – Present values of joint life and last survivor assurances – Present values of joint life and last survivor annuities.

Contingent and reversionary benefits: Contingent probabilities of death - Present values of contingent assurances –Present values of reversionary annuities – Present values of functions with specified terms. Expected present values of last survivor assurances and annuities that also depend upon terms – Expected present values of reversionary annuities that depend upon terms – Expected present values of contingent assurances that depend upon terms – expected present value of annuities payable m times a year – Premium conversion relationships

Profit testing: Unit – linked contracts – Evaluating expected cash flows – Multiple decrement tables- Evaluating expected cash flows for conventional whole life assurance, Disability insurance with waiver of premium.

## Unit II

Unit- linked endowment assurance - Profit tests for annual premium contracts summary measures of profit – Choosing the risk discount rate – Determining premiums using a profit test- Profit criterion. Determining provisions using profit testing: Pricing and provisioning bases- Determining provisions for a unit – linked policy using cash flow techniques – Zeroising negative cash flows – Determining provisions for a conventional policy using cash flow techniques – Effect of pricing used provisioning bases on a profit test.

Competing risk: Multiple state modelling – Notation – Kolmogorov forward equations – Valuing benefits that are contingent upon competing risk –Multiple state approach multiple decrement tables – deriving department probabilities from transition intensities – Deriving the independent probabilities from the dependent probabilities.

Multiple decrement tables: Multiple decrement service table for pension calculations – updating a service table- Associated single decrement tables – Relationship between single and multiple decrement tables – Obtaining the underlying single decrement tables from the multiple decrement tables – construction of multiple decrement tables from underlying single decrement tables – How to obtain  multiple decrement tables rates – Alternative method for determining underlying single decrement rates – Consistency with the

multiple state approach.

## Unit III
Pension Funds    : Salary scale - Salary related pension benefits and contributions, Age retirement benefits, III health retirement benefits , death in service benefits, Scheme contributions , Expected cash flows generated by pension and contributions – classifications of benefits, Determining expected cash flows expected amount payable-Probability of payments – Expected cash flows using commutation functions to value salary related benefits and contributions – death benefits – Members contributions Benefits and options available to an individual leaving a pension scheme – return of contribution – A Referred pension – Immediate pension – Transfer of cash equivalent .

## Unit IV
Mortality, selection an standardization; Principal factors contributing to variation in mortality and morbidity- Occupation – Nutrition – Housing – Climate and geographical location- Education – Genetics – Selection- Temporary initial selection – Class selection Time Selection- Adverse Selection – Spurious 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 – Single figure indices – Crude mortality rate – Directly standardized mortality rate indirectly standardized mortality rate – Standardized mortality ratio.

# 3.Finance & Investments

## Unit I:
Measures of investment: risk: variance of return, downside semi-variance of return, shortfall probabilities, Extreme values, quantile estimators and Value at risk (VaR)/Tail VaR.
Investor's utility function.

## Unit II:
Mean-variance portfolio theory and its principal results.
Single and multifactor models of asset returns; Capital Asset Pricing model; Arbitrage Pricing theory model.

## Unit III
Investment indices.
Derivatives – Options, Futures, Swaps
Option Pricing – Binomial Model, Black Scholes Model

## Unit IV
Efficient Markets Hypothesis
Financial and non-financial risk: Interest rate risk; Market risk, Credit risk, Foreign Exchange risk, Sovereign risk, Liquidity risk, Compliance risk; actuarial techniques to identify and measure these.

# 4.General Insurance

### Unit I:
Non-life insurance – Types & Categories
Concepts of exposure, severity, frequency, rating and risk factors

### Unit II:
Reinsurance, rating and risk factors
Risk premium, reinsurance, Net and gross premium calculations.
Distributions of claims size and amounts, incurred claims, chain ladder
method etc.

### Unit III:
Laws related to non-life insurance business.

### Unit IV:
Concepts of financial statements of non-life insurance companies including
solvency norms

# 5.Presentation & Viva

Presentation based on any topic during Semester IV under the guidance of a teacher in the concerned department. There should be an internal assessment and external assessment for the Presentation. The external evaluation of the presentation will be assessed by a Viva.

# 1. Statistical Methods – II

### Unit I
Empirical Bayes credibility theory: Models - I – Empirical bayes credibility theory Models II
Ruin Theory: basis concepts notation - The surplus process the probability of ruin in continues time – the probability of ruin in short term.

### Unit II
Run – off triangles: introduction – the origins of run-off triangles – types of reserves – presentations of claims data – estimating feature claims. Projections using development factors: run – off triangles – the chain ladder method – model checking – other methods of deriving development factors assumptions underlying the method. Adjusting for inflation: The inflation adjusted chain ladder method. The average cost per claim method description of method application of the method – assumptions underlying the method. Loss ratios the bornhuetter Ferguson method: concept of bornhuetter Ferguson method – description of the method – application of the method – assumptions underlying the method – grossing up factors versus development factors.

### Unit III
Generalized linear models: Introduction – exponential families: Normal distribution – Poisson distribution – Binomial distribution – gamma distribution. Link functions and liner predictor link functions – linear predictor. Deviance of model fitting residuals analysis and assessment of model fit.

### Unit IV:
Time series (1): - Introduction – Properties of a univariate time series – stationary random series main linear model of time series: introduction-backwards shift operator, B and difference operator – the first order autoregressive model AR (1) – the autoregressive model AR (p) – the first – order moving average. Model MA (1) the moving average MA(q) the autoregressive moving average process ARMA (p, q) 39modelling non stationary processes: the ARIMA model.

# 2. Finance and Financial Reporting – II

## Unit I

Introduction to accounts the accounting framework-users sources of regulation statutory requirements – directors report – accounting standards – contents of annual report – auditor's report accounting concepts – cost concepts – money measurements concepts – business entity concept – realization concept – accrual concept – dual aspect concept – materiality – prudence – going on concept- consistency – bringing the concepts together.

The main accounts – the balance sheet – format – fixed assets – tangible assets and intangible assets – revaluation – current assets – liabilities – long term – liabilities – current liabilities – provisions and charges –provisions for taxation and dividends – pensions – contingent liability –capital – profit and loss account – format – cost of sales – expenses – categories of profit – taxation – dividends and retained profits – earnings per share – cash flow statement – format – purpose of cash flow statement –notes to accounts

## Unit II

Depreciation and reserves –introduction – purpose – methods – straight-line methods - reducing balance method – capital and reserves – share capital and share premium – revaluation reserve –profit and loss account.

Generating accounts – the trial balance – construction and preparation of financial statement – profit and loss account and balance sheet – awkward items in the trial balance – depreciation – profit and loss reserve – stock-adjustment in the accrual concept preparation of cash flow statement - limitations of accounts – shortcoming of historical cost accounting – valuation of stock – depreciation interest payments – consistency over time – limitations in the interpretation of accounts – subjectivity appropriateness – comparison between firms – some limitations of ratio analysis  -accuracy of figures.

## Unit III

Group accounts and insurance company accounts – introduction – consolidated financial statements subsidiary companies – consolidated balance sheet – goodwill on consolidation – minority interest associated companies – consolidated balance sheet – good will on consolidation –minority interest associated companies –interpretation of consolidated financial statements – insurance companies introduction – estimation  of  liabilities and timing of profit – profit and loss account – technical accounts non- technical accounts – balance sheet –assets – liabilities – shareholders fund.

## Unit IV

Interpretations of accounts – security of loan capital – introduction –measuring

risk associated with loan capital – loan capital – income cover and income priority percentages – asset cover and asset priority percentages – asset gearing – income gearing – shareholder analysis- earnings per share basic and diluted – earnings and dividend ratios – price earnings ratio- dividend yield – dividend cover – payout ratio- EBITDA- net asset value per share – other accounting ratios – profitability ratios – return on capital employed – profit margin- liquidity ratios – current ratio- quick ratio efficiency ratios – stock turnover ratio – debtors turnover ratio – creditors turnover ratio.

# 3.Actuarial Risk Management – II

## Units I

Introduction to financial products and customer needs ;- introduction – financial products ( insurance contracts, pension schemes, investment schemes, derivatives, reinsurances contracts ) bringing together customer needs and financial products ( logical or emotional needs, current or future needs, designing products to meet the need, core reading examples ) – pension schemes ( defined benefit pension schemes, defined contribution scheme, hybrid schemes)

Risk in benefit schemes  : - risk and uncertainties ( risks to the beneficiary, risks to the sponsor, risks to the state ) – benefit risks ( benefit risks in defined benefit schemes, benefits  risks in defined contribution schemes, benefit risks in both defined benefit and defined contribution schemes) – contribution / premium risks ( contribution /premium risks in a defined contribution scheme, contribution /premium risks in a defined benefit scheme, contribution risks in both  defined benefit and defined contribution schemes) –investment risks ( income, capital proceeds, reinvestment, default, tax and expenses, appreciation of benefits by recipients, opportunity cost of  the capital ) -overall security  risks in benefits schemes ( security , strength  of the sponsor / provider promise )

Risks in insurance: categories of risk – financial risks (market risks, credit risks, business risk) –non financial risks (operational risk, external risk, core reading   examples) risk classification (core reading examples)

## Unit II

The risk management process- introduction the risk faced ( risks identification, risks measurement, risk control, risk  financing, risk monitoring ) adoption of control measures ( introduction, reducing the total cost of a risk , reducing the probability of catastrophic loss , ensuring survival while minimizing the cost of risk management, core reading examples ) risk  as an opportunity not a constraint

Risk management tools – I  : issues surrounding the management of risk –tools that can be used to aid the management of risks – reinsurance terminology- reinsurance contracts  ( facultative reinsurance , treaty reinsurance )- types of reinsurance ( proportional reinsurance, non- proportional reinsurance ) proportional reinsurance ( quota share, surplus, reinsurance premiums under proportional arrangements ) non – proportional   reinsurance (excess of loss reinsurance, risk excess of loss, aggregate excess of loss, catastrophe excess of loss, stop loss, use of non- proportional reinsurance) financial reinsurance - reinsurance  as a risk  management tool ( the benefits of reinsurance, the cost of reinsurance , cost vs. benefits, the effectiveness of reinsurance, core reading

examples)

## Unit III

Risk management Tools 2: Introduction – diversification – underwriting ( what is underwriting, under writing as a risk management tools, life insurance underwriting , core reading examples)- alternative risk transfer ( discounted covers, integrated risk covers, securitization , post loss funding, insurance derivates, swaps, summary of art ) - management control systems – managing the risk associated with options and guarantees

## Unit IV

Capital and capital management :- Introduction – introduction of capital ( types of capital ( economic and regulatory ), the regulatory environment, modelling capital requirements ) -capital needs ( individuals, companies , providers of financial services products , banks, the state ) sources of capital ( proprietary companies , mutual companies, sponsors of benefit schemes, the state)- capital management tools ( reinsurance, financial reinsurance, securitization, subordinated debt, banking products, derivatives, equity capital, internal sources of capital )
Insolvency and Closure: insurance companies – sponsored benefit schemes (level of benefits, provision of benefits)

# 4.Industry Project Work – II

Project work shall be completed by working outside the regular teaching hours under the supervision of a teacher in the concerned department in a reputed insurance company or industry/Research Institute. There should be an internal assessment and external assessment for the project work. The external evaluation of the Project work is followed by presentation of work including dissertation and Viva-Voce.

# 5.Viva

## This paper will consist of Viva exam based on all the papers during Semester VI.

| Reference Books |
|---|
| **Accountancy and Financial Management** |
| *. Introduction to Accountancy by T. S. Grewal, S. Chand and Company (P) Ltd., New Delhi Advance Accounts by Shukla Grewal, S. Chand and Company (P) Ltd., New Delhi*<br>☐ Advanced Accountancy by R. L Gupta and M Radhaswamy, S. Chand and Company (P) Ltd., New Delhi<br>☐ *Modern Accountancy by Mukherjee and Hanif, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial Accounting by LesileChandwichk, Pentice Hall of India AdinBakley (P) Ltd.*<br>☐ *Financial Accounting for Management by Dr. Dinesh Harsalekar, Multi-Tech. Publishing Co. Ltd., Mumbai.*<br>☐ *Financial Accounting by P. C. Tulsian, Pearson Publications, New Delhi Accounting Principles by Anthony, R.N. and Reece J.S., Richard Irwin Inc.*<br>☐ Financial Accounting by Monga, J.R. Ahuja, GirishAhujaandShehgal Ashok, Mayur Paper Back<br>☐ Compendium of Statement & Standard of Accounting, ICAI.<br>☐ *Indian Accounting Standards, Ashish Bhattacharya, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial Accounting by Williams, Tata Mc. Grow Hill & Co. Ltd., Mumbai*<br>☐ *Company Accounting Standards by ShrinivasanAnand, Taxman. Financial Accounting by V. Rajasekaran, Pearson Publications, New Delhi. Introduction to Financial Accounting by Horngren, Pearson Publications.*<br>☐ Financial Accounting by M. Mukherjee.M. Hanif. Tata McGraw Hill Education Private Ltd; New Delhi |
| **Business Economics** |
| ☐ *Mehta, P.L.: Managerial Economics – Analysis, Problem and Cases (S. Chand & Sons, N. Delhi, 2000)*<br>☐ *Hirchey.M., Managerial Economics, Thomson South western (2003)*<br>☐ Salvatore, D.: Managerial Economics in a global economy (Thomson South Western Singapore, 2001) |

☐ Frank Robert.H, Bernanke. Ben S., Principles of Economics (Tata McGraw Hill (ed.3)

*Gregory Mankiw., Principles of Economics, Thomson South western (2002 reprint)*

☐ Samuelson &Nordhas.: Economics (Tata McGraw Hills, New Delhi, 2002)

☐ Pal Sumitra, Managerial Economics cases and concepts (Macmillan, New Delhi,2004)

## Business Communication

☐ *Agarwal, AnjuD (1989) A Practical Handbook for Consumers, IBH.*

☐ Alien, R.K. (1970) Organisational Management through Communication.

☐ Ashley, A (1992) A Handbook of Commercial Correspondence, Oxford University Press.

☐ *Aswalthapa, K (1991) Organisational Behaviour, Himalayan Publication, Mumbai.*

☐ Atreya N and Guha (1994) Effective Credit Management, MMC School of Management, Mumbai.

☐ Bahl, J.C. and Nagamia, S.M. (1974) Modern Business Correspondence and Minute Writing.

☐ *Balan, K.R. and Rayudu C.S. (1996) Effective Communication, Beacon New Delhi.*

☐ *Bangh, LSue, Fryar, Maridell and Thomas David A. (1998) How to Write First Class Business Correspondence, N.T.C. Publishing Group USA.*

☐ *Banerjee, Bani P (2005) Foundation of Ethics in Management Excel Books 10. Business world Special Collector's Issue: Ethics and the Manager*

☐ Barkar, Alan (1993) Making Meetings Work, Sterling Publications Pvt. Ltd., New Delhi.

☐ Basu, C.R. (1998) Business Organisation and Management, T.M.H. New Delhi.

☐ *Benjamin, James (1993) Business and Professional Communication Concepts and Practices, Harper Collins College Publishers, New York.*

☐ Bhargava and Bhargava91971) Company Notices, Meetings and Regulations

☐ Black, Sam (1972) Practical Public Relations, E.L.B.S. London.

☐ *Bove Courtland, L and Thrill, John V (1989) Business Communication, Today McGraw Hill, New York, Taxman Publication.*

☐ *Burton, G and Thakur, (1995) Management Today- Principles and Practices. T.M.H., New Delhi.*

☐ *Darrow, Richard, Forrstal, Dan and Coolman, Aubrey (1967) Public Relations Handbook, TheDartwell Co., Chicago.*

## Environmental Studies

☐ Singh, Savindra, 2011: Environmental Geography, PrayagPustakBhavan,Allahabad, India

☐ GautamAlka, 2009: Environmental Geography, ShardaPustakBhavan, Allahabad, India

☐ *Odum E.P. (1971): Fundamentals of Ecology, W.B Saunders, Philadelphia*

☐ Botkin D.B. & Keller E.A.,1995: Environmental Science, John Wiley & Sons, New York

☐ McKinney M.L. &Schoch R.M.,1998: Environmental Science, Jones & Bartlett Publishers, London

☐ *Allaby M. 2002: Basics of Environmental Sciences, Routledge, London*

☐ Detwyler T.R., 1971: Man's Impact on Environment, McGraw-Hill, New York

☐ Rao K.L. 1975: India's Water Wealth, Orient Longman Ltd. New Delhi

☐ *Ahirrao W.R. & others, ParyavaranVijnan (Marathi), NiraliPrakashan, Pune*

## Mathematical and Statistical Techniques

☐ *Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000, Chapters 1, 2, 4, 6 to 9 & 10.*

☐ *Applied Calculus: By Stephen Waner and Steven Constenoble, Brooks/Cole Thomson Learning, second edition, Chapter 1 to 5.*

☐ *Business Mathematics by D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1, 5, 7, 9 &10.*

☐ *Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc- Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.*

☐ *Quantitative Methods-Part-I By S. Saha and S. Mukerji, New Central Book Agency, 1996, Chapters 7 & 12.*

☐ *Mathematical Basis of Life Insurance by S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute of India, Chapters 2: units 2.6, 2.9, 2.20 & 2.21.*

☐ *Securities Laws & Regulation of Financial Market: Intermediate Course Paper 8, Institute of Company Secretaries of India, Chapter 11.*

☐ *Investments by J.C. Francis & R.W. Taylor, Schaum's Outlines, Tata Mc-Graw Hill Edition 2000, Chapters 2,4& section 25.1.*

☐ *Indian Mutual Funds Handbook: By SundarShankaran, Vision Books, 2006, Sections 1.7,1.8.1,6.5 & Annexures 1.1to 1.3.*

☐ *STATISTICS by Schaum Series.*

☐ *Operations Research by Gupta and Kapoor*

☐ *Operations Research by Schaum Series*

☐ *Fundamentals of Statistics - D. N. Elhance.*
☐ *Statistical Methods - S.G. Gupta (S. Chand & Co.*
☐ *Statistics for Management - Lovin R. Rubin D.S. (Prentice Hall of India)*
☐ *Statistics - Theory, Method & Applications D.S. Sancheti& V. K. Kapoor.*
☐ *Modern Business Statistics - (Revised}-B. Pearles& C. Sullivan –Prentice Hall of India.*
☐ *Business Mathematics & Statistics: B Aggarwal, Ane Book Pvt. Limited*
☐ *Business Mathematics: D C Sancheti& V K Kapoor, Sultan Chand & Sons*
☐ *Business Mathematics: A P Verma, Asian Books Pvt.: Limited.*

## Question Paper Pattern
### (Theoretical Courses)

Maximum Marks: 100
Questions to be set: 06
Duration: 03 Hrs.
All Questions are Compulsory Carrying 15 Marks each.

| Question No | Particular | Marks |
|---|---|---|
| Q-1 | Objective Questions<br><br>A) Sub Questions to be asked 12 and to be answered any 10<br>B) Sub Questions to be asked 12 and to be answered any 10<br>(*MCQ / True or False / Match the columns/Fill in the blanks) | 20 Marks |
| Q-2 | Full Length Question<br><br>**OR** | 15 Marks |
| Q-2 | Full Length Question | 15 Marks |
| Q-3 | Full Length Question | 15 Marks |

| | | |
|---|---|---|
| Q-3 | **OR**<br>Full Length Question | 15 Marks |
| Q-4 | Full Length Question<br><br>**OR** | 15 Marks |
| Q-4 | Full Length Question | 15 Marks |
| Q-5 | Full Length Question<br><br>**OR** | 15 Marks |
| Q-5 | Full Length Question | 15 Marks |
| Q-6 | A) Theory questions | 10 Marks |
| | B) Theory questions | 10 Marks |
| Q-6 | **OR**<br>Short Notes (Any 4 out of 6) | 20 Marks |

*Note:*
*Theory question of 15 marks may be divided into two subquestions of 7/8 and 10/5Marks.*