B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : Calculus-II   *Semester-1I*
Course Code : MTH151C
Credit hrs. : 4

Course Objective: Introduce students to calculate derivatives efficiently, use derivatives to solve authentic real-life application problems, use of definite integrals and the fundamental theorem of Calculus to find areas and total change.

Unit I: Applications of integration, areas between curves, volumes, volumes by disks and cylindrical shells, arc length.

Unit II: Strategy for integration, integration by parts, trigonometric integrals, trigonometric substitution, integration of rational functions by partial fractions, improper integrals

Unit III: Infinite sequences and series, convergence of a series, divergence test, integral and comparison tests, alternating series, absolute convergence, ratio and root tests, power series, Taylor and Maclauren series.

Unit IV: Parametric equations, calculus with parametric curves, polar coordinates

Textbook:

➢ Calculus – Early Transcendentals by James Stewart

Supplementary books:

- Calculus by Thomas and Finney. Morgan Kaufmann Pub.

- A First Course in Calculus - by Serge Lang,

- Calculus – by Howard Anton

- Integral Calculus - by Hari Krishan

- Calculus I & II by Tom Apostol

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : Introduction to Actuarial Mathematics   *Semester-1I*
Course Code : MTH152C
Credit hrs. : 4

Course Objective: Introduces the students to provide basic grounding in basic financial mathematics like simple interest, compound interest, loan calculation and their simple applications.

Unit I: Probabilities and events, conditional probability, random variables, expected values, variance.

Unit II: Simple interest, compound interest, continuously compounded interest, present value of future payments, rate of return, continuously varying interest rates.

Unit III: Annuities, calculating annuity premiums, amortization of a debt, sinking funds, capital budgeting.

Unit IV: Risk and insurance, long-term and short-term insurance, life insurance, automobile insurance, property insurance, indemnity principle, coinsurance principle, stocks, dividends and bonds

Unit V: Deterministic cash flows: net present value, internal rate of interest, modified internal rate of interest, project choice. Fixed income securities (bonds): bond price and yield, duration, convexity, immunization against interest rate fluctuations, short and forward rates, term structure of interest rates, incorporating term structure into price/duration/convexity/immunization.

Textbooks:

- An Elementary Introduction to Mathematical Finance – Sheldon Ross
- An Undergraduate Introduction to Financial Mathematics – by Robert Buchanan
- Business Mathematics - by Lerner and Zima (Schaum's Outline Series)
- Corporate Finance by Brealy and Myers
- Fundamentals of Actuarial Mathematics by David Promislow
- Investment by Sharpe and Bailey Upper Saddler River, N.J. Prentice Hall, c1999.
- Investment Science by Luenberger (Indian Edition), Oxford University Press
- Investments by Bodie, Kane and Marcus, McGraw-Hill Irwin, c2005.
- Lecture Notes on Actuarial Mathematics – by Jerry Veeh
- Actuarial Mathematics by Bowers *et al,* Society of Actuaries, USA.

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : Excel for Business   *Semester-1I*
Course Code : MTH190C
Credit hrs. : 2

Course Objective: Introduces the student's applicability of actuarial calculations using excel data tool pack.

Course Contents

	Learning Objectives	Excel Topics
1	Excel Basics	Naming Cells and Ranges, Descriptive statistics functions, Display options (Custom views, Freeze panes)
2	Developing charts in Excel	Bar chart, Stacked bar chart, line chart, dynamic charting (this uses the OFFSET function)
3	Some useful functions	IF, SUMIF, SUMIFS, COUNTIF, COUNTIFS, COUNT, COUNTA
4	Interest and Amortization	FV, PV, PMT, PPMT, IPMT, RATE, NPER
5	Data Handling Wizards	Sort, Filter, Text-to-Columns, Remove Duplicates, Consolidate, Data Validation.
6	Data Handling Functions	VLOOKUP, HLOOKUP, text functions, MATCH, INDEX
7	Cash Flow Analysis	NPV, XNPV, IRR, XIRR, GOAL SEEK
8	Sensitivity Analysis	Data Tables and Scenario Manager
9	Optimization	Using the SOLVER add-in to solve some important problems in Finance and the industry.
10	Linear Regression	LINEST, STEYX, INTERCEPT,SLOPE, FORECAST, TREND, ANALYSIS TOOLPAK Add-in
11	Exploring Data	Pivot table and Pivot Chart
12	Visual Basic for Applications (VBA)	VBA can tackle situations that an analyst faces in his routine work for which Excel does not have a 'readymade' answer.

Textbooks:

- Excel 2007 for Starters by M. McDonald.

- Analyzing Business Data with Excel by G. Knight

- Mathematical Modeling with Excel by B. Albright.

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : Principles of Economics   *Semester-II*
Course Code : ECN151C
Credit hrs. : 4

Course Objective: Introduce the student's concepts of cost, nature of production and its relationship to business operations, to understand marginal analysis to the "firm" under different market conditions and to integrate the concept of price and output decisions of firms under various market structure.

Unit I:

Nature and scope of economics. Positive and Normative economics. Micro and Macro economics. Methods of economic analysis; Economic systems, Major economic problems.

Unit II:

Demand and supply concept: Law of demand, elasticity of demand and its measurement. Law of diminishing marginal utility, law of equi-marginal utility. Law of Supply, Indifference curve analysis; meaning of indifference curve; properties of indifference curve. Consumer's equilibrium; consumer's surplus; effects of price change; income effect and substitution effect; breaking up of price effect into income and substitution effect.

Unit III:

Production: Factors of production. Determination of factors pricing; modem approach. Production function and producers equilibrium. Laws of returns and returns to scale. Consumption function: psychological law of consumption function. Investment function; multiplier and accelerator.

Unit IV:

Theory of employment: classical theory of employment. Say's law - basic assumption of say's law of market and its implications; Keynesian theory of employment; determination of equilibrium level of employment. National income; measurement of national income. Balance of payment; concept and causes of disequilibrium; methods of correction of disequilibrium. Trade Cycles: meaning and types of economic fluctuation.

Suggested Readings:

1. H, L, Ahuja, Modem Economics.
2. J.K.Mitra, Economics Micro and Macro.
3. M.C.Vaish, Macro Economic Theory.
4. Edward Shapiro, Macro Economic Analysis
5. John Solomon, Economics.
6. Stenier and Hague, Economics Theory.
7. A.Nag, Macro Economic for management Students.

B.Sc. ACTUARIAL AND FINANCIAL MATHEMATICS

Course Title : Environmental Studies *Semester-1I*
Course Code : EVS101F
Credit hrs. : 3

Course Objective: Introduces the students the real situations in their surroundings to help them connect, be aware of, appreciate and be sensitized towards the prevailing environmental issues (natural, physical, social and cultural).

Unit – I
Introduction to Environmental Science: Scope and importance, Public Environmental awareness and methods of its propagation, Consumerism and Green Consumerism. Environmental issues, Environmental Ethics-Anthropocentricism and Ecocentricism.

Unit – II
Introduction to Ecosystem and Ecology, Types of Ecosystems, Structure of an Eco system-biotic and abiotic components, Food chain and Food Web, Ecological Pyramids; Ecological Succession, Energy flow in an ecosystem, Major World Ecosystems and their characteristics.

Unit – III
Natural resources classification and their conservation; Biodiversity-Definition, values and threats to biodiversity; Classification of species as per IUCN; Hot Spots of Biodiversity. Conservation approaches – *In-Situ* and *Ex-Situ* conservation; Alternatives to conventional developmental approaches – Sustainable Development.

Unit – IV
Introduction to global climate change; Greenhouse effect, global warming, acid rain, ozone layer depletion. Definition, Cause, effects and control measures of Air pollution, water pollution, soil pollution, noise pollution, thermal pollution and Solid waste pollution.

Reading List:

1. Ecology and Environment by P.D. Sharma. (Rastogi Publications)
2. Environmental Science Towards a Sustainable Future by Nebel and Wright (PHI) LPE
3. Environmental Studies by Erach Barucha (Oxford Publications)
4. Environmental Studies From Crises to Cure authored by R. Rajagopalan; Published by Oxford University Press. Price INR 160.
5. Environmental Management by Oberoi
6. Principles Of Environmental Science: Inquiry & Applications (Special Indian Edition) authored by William Cunningham & Mary Cunningham; Published by Tata McGraw Hill. Price INR 375.
7. Perspectives of environmental studies by AP Kaushik and CP kaushik. New age international publications.