DEPARTMENT OF ACTUARIAL SCIENCE
SCHOOL OF MATHEMATICAL SCIENCES
NORTH MAHARASHTRA UNIVERSITY
JALGAON - 425001, INDIA

SYLLABUS FOR

F.Y.B.Sc.(Actuarial Science)

Under

Three-year Course

B.Sc.(Actuarial Science)

WITH EFFECT FROM ACADEMIC

YEAR 2014-2015

(Course Started from 2010-11)

Department of Actuarial Science
School of Mathematical Sciences
North Maharashtra University, Jalgaon, India

Syllabus Structure for F.Y.B.Sc.(Actuarial Science)

Under

Three-year course B.Sc.(Actuarial Science)
(The medium of instruction is English)

Semester-I

Course Code	Title of the Course	Contact hours/week			Distribution of Marks for Examination						Credits
					Internal		External		Total		
		Th(L)	Pr	Total	Th	Pr	Th	Pr	Th	Pr	
AS-101	Calculus-I	03	--	03	40	--	60	--	100	--	04
AS-102	Linear Algebra	03	--	03	40	--	60	--	100	--	04
AS-103	Descriptive Statistics-I	03	--	03	40	--	60	--	100	--	04
AS-104	Principles of Microeconomics	03	--	03	40	--	60	--	100	--	04
AS-105	Effective Communication in English	03	--	03	40	--	60	--	100	--	04
AS-106	Practicals- I	--	04	04	--	40	--	60	--	100	04

Semester-II

Course Code	Title of the Course	Contact hours / week			Distribution of Marks for Examination						Credits
					Internal		External		Total		
		Th(L)	Pr	Total	Th	Pr	Th	Pr	Th	Pr	
AS-201	Calculus-II	03	--	03	40	--	60	--	100	--	04
AS-202	Probability Distributions-I	03	--	03	40	--	60	--	100	--	04
AS-203	Descriptive Statistics-II	03	--	03	40	--	60	--	100	--	04
AS-204	Principles of Macroeconomics	03	--	03	40	--	60	--	100	--	04
AS-205	Principles and Practices in Insurance	03	--	03	40	--	60	--	100	--	04
AS-206	Practicals-II	--	04	04	--	40	--	60	--	100	04

Note: Syllabus structure of complete Three-year course B.Sc.(Actuarial Science) is given separately.

Examination and Declaration of result: Internal and External Examinations will be conducted by the Department of Actuarial Science under Academic flexibility and results will be declared by University's Examination section based on CGPA system.

Detailed Syllabi for F.Y.B.Sc.(Actuarial Science)

AS-101 Calculus-I

- Algebraic Operations, Equations of lines (2L)
- Inequalities (1L)
- Functions including the definitions and properties of absolute value, power, polynomial, rational, trigonometric, exponential, and logarithmic functions (2L)
- Composition of functions (1L)
- Definitions and calculation methods for limits. Basic properties of limits (2L)
- Horizontal and vertical asymptotes (1L)
- Continuity, Intermediate value theorem, properties of continuous functions (3L)
- Derivative, definition and geometrical interpretation (1L)
- Derivative as rate of change; velocity and acceleration (1L)
- Rules of differentiation, differentiation formulas for power, trigonometric, exponential and logarithmic functions (3L)
- Chain rule, Implicit differentiation (2L)
- Linear approximation to a differentiable function (2L)
- Maxima and minima; extreme value theorem; mean value theorems (5L)
- Increasing and decreasing functions. Concavity (2L)
- First derivative test; second derivative test (2L)
- Curve sketching (2L)
- Applied maximum - minimum problems (2L)
- Anti derivatives; integration formulas (3L)
- Area, Definite integral and properties (3L)
- Fundamental theorem of calculus (3L)
- Integration by substitution (2L)

References

1. Murray R. Spiegd, Theory and Problems of Advanced Calculus, Schaum Outline Series, Schaum Publishing co., New York.
2. Gorakh Prasad, Differential Calculus, Pothishala Private Ltd, Allahabad
3. Shanti Narayan, Differential Calculus, S. Chand and company, Delhi.
4. Gorakh Prasad, Integral Calculus, Pothishala Private Ltd, Allahabad
5. H. S. Hall and S. R. Knight, Higher Algebra, H. M. Publication, 1994.
6. Ayres F. Jr.: Calculus, Schaum Outline Series, McGraw Hill 1981.

AS-102 Linear Algebra

- Vector spaces, subspaces, independence, basis and dimension, row and column space of a matrix, rank, applications, change of basis (10L)
- Linear transformations, kernel and image, composition, isomorphism, linear functions, the double dual, transpose of a linear transformation. (9L)
- Systems of linear equations, matrices, reduced row echelon form matrix multiplication, inverses, proper and g-inverse. (6L)
- Determinant functions, permutations, uniqueness of determinants, properties of determinants. (6L)
- Eigenvalues, eigenvectors, characteristic polynomials. (4L)
- Inner product, norm, orthogonality, Gram-Schmidt process, orthogonal diagonalization and least square approximation, quadratic forms, SVD. (10L)

References

1. Krishnamurthy V, Mainra V P and Arora J L (1976), An Introduction to Linear Algebra, East West Press.
2. A. Ramachandra Rao and P. Bhimasankaram (2000), Linear Algebra, Hindustan Book Agency, Delhi
3. Herstein I. N. (1976), Topics in Algebra, Vikas Publishing House.
4. Lipschutz S. (1981), Linear Algebra, Schaum Outline Series.

AS-103 Descriptive Statistics-I

- Types of Data: Concepts of a statistical population and sample from a population; qualitative and quantitative data; nominal and ordinal data; cross sectional and time series data; discrete and continuous data; frequency and non-frequency data. Different types of scale - nominal, ordinal, ratio and interval. (10L)
- Collection and Scrutiny of Data: Primary data - designing a questionnaire and a schedule; checking their consistency. Secondary data - their major sources including some government publications. Complete enumeration, controlled experiments, observational studies and sample surveys. Scrutiny of data for internal consistency and detection of errors of recording. Ideas of cross-validation. (10L)
- Presentation of Data: Construction of tables with one or more factors of classification. Diagrammatic and graphical representation of non-frequency data. Frequency distributions, cumulative frequency distributions and their graphical and diagrammatic representation - column diagram, histogram, frequency polygon and ogives. Stem and leaf chart. Box plot. (12L)
- Analysis of Quantitative Data: Univariate data: Concepts of central tendency or location, dispersion and relative dispersion, skewness and kurtosis, and their measures including those based on quantiles and moments. Sheppard‘s corrections for moments for grouped data (without derivation). Measures of inequality - Gini‘s coefficient and Lorenz Curve. (13L)

References

1. Bhat B.R, Srivenkatramana T and Rao Madhava K.S. (1996): Statistics: A Beginner's Text, Vol. I, New Age International (P) Ltd.
2. Croxton F.E, Cowden D.J and Kelin S (1973): Applied General Statistics, Prentice Hall of India.
3. Goon A.M., Gupta M.K., Das Gupta.B. (1991): Fundamentals of Statistics, Vol.I, World Press, Calcutta.
4. Cooke, Craven and Clarke (1990): Basic Statistical Computing, Chapman and Hall.
5. Mood A.M, Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.
6. Snedecor G.W and Cochran W. G. (1967): Statistical Methods. Iowa State University Press.
7. Spiegel, M. R. (1967): Theory and Problems of Statistics, Schaum's Publishing Series.
8. Devore/ Peck: Statistics (The Exploration and Analysis of Data), Duxbury.

AS-104 Principles of Microeconomics

- Introduction: Nature and scope of economics; Methodology in economics; Choice as an economic problem; Production possibility frontier (curve); basic postulates; Role of price mechanism; Demand and supply; Basic framework — applications; Market equilibrium; Elasticity of demand- Price, income and cross; Consumer's surplus; Engel curve. (10L)
- Consumer's Behavior: Choice and Utility theory- Cardinal and ordinal approaches; Law of diminishing marginal utility; Indifference curve; Consumer's equilibrium (Hicks and Slutsky); Substitute and Income effect; Consumer and producer surplus and their application; Giffin goods; Compensated demand. (8L)
- Theory of Production and Costs: Production decisions; Production function; Average and marginal production; Iso-quant; Factor substitution; law of variable proportions; returns to scale; economies of scale; Different concepts of cost and their interrelation; Equilibrium of the firm; Expansion path; Empirical evidence on costs. (5L)
- Market Structure: Market forms — Perfect and imperfect markets; Equilibrium of a firm — Perfect competition, monopoly and price discrimination; Measure of monopoly power; Monopolistic competition; Duopoly, Oligopoly; Profit maximization condition; Taxation and equilibrium of a firm; Notion of controlled and administered prices. (7L)
- Factor Pricing: Marginal productivity theory of distribution; Theories of wage determination; Wages and collective bargaining; Wage differentials; Rent - Scarcity rent; Differential rent; Quasi rent; Interest-Classical and Keynesian theories; Profits - Innovation, risk and uncertainty theories. (7L)
- Investment Analysis: Payback period-average annual rate of return, Net present value, Internal rate of return criteria, price changes, risk and uncertainty, elements of social cost-benefit analysis. (4L)

- Welfare Economics: Problems in measuring welfare; Classical welfare economics; Pareto's criteria; Value judgment; Concept of a social welfare function; Compensation principle — Kaldor, Hicks. (4L)

References

1. CT-7 Study material of Institute of Actuaries of India.
2. Henderson J. and R.E. Quandt (1980), Microeconomic Theory: A Mathematical Approach, McGraw Hill, New Delhi.
3. Heathfield and Wibe (1987), An Introduction to Cost and Production Functions, Macmillan, London.
4. Lipsey, R.G. and K.A. Chrystal (1999), Principles of Economics (9th Edition), Oxford University Press, Oxford.
5. Mansfield, E. (1997), Microeconomics (9th Edition), W.W. Norton and Company, New York.
6. Samuelson, P.A. and W.D. Nordhaus (1998), Economics, Tata McGraw Hill, New Delhi.
7. Stonier, A.W. and D.C. Hague (1972), A Textbook of Economic Theory, ELBS & Longman Group, London.
8. Varian, H.R. (2000), Intermediate Microeconomics: A Modern Approach (5th Edition), East-West Press, New Delhi.

AS-105 Effective Communication in English

Effective Oral Communication

1. Theory of Communication (10L)
   - Verbal, Nonverbal Communication
   - ii) Functions of Communication
   - iii) Models of Communication
   - iv) Effective Communication
   - v) Miscommunication
2. The Phonology of English (8L)
   - Physiology of Speech
   - Difficulties of Indian learners regarding Vowels,
   - Diphthongs, Consonants
   - Phonemes, Allophones, Syllabic Consonants
   - Assimilation and Elisions
   - Word Accent, Stress, Intonation
   - Varieties of English
   - Phonemic and Phonetic Transcription
3. Conversation Skills (5L)
   - Formal, Informal
   - English for Situations
   - Interviews

- Meetings

4. Public Speaking, Presentations & Group Discussions (2L)

Effective Written Communication

1. Academic & Analytical Writing (7L)
   - Resumes and CVs
   - Project Proposals
   - Research Articles
   - Referencing
2. Writing for the Media (6L)
   - Difference between print and electronic media
   - Different kinds of writing like news writing, feature
   - writing, investigative reports, current news, human
   - Interest stories, subediting, proof-reading symbols.
   - Script writing for radio and television.
3. Technical Writing (7L)
   - Technology in communication
   - Effective use of available technology
   - Writing instructions
   - Technical description
   - Writing for the web
   - Instructions manuals

References

1. Gerson, J. Sharori Technical writing, process and product, Pearson Education Reprint-2004.
2. Betty Kirkpatrick: The concise Oxford Thesaurus. OUP, 24th Impression 2003.
3. Arnold, G.F. & Gimson, A.C., 'English Pronunciation Practice', London: Hodder and Stoughton.
4. Bansal, R.K., 'The Intelligibility of Indian English', Orient Longman.
5. Bolinger, D. 'Aspects of Language', New York, Harcourt, Brace and World Inc., 1968.
6. Miller, George A., 'Language and Communication', New York: Mc Graw Hill.
7. Booher, Dianna E-writing, 21st –century tools for effective communication, Macmillan India Ltd Reprint-2008.
8. Mohan, Krishna & Banerji, Meera Developing Communication Skills, Macmillan India Ltd Reprint-2007.
9. Vilanilam, J. V. More Effective Communication (A Manual for Proffessionals), Response Books, New Delhi (2003).

AS-106 Practicals- I (On PC Using Software)

A. Practicals based on AS-101 (Calculus-I) (12 Hrs)

1. Checking monotonicity of a given function.
2. Curve sketching and checking the covexicity/concavity of a function.
3. Evaluation of logarithmic, exponential and trigonometric functions.
4. Integration and differentiation of a given function.
5. Differentiating given function by chain rule.
6. Verification of Extreme value and Mean value theorem.
7. Demonstrating occurrence of maxima and minima of a given function.

B. Practicals based on AS-102 (Linear Algebra) (12 Hrs)

1. Checking linearly dependence/independence of set of vectors.
2. Getting vectors in row/column space and null space of the given matrix.
3. Verification of properties of determinant of the matrix.
4. Checking various characterizations of the matrix such as: rank, singularity/nonsingularity, orthogonality, symmetry, definiteness, idempotency etc.
5. Gram-Schmidt orthonormalization and forming an orthogonal matrix of specified order using Gram-Schmidt orthogonalization.
6. Calculating eigen values and eigen vectors of a given matrix.
7. Quadratic forms and their definiteness.

C. Practicals based on AS-103 (Descriptive Statistics I) (12 Hrs)

1. Graphical and tabular presentation of data of various types.
2. Classification, tabulation of a given data in one way/multi-way table.
3. Preparing frequency distribution, frequency polygon and ogives.
4. Exploratory data analysis: Bar graphs, histogram, Stem-and- Leaf plots, Box plots, dot plots, multiple bar graphs, Pie chart, Scatter diagram etc.
5. Calculating various measures of central tendency and dispersion for given sample data.
6. Calculation of correlation coefficient.
7. Calculation of Gini's Coefficient and plotting of Lorenz curve.

D. Practicals based on AS-104 (Principles of Microeconomics-I) (12 Hrs)

1. Pareto criteria/analysis.
2. Plotting of production possibility frontier (PPF)
3. Plotting demand and supply curve and determination of equilibrium point.
4. Computation of consumer and producer surplus.
5. Calculation and sketching of total, marginal and average cost curve.
6. Sketching of utility functions.

7. Solving Profit maximization problem under following market structures.
   - Perfectly competitive
   - Monopoly
   - Oligopoly
   - Monopolistic
8. Problems based on investments, variation in interest rates, risks etc.

E. Introduction to WIDOWS-7/8 and different Statistical Software Packages (Introduction can be done through following simple practical) (12 Hrs)

1. Introduction of various types of files, file handling, report generation etc.
2. Introduction to basic mathematical and statistical functions.
3. Various graphical tools in MS Excel.

AS-201 Calculus-II

- Inverse functions, inverse trigonometric functions (4L)
- Techniques of integration, numerical integration, improper integrals. (11L)
- Applications of integrals (area, volumes) (4L)
- Taylor polynomials (4L)
- Sequences, Infinite series, Power Series, Taylor Series (11L)
- Differential equations: Separable, linear first and second order, constant coefficients, undetermined coefficients, variation of parameters (11L)

References

1. Murray R. Spiegel, Theory and Problems of Advanced Calculus., Schaum outline series, Schaum Publication Co. New York.
2. Murray D. A. (1967), Introductory Course in Differential Equations, Orient Congman (India)
3. David Widder (1979), Advanced Calculus, Prentice Hall of India, New Delhi. (Second Ed.)
4. Rajaraman V. (1971), Computer Oriented Numerical Methods. (Third Edition)
5. Shantinarayan, Calculus, S. Chand and Co.

AS-202 Probability Distributions-I

- Random experiment: trial, sample point and sample space, event, Operations of Events, concepts of mutually exclusive and exhaustive events. (5L)
- Definition of probability: classical and relative frequency approach. Discrete probability space, Properties of probability, Independence of events, Conditional probability, total and compound probability rules, Bayes' theorem and its applications. (10L)

- Discrete random variable (rv): its probability mass function (pmf) and cumulative distribution function (cdf). Joint pmf of several discrete rvs. Marginal and conditional pmfs. Independence of rvs. Expectation of a rv and its properties. Moments, measures of location and dispersion of a rv. Probability generating function (pgf) and moment generating function (mgf) of a rv, their properties and uses. (10L)
- Standard univariate discrete distributions: degenerate, Bernoulli, discrete uniform, binomial, hypergeometric, Poisson, geometric and negative binomial distributions, reproductive property of standard distributions. (10L)
- Bivariate discrete distributions: Bivariate Binomial, Bivariate Poisson, Bivariate Negative Binomial, Marginal and conditional distributions. (6L)
- Distributions of functions of discrete rvs, (4L)

References

1. Chung, K. L. (1979). Elementary Probability Theory with Stochastic Processes, Springer International Student Edition.
2. David Stirzaker (1994). Elementary Probability, Cambridge University Press.
3. Feller, W. (1968). An Introduction to Probability Theory and Its Applications, Wiley.
4. Hogg, Robert V. & Craig Allen T. (2008). Introduction to Mathematical Statistics, Pearson Education.
5. Mukhopadhyay, P. (1996). Mathematical Statistics, New Central Book Agency, Calcutta.
6. Parzen, E. (1960). Modern Probability Theory and Its Applications, Wiley Eastern.
7. Pitman, Jim (1993). Probability, Narosa Publishing House.

AS-203 Descriptive Statistics-II

- Bivariate data: Scatter diagram. Product moment correlation coefficient and its properties. Coefficient of determination. Correlation ratio. Concepts of regression. Principle of least squares. (5L)
- Fitting of linear and quadratic regression and related results. Correlation index. Fitting of curves reducible to polynomials by log and inverse transformation. Fitting of curves by the method of group averages. Intra-class correlation coefficient with equal and unequal group sizes. Rank correlation- Spearman‘s and Kendall‘s measures. (12L)
- Multivariate data: Multiple regressions, multiple correlation and partial correlation in 3 variables. Their measures and related results. (8L)
- Analysis of Categorical Data: Consistency of categorical data. Independence and association of attributes. Various measures of association for two-way and three-way classified data. Odds ratio. (8L)
- Scaling of Data: Motivation for scaling. Measurement for psychological traits. Scaling of items according to difficulty. Scaling of test scores. Scaling of rates and ranks. Scaling of judgments. (12L)

References

1. Goon A.M., Gupta M.K., Dasgupta. B. (2001), Fundamentals of Statistics, Volume I and II, World Press, Calcutta.
2. Croxton FE, Cowden D. J. and Klein S. (1973). Applied General Statistics Prentice Hall of India.
3. Snedecor G. W. and Cochran W. G. (1967). Statistical Methods Iowa State University Press.
4. Spiegel, M. R. (1967), Theory & Problems of Statistics, Schaum's Publishing Series.
5. Agreshti (1996), An Introduction to Categorical Data Analysis, John Wiley & Sons Inc, NY.
6. Samprit Chatterjee and Bertram Price (1991), Regression analysis by Example, John Wiley & Sons, Inc.
7. Guilford, J. P. and Fruchter B. (1980), Fundamental Statistics in Psychology and Education, McGraw Hill.
8. Devore/ Peck: Statistics (The Exploration and Analysis of Data), Duxbury.

AS-204 Principles of Macroeconomics

- National Income and Social Accounts: Concept and measurement of national income; National income identities with government and international trade; incorporation of environmental concerns in national accounts — green accounting. Macroeconomic Policy in a monetary Economy: Money and monetary institutions; the role of money in Macroeconomics; Microeconomic policy in an open economy. (12L)
- Output and Employment: Say's law of markets and the classical theory of employment; Keynes' objection to the classical theory; Aggregate demand and aggregate supply functions; The principle of effective demand; Consumption function — Average and marginal propensity to consume; Factors influencing consumption spending; The investment multiplier and its effectiveness in LDCs; Theory of investment— Autonomous and induced investment; Marginal efficiency of capital; Savings and investment — ex post and ex ante, Equality and equilibrium.
  Rate of Interest: Classical, Neo-classical and Keynesian theories of interest. (12L)
- Trade Cycles: Nature and characteristics; Hawtrey's monetary theory; Hayek's over-investment theory; Keynes' view on trade cycle; The concept of accelerator and multiplier model; Fiscal policy in multiplier model; Samuelson and Hicks multiplier-accelerator interaction model; Control of trade cycles; Beyond the multiplier model. (12L)
- Economic Growth: Sources of growth; trend and cycle of Growth models - Harrod and Domar; Benefits and costs of growth theories of economic growth; Instability of equilibrium; Neo-classical growth models — Solow; Economic growth and technical progress; International trade. (9L)

References

1. CT-7 Study material of Institute of Actuaries of India.
2. Ackley, G. (1976), Macroeconomics: Theory and Policy, Macmillan Publishing Company, New York.
3. Gupta, S.B. (1994), Monetary Economics, S. Chand and Co., Delhi.
4. Heijdra, B.J. and F.V. Ploeg (2001), Foundations of Modern Macroeconomics, Oxford University Press, Oxford.
5. Lewis, M.K. and P.D. Mizan (2000), Monetary Economics, Oxford University Press, New Delhi.
6. Shapiro, E. (1996), Macroeconomic Analysis, Galgotia Publications, New Delhi.
7. Lucas, R. (1981), Studies in Business Cycle Theory, MIT Press, Cambridge, Massachusetts.
8. Lipsey, R.G. and K.A. Chrystal (1999), Principles of Economics (9th Edition), Oxford University Press, Oxford.
9. Samuelson, P.A. and W.D. Nordhaus (1998), Economics, Tata McGraw Hill, New Delhi.

AS-205 Principles and Practices in Insurance

- Principles of Life Insurance: Nature of Insurance, Classification of Insurance Economic value of Earning Head of the Household, Basic Insurance Protection, Business use of Life Insurance, Basic elements of life insurance contacts, Insurable interest, Need for utmost good faith, disclosure of Material Facts, Warrant, Tax advantages of Certain Assurance, Wealth Tax. (10L)
- Selection and classification Risks, Objectives for selection and classification of risks, factors relating to Physical Hazard, Factors relating to occupational Hazards and Moral Hazard, Source of Information, Insurance of female lives, rating of female lives. (10L)
- Investment of life fund: Investment of LIC, Investment of life Insurance Fund, basic principles, statutory requirements of investments, people's money for peoples welfare valuation, purpose and types. (6L)
- Policy conditions and Privileges, calculation of paid up values, Surrender values, Loans, Foreclosure Alterations, Distribution of loans, Calculations of Vested bonus, Interim bonus, Final bonus, settlement of Claims, calculation of benefit payable on, Maturity claims, Death claims and adjustment for loans, unpaid premium and interest. (8L)
- General Insurance: Need for general insurance, Types of general insurance, Fire Insurance, Marine Insurance, Motor Insurance, Liability Insurance, Aviation Insurance, Engineering Insurance, Burglary Insurance, Mediclaim and project Insurance, Loss of profit Insurance. (8L)
- Principles of general Insurance, Privatization of Insurance in India, Role of IRDA. (3L)

References

1. Kenneth Black Jr. and Harold D. Skipper (1999), Life and Health Insurance. (13th Ed.)
2. Principles and Practice of Life Insurance-Insurance Institute of India
3. Principles and General Insurance- Insurance Institute of India

AS-206 Practicals- II (On PC Using Software)

A. Practicals based on AS-201 (Calculus-II) (8 Hrs)

1. Problems based on integration.
2. Convergence of sequences, series.
3. Verification of Taylors series expansion.
4. Definite and indefinite integration of a given function.

B. Practicals based on AS-202 (Probability Distributions-I) (22 Hrs)

1. Simulation of some random experiments.
2. Calculation of *pmf, CDF,* expectation and variance of the given discrete distribution.
3. Plotting of *pmf* and *CDF* (step function).
4. Generating random samples from given discrete distribution.
5. Generating random samples from standard discrete distributions such as Binomial, Negative Binomial, Poisson, Hypergeometric etc.
6. Finding marginal and conditional distribution from the given joint distribution.
7. Generating random samples from joint and conditional distributions.

C. Practicals based on AS-203 (Descriptive Statistics-II) (22 Hrs)

1. Fitting of linear and quadratic regression models.
2. Fitting of polynomials by using transformations.
3. Calculating of multiple and partial correlation coefficients.
4. Intraclass correlation coefficient with equal and unequal group sizes.
5. Fitting of multiple linear regression model.
6. Testing independence of attributes.
7. Analysis of categorical data using odds ratio.

D. Practicals based on AS-204 (Principles of Macroeconomics) (8 Hrs)

1. Calculation of nominal, real GDP and GDP deflator.
2. Calculation of price indices.
3. Calculation of Multiplier.
4. Evaluating Macroeconomic equilibrium.
5. Plotting of Phillips curve.