



## **ST. XAVIER'S UNIVERSITY, KOLKATA**

### **SYLLABUS FOR BA ECONOMICS**

**Action Area IIIB**  
**New Town, Kolkata - 700160**  
**West Bengal, India**  
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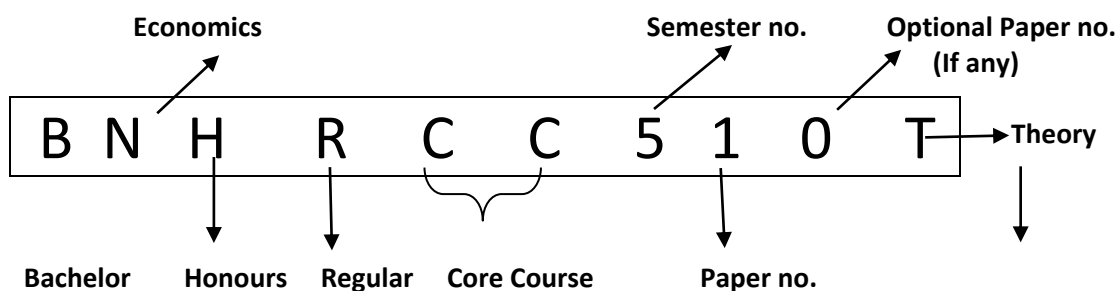
Sem	Paper Code	Course Title	Full Marks	Pass Marks	CIA MARKS			End-Sem Marks	Credits
					WT	O	ATT		
I	BNHRCC110T	Introductory Microeconomics	100	40	10	5	5	80	6
	BNHRCC120T	Mathematical Methods for Economics -I	100	40	10	5	5	80	6
	BNHRGE130T	Mathematics - I	100	40	10	5	5	80	6
	BNHRAE140T	English Communication - I	50	20	5	2.5	2.5	40	1
	BNHRAE150T	Environmental Studies - I	50	20	5	2.5	2.5	40	1
	BNHRFN160A	Foundation Course-I *	50	15	-			50	1
<b>TOTAL</b>			<b>450</b>	<b>TOTAL</b>			<b>21</b>		
II	BNHRCC210T	Introductory Macroeconomics	100	40	10	5	5	80	6
	BNHRCC220T	Mathematical Methods for Economics -II	100	40	10	5	5	80	6
	BNHRGE230T	Mathematics - II	100	40	10	5	5	80	6
	BNHRAE240T	English Communication-II	50	20	5	2.5	2.5	40	1
	BNHRAE250T	Environmental Studies -II	50	20	5	2.5	2.5	40	1
	BNHRFN260A	Foundation Course - II*	50	15	-			50	1
<b>TOTAL</b>			<b>450</b>	<b>TOTAL</b>			<b>21</b>		
III	BNHRCC310T	Intermediate Microeconomics - I	100	40	10	5	5	80	6
	BNHRCC320T	Intermediate Macroeconomics - I	100	40	10	5	5	80	6
	BNHRCC330T	Statistical Methods for Economics	100	40	10	5	5	80	6
	BNHRGE340T	Statistics - I	100	40	10	5	5	80	6
	BNHRSE350T	Data Analysis	100	40	10	5	5	80	2
<b>TOTAL</b>			<b>500</b>	<b>TOTAL</b>			<b>26</b>		
IV	BNHRCC410T	Intermediate Microeconomics - II	100	40	10	5	5	80	6
	BNHRCC420T	Intermediate Macroeconomics - II	100	40	10	5	5	80	6
	BNHRCC430T	Introductory Econometrics	100	40	10	5	5	80	6
	BNHRGE440T	Statistics - II	100	40	10	5	5	80	6
	BNHRSE450T	Research Methodology	100	40	10	5	5	80	2
<b>TOTAL</b>			<b>500</b>	<b>TOTAL</b>			<b>26</b>		
V	BNHRCC510T	International Economics	100	40	10	5	5	80	6
	BNHRCC520T	Development Economics	100	40	10	5	5	80	6
	BNHRDS531T	Topics in Microeconomics	100	40	10	5	5	80	6
	BNHRDS542T	Applied Econometrics	100	40	10	5	5	80	6
<b>TOTAL</b>			<b>400</b>	<b>TOTAL</b>			<b>24</b>		
VI	BNHRCC610T	Public Economics	100	40	10	5	5	80	6
	BNHRCC620T	Indian Economy	100	40	10	5	5	80	6
	BNHRDS631T	Money & Finance	100	40	10	5	5	80	6
	BNHRDS632T	—	100	40	10	5	5	80	6
	BNHRDS640J	Dissertation	100	40	-	15	5	80	6
<b>TOTAL</b>			<b>400</b>	<b>TOTAL</b>			<b>24</b>		

**ACRONYMS (AS APPLICABLE) :**

CC=Core Course  
GE =Generic Elective  
AE=Ability Enhancement Compulsory Course  
AC= Additional Compulsory Course  
SE= Skill Enhancement Elective Course  
DS= Discipline Specific Elective

T=Theory  
P=Practical  
WT= Written test  
A=Assignment  
ATT=Attendance  
O=Others (Seminar, Assignment, etc.)

**PAPER CODE ILLUSTRATION:**



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Signature  
Professor-In-Charge (with Date)

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Signature  
Dean (with Date)

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Controller of Examinations,  
St. Xavier's University, Kolkata

## SEMESTER: I

Total Marks: 100

Paper Code: BNHRCC110T

### INTRODUCTORY MICROECONOMICS

#### Learning Objective :

1. To provide students with a theoretical structure to analyze and understand economics as it relates to individuals and businesses.
2. To give students a thorough understanding of the principles of economics in application to individual decision makers, both consumers and firms.  
To expose the students to the basic principles of microeconomic theory.

#### Course Outcome:

1. The course introduces students to models of how individuals and firms interact within markets, when markets fail, and how government policy may improve outcomes for society.
2. To develop an understanding of the framework that economists use to analyze choices made by individuals in response to incentives and consider how these choices can also serve the social interest.
3. Relate the basic economic theory and principles to current microeconomic issues and evaluate related public policy
4. To develop thinking capability like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

#### Course Outline:

##### 1. Exploring the subject matter of Economics

Why study economics? Scope and method of economics; the economic problem: scarcity and choice; the question of what to produce, how to produce and how to distribute output; science of economics; the basic competitive model; prices, property rights and profits; incentives and information; rationing; opportunity sets; economic systems; reading and working with graphs.

##### 2. Supply and Demand: How Markets Work, Markets and Welfare

Markets and competition; determinants of individual demand/supply; demand/supply schedule and demand/supply curve; market versus individual demand/supply; shifts in the demand/supply curve, demand and supply together; how prices allocate resources; elasticity and its application; controls on prices; taxes and the costs of taxation; consumer surplus; producer surplus and the efficiency of the markets.

##### 3. The Households

The consumption decision - budget constraint, consumption and income/price changes, demand for all other goods and price changes; description of preferences (representing preferences with indifference curves); properties of indifference curves; consumer's optimum choice; income and substitution effects; labour supply and savings decision - choice between leisure and consumption.

#### 4. The Firm and Perfect Market Structure

Behavior of profit maximizing firms and the production process; short run costs and output decisions; costs and output in the long run.

#### 5. Imperfect Market Structure

Monopoly and anti-trust policy; government policies towards competition; imperfect competition.

#### 6. Input Markets

Labour and land markets - basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product); demand for labour; input demand curves; shifts in input demand curves; competitive labour markets; and labour markets and public policy.

#### Reading / Reference Lists:

1. Karl E. Case and Ray C. Fair, *Principles of Economics*, 8<sup>th</sup> Edition, Pearson, 2007.
2. N. Gregory Mankiw, *Economics: Principles and Applications*, 4<sup>th</sup> edition, Indian edition by South Western, a part of Cengage Learning, Cengage Learning India Private Limited, 2007.
3. Joseph E. Stiglitz and Carl E. Walsh, *Economics*, 4<sup>th</sup> Edition, W.W. Norton & Company, Inc., New York, International Student Edition, 2007
4. Hal. R Varian, *Intermediate Microeconomics, A modern Approach*, 8<sup>th</sup> Edition, WW Norton and Company Inc., 2010
5. P Samuelson and W. Nordhaus, *Economics*, 14<sup>th</sup> edition/ latest edition, McGraw hill Education
6. Robert S. Pindyck, Daniel L. Rubinfeld and Prem L. Mehta, 7<sup>th</sup> edition, *Microeconomics*, Pearson Education India, 2009
7. G. S. Maddala and E. Miller, *Microeconomics*, Prentice Hall, McGraw Hill Education, 1989

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**Total Marks:** 100

**Paper Code:** BNHRCC120T

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### MATHEMATICAL METHODS FOR ECONOMICS-I

#### Learning Objective:

1. To develop the knowledge of basic mathematics that enables the study of economic theory at the undergraduate level.

#### Course Outcome:

1. Understanding and analyzing the theory and models taught in the subsequent courses of Microeconomics, Macroeconomics, and Econometrics.
2. Develop the technical skill to build up simple analytical models.

#### Course Outline:

##### 1. Sets theory and Probability

Definition of a set and discussion of related concepts; Set types; Operations on sets; Cartesian product; Introduction to probability theory; Classical definition and axiomatic definition; Conditional probability and independence, Bayes Theorem; Random variables: discrete and continuous types; Properties of distribution functions, mass functions and density functions;

Expectation and Variance of a random variable.

**2. Logic and Relations**

Propositions, tautologies, contradictions and negation; Necessary and sufficient conditions; Converse relations; Two-place and three-place relations.

**3. Functions and Correspondences**

Definitions; Graphs; Concepts of 'range', 'domain' and 'mapping'; Function and Relation; Different types of relation; Types of functions: quadratic, polynomial, power, exponential, logarithmic, implicit and explicit, composite, inverse, convex, concave functions and their applications, quasi-convex and quasi-concave

**4. The Real numbers**

The Algebraic and Order properties of  $\mathbb{R}$ ; Absolute value and the Real Line; The Completeness property of  $\mathbb{R}$ ; Supremum and Infimum; Intervals

**5. Sequence and Series**

Basic Concepts; Convergence and divergence; Algebraic properties and applications

**6. Single-variable optimization**

Local and Global optima: geometric characterizations, characterizations using calculus and applications.

**7. Integration of functions**

Integration by parts; Method of substitution; Definite integral; Application: Derivation of total cost function from marginal cost function, Derivation of total revenue function from marginal revenue function.

**8. Difference Equations**

First order and Second order; Economic application: Cobweb model, Samuelson and Hicks models of business cycles

**Reading / Reference Lists:**

1. K. Sydsaeter and P. Hammond, *Mathematics for Economic Analysis*, Pearson, 2002.
2. K.G. Binmore, *Mathematical Analysis*, Cambridge University Press, 1991.
3. R.V. Hogg and A.T. Craig, *An Introduction to Mathematical Statistics*, 3<sup>rd</sup> Edition, Macmillan Company, 1970
4. John Francis Kenny and E. S. Keeping, *Mathematical Statistics*, Van Nostrand, 1964
5. Alpha Chiang and Kevin Wainwright, *Fundamental Methods of Mathematical Economics*, 4th Edition, Mc-Graw Hill Education, 2005

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**Total Marks: 100**

**Paper Code: BNHRGE130T**

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**MATHEMATICS -I**

**Learning Objective :**

1. Familiarize the students with suitable tools of mathematical analysis to handle issues and problems in mathematics and related areas.

## Course Outcome:

This course will enable the students to:

1. Understand the Real Analysis in details.
2. Apply derivative tests in optimization problems appearing in social sciences

## Course Outline:

**Fundamentals of Set Theory (2 Classes):** Definition of a Set, subset, laws of algebra on a set, De Morgan's laws, set of sets, partition in a set, Cartesian products

**Relations (2 Classes):** Definition, relations on a set, composition of relations, equivalence relation (properties without proofs and examples)

**Mapping (4 classes):** Definition, domain, range, into mapping, onto mapping, surjective mapping, injective mapping, bijective mapping, constant mapping, identity mappings, equality of mappings, composition of mappings, inverse of mappings (necessary theorems to be taught if required and no proofs)

**Functions (7 classes):** Introduction (the Real Number System, The natural numbers, Integers, Rational Numbers), Peano's Axiom, the well ordering principle, the Archimedean property, open and closed sets, countable and uncountable sets, bounded and unbounded property of sets, supremum and infimum, the least upper bound axiom, definition of a function, graphical representation of functions, finding domain and range of any function, some special functions namely the modulus function, the box function, trigonometrical functions etc.

**Sequences (7 classes):** definition, bounded and unbounded sequences, limit of a sequence and necessary theorems (no proofs required), monotone sequences, convergence and divergence of monotone sequences, monotone convergence theorem, Cauchy Sequences

**Series of constant terms (7 classes):** definition, convergence and divergence, the geometric series and the p series, Cauchy's Convergence Criterion as applied to infinite series, some general theorems on divergence (only statements), Series of positive terms and test for their convergence (Comparison Test, Cauchy's Root Test, D' Alembert's Ratio Test, Raabe's Test, Gauss's Test), Alternating Series, Leibnitz theorem for convergence of alternating series

**Limit and Continuity (8 classes):** concept of infinity, meaning of the symbols  $x \rightarrow a$  and  $x \rightarrow \pm\infty$ , concept of neighborhood and interval,  $\epsilon$ - $\delta$  definition of limit, geometric significance of a limit, left hand limit and right hand limit, certain theorems on limit (no proofs required), Cauchy's Criterion for the Existence of Limit of a Function, limit of a function as defined in the language of a sequence, definition of continuity at a point and on an interval, graphical interpretation of continuity, piecewise continuous function: discontinuous functions, types of discontinuity, elementary properties on continuous functions (no proofs), intermediate value property (Bolzano's theorem of continuity, intermediate value property, fixed-point theorem only statements no proofs), Boundedness property of continuous functions, continuity of inverse functions.

**Differentiation and Differentiability (7 classes):** definition, derivability, relation between continuity and derivability, differentiation using the fundamental theorem of differentiation, standard formula and rules for differentiation, implicit and parametric forms, concept of differentiability, sign of the derivative at a point, geometric interpretation of a derivative, Chain Rule

(statement and applications), intermediate value property of derivatives.

**Successive Differentiation (2 classes):** the  $n$ th derivative of  $x^k$ , standard problems on second order differentiation, Leibnitz Theorem on Successive Differentiation

**Maxima Minima and Indeterminate Forms (6 classes):** Indeterminate Forms and L'Hospital's Rule (statement and applications), maxima and minima definitions, critical value, higher derivative test for the existence of extreme values, an introduction to convex and concave functions

**Mean Value Theorems (8 classes):** introduction, Rolle's Theorem (proof required), geometric interpretation of Rolle's theorem, Lagrange's Mean Value Theorem (proof required), geometric interpretation of Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem (proof required), Taylor's Generalised Mean Value Theorem

(Lagrange, Cauchy and Schlomilch-Roche form of Remainder) (only statement),

Maclaurin's Theorem (only statement), Young's form of Taylor's Theorem (only statement) Infinite Series as applied using Taylor's Infinite Series, Power Series Expansion of exponential, cosine, sine and logarithmic functions.

**Reading / Reference Lists :**

1. Alpha Chiang and Kevin Wainwright, *Fundamental Methods of Mathematical Economics*, 4<sup>th</sup> Edition, Mc-Graw Hill Education, 2005.
2. Sheldon Ross, *Introductory Statistics*, Academic Press, 2017
3. Tom M. Apostol, *Mathematical Analysis*, 2<sup>nd</sup> Edition, Addition Wesley Publishing Company, Inc.
4. Walter Rudin, *Principle of Mathematical Analysis*, Mc-Graw Hill Education, 1953

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**Total Marks :50**

**Paper Code: BNHRAE140T**

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## ENGLISH COMMUNICATION - I

### Module I

Theory Of Communication

Types and Modes Of Communication

Barriers to communication

Intra-Personal, Inter-Personal and Group Communication

### Module II

Dialogue

Group Discussion

Effective Communication / Miscommunication

Interview

Public Speaking

### Module III

Close Reading

Comprehension

Summary paraphrasing

Analysis and interpretation

### Module IV (Writing Skills)

Report Writing

Making Notes

Letter Writing

**Recommended Readings :**

1. *Fluency In English* – Part II, oxford University Press, 2006
2. *Business English*, Pearson, 2008
3. Orient Blackswan, *Language, Literature, and creativity*, 2013
4. Dr. Gauri Mishra, Dr. Ranjana Kaul and Dr. Bratati Biswas, *Language through Literature (forthcoming)* ed.

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**Total Marks :** (40+10)

**Semester:** I

**Paper Code:** BNHRAE150T

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**ENVIRONMENTAL STUDIES**

- Unit1 : Introduction to Environmental Studies :** 2 Lectures
- Multidisciplinary nature of Environmental Studies; Scope and importance; the need for Environmental Education. Concept of sustainability and sustainable development.
- Unit2 : Ecosystems :** 3 Lectures
- What is Ecosystem? Structure: food chains, food webs and function of ecosystem: Energy flow in an Ecosystem: Energy flow in an Ecosystem, Nutrient cycle and ecological successions. Ecological interactions.
  - Case studies of the following Ecosystems: a) Forest Ecosystem b) Grassland Ecosystem) Desert Ecosystem d) Aquatic Ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
- Unit3 : Biodiversity and conservation :** 4 Lectures
- Levels of biological diversity: Genetic, Species and Ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and Global biodiversity hot spots
  - India as mega –biodiversity nation; Endangered and endemic species of India
  - Threats to biodiversity: Habitat loss, poaching of Wildlife, Man –Wildlife conflicts, biological invasions: Conservation of biodiversity: In-Situ and Ex- Situ conservation of biodiversity
  - Nature reserves, tribal populations and rights (Niyamgiri Vedanta, POSCO), and human Wildlife conflicts in Indian context (Sundarban-Human –Tiger encounters)
  - Ecosystem and biodiversity services: Ecological, Economic, Social, Ethical, Aesthetic and Informational value.
- Unit4 : Environmental pollution and Global Environmental issues :** 6 Lectures
- Environmental pollution: Types, causes, effects and controls: Air, water, soil, and noise pollution.
  - Climate change, Global warming, Ozone layer depletion, acid rain, photo- chemical smog, and impacts on human communities and agriculture

- Nuclear hazards and human health risks (Chernobyl, 3-mile Island, Daiichi – Fukushima)
- Solid-waste Management: Control measures of urban and industrial waste, special reference to e-waste, Biomedical waste
- Pollution Tragedies: Love canal, Bhopal Gas, Endosulfan, Minamata and Flint water.

**Text Book :**

1. M. Basu, and S. Xavier, *Fundamentals of Environmental Studies*, Cambridge University Press, 2016
2. A. K Mitra and R. Chakraborty, *Introduction to Environmental Studies*, Book Syndicate, 2016
3. E. Enger and B. Smith, *Environmental Science: A Study of Interrelationships*, 12<sup>th</sup> edition, McGraw-Hill Higher Education; 2010
4. R. N. Basu, *Environment*, University of Calcutta, 2000

**Suggested Reading :**

1. R. Carson, *Silent Spring*, Houghton Mifflin Harcourt, 2002
2. M. Gadgil and R. Guha, *This Fissured Land- An Ecological History of India*, University of California Press, 1993
3. E.P Odum, H.T & J. Andrews, *Fundamentals of Ecology*. Philadelphia: Saunders, 1971
4. I.L. Pepper, C.P. Gerba and M.L. Brusseau, *Environmental and Pollution Science*, Academic Press, 2011
5. K.M. Agarwal, P.K. Sikdar and S.C. Deb, *A Text book of Environment*, Macmillan Publication, 2002.
6. Richard T. Wright, *Environmental science: Towards a Sustainable Future*, Prentice Hall, 2008

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**SEMESTER : II**

**Total Marks : 100**

**Paper Code: BNHRCC210T**

**INTRODUCTORY MACROECONOMICS**

**Learning Objective :**

1. This course aims to introduce the students to the basic concepts of Macroeconomics which deals with the aggregate economy.
2. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like savings, investment, GDP, money, inflation, and the balance of payments.
3. Students will learn the major perspectives on what determines performance of the overall

economy and will learn to analyze impacts on the economy.

4. To understand how the economy is regulated through monetary and fiscal policies.
5. To study the important indicators of the economy and their significance.

### **Course Outcome:**

On completion of this course, the students will be able:

1. To explain the concept of macroeconomics. Students will learn how to explain the measurement and importance of GDP, inflation, unemployment, money, and trade. Be able to describe the cause and effect of changes in all of these variables.
2. To apply the circular flow of income and expenditure.
3. To analyze the income determination through classical and Keynesian economics.
4. To integrate the role of fiscal and monetary policies in regulating economy.
5. Students would be able to read and explain the content of economic materials from a secondary source and relate economic concepts to these real-world events and critically evaluate the impact of economic policy.

### **Course Outline:**

#### **Module 1**

##### **1. Introduction to Macroeconomics and National Income Accounting :**

Basic issues studied in macroeconomics; measurement of gross domestic product; income, expenditure and the circular flow; real versus nominal GDP; price indices; national income accounting for an open economy; balance of payments: current and capital accounts.

##### **2. Money :**

Functions of money; quantity theory of money; determination of money supply and demand (only quantity theory of money); credit creation; tools of monetary policy.

##### **3. Inflation :**

Inflation and its social costs; hyperinflation, Demand Pull Inflation, Cost Push Inflation and Stagflation

#### **Module 2**

##### **4. The Closed Economy in the Short Run**

**a)** Concept of Effective Demand: Income Determination in Simple Keynesian model; equilibrium, adjustment process and stability, Multiplier analysis; autonomous expenditure, balanced budget, paradox of thrift.

**b)** Income Determination in IS- LM model: construction of IS and LM curve, equilibrium, adjustment process and stability, Effects of fiscal policy, monetary policy and policy mix; Real Balance effects & its implications.

### **Reading / Reference Lists :**

1. Andrew B. Abel and Ben S. Bernanke, *Macroeconomics*, 7<sup>th</sup> edition, Pearson, 2011
2. Chandana Ghosh and Ambar Ghosh, *Macroeconomics*, PHI Publishers, 2011
3. Errol D'Souza, *Macroeconomics*, Pearson Education, 2006
4. Olivier Blanchard, *Macroeconomics*, 5<sup>th</sup> Edition, Pearson, 2009
5. Paul R. Krugman, Maurice Obstfeld and Marc Melitz, *International Economics*, 9<sup>th</sup> Edition,

Pearson Education, 2012

6. N. Gregory Mankiw. *Macroeconomics*, 7<sup>th</sup> edition, Worth Publishers, 2010.
7. Richard T. Froyen, *Macroeconomics*, 2<sup>nd</sup> Edition, Pearson Education, 1986
8. Rudiger Dornbusch, Stanley Fischer and Richard Startz, *Macroeconomics*, 11<sup>th</sup> Edition, McGraw Hill Education, 2010
9. Soumyen Sikdar, *Principles of Macroeconomics*, 3<sup>rd</sup> Edition, Oxford University Press, 2020

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**Total Marks:** 100

**Paper Code:** BNHRCC220T

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## **MATHEMATICAL METHODS FOR ECONOMICS - II**

### **Learning Objective :**

To develop the knowledge of basic mathematics that enables the study of economic theory at the undergraduate level.

### **Course Outcome:**

1. Understanding and analyzing the theory and models taught in the subsequent courses of Microeconomics, Macroeconomics, and Econometrics.
2. Develop the technical skill to build up simple analytical models.

### **Course Outline:**

#### **Module 1**

##### **1. Linear algebra:**

Vector spaces: algebraic and geometric properties, scalar products, norms, orthogonality; linear transformations: properties, matrix representations and elementary operations; systems of linear equations: properties of their solution sets; determinants: characterization, properties and applications.

##### **2. Functions of several real variables:**

Geometric representations: graphs and level curves; differentiable functions: characterizations, properties with respect to various operations and applications; second order derivatives: properties and applications; the implicit function theorem, and application to comparative statics problems; homogeneous and homothetic functions: characterizations and applications.

##### **3. Multi-variable optimization:**

Convex sets; geometric properties of functions: convex functions, their characterizations, properties and applications; further geometric properties of functions: quasi-convex functions, their characterizations, properties and applications; unconstrained optimization: geometric characterizations, characterizations using calculus and applications; constrained optimization with equality constraints: geometric characterizations, Lagrange characterization using calculus and applications; properties of value function: envelope theorem and applications.

## Module 2

### 4. Differential equations:

Defining Order and degree of Differential equations, First order and Second order differential equation, Applications. Output Adjustment in SKM, Price adjustment in competitive markets.

### Reading / Reference Lists :

1. Alpha Chiang and Kevin Wainwright, *Fundamental Methods of Mathematical Economics*, 4<sup>th</sup> Edition, Mc-grawHill Education, 2017
2. Avinash K. Dixit, *Optimization in Economic Theory*, 2<sup>nd</sup> Edition, Oxford University Press, 1990
3. Carl P. Simon and Lawrence Blume, *Mathematics for Economists*, W.W. Norton and Company Inc., 1991
4. K. Sydsaeter and P. Hammond, *Mathematics for Economic Analysis*, Pearson Education Asia: Delhi, 2005

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**Total Marks : 100**

**Paper Code: BNHRGE230T**

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## MATHEMATICS - II

### Learning Objective :

Familiarize the students with suitable tools of mathematical analysis to handle issues and problems in mathematics and related areas.

### Course Outcome:

This course will enable the students to:

1. Understand the Matrix and Vector in details.
2. Relate matrices and linear transformations, compute Eigen values and Eigen vectors of linear transformations.
3. Know the fundamental concept of integration for single and multivariate functions.

### Course Outline :

#### LINEAR ALGEBRA:

##### 1. MATRICES AND GAUSSIAN ELIMINATION:

Introduction, the Geometry of Linear Equations, An Example of Gaussian Elimination, Matrix Notation and Matrix Multiplication, Triangular Factors and Row Exchanges, Inverses and Transposes

##### 2. VECTOR SPACES AND SUBSPACES:

Solving  $Ax = 0$  and  $Ax = b$ , Linear Independence, Basis, and Dimension, The Four Fundamental Subspaces, Linear Transformations

##### 3. ORTHOGONAL VECTORS AND ORTHOGONAL SPACES:

Cosines and Projections onto Lines, Projections and Least Squares, Orthogonal Bases and

Gram-Schmidt

**4. DETERMINANTS :**

Introduction, Properties of the Determinant, Formulas for the Determinant, Applications of Determinants

**5. EIGEN VALUES AND EIGEN VECTORS:**

Introduction, Diagonalization of a Matrix, Difference Equations and Powers Ak, Differential Equations

**6. POSITIVE DEFINITE MATRICES :**

Minima, Maxima, and Saddle Points, Tests for Positive Definiteness, Singular Value Decomposition

**INTEGRATION OF SINGLE AND MULTIVARIATE FUNCTIONS:**

Areas under two dimensional curves, Indefinite integrals of a one variable function, Definite integral, Double Integral, Geometry of Bivariate functions; Surface and Volume

**Reading / Reference Lists:**

1. B.C. Das and B.N. Mukherjee, *Integral Calculus*, 4<sup>th</sup> Edition, Calcutta: U.N. Dhur, 1964
2. Hoffman and Kunze, *Linear Algebra*, 2<sup>nd</sup> Edition, Pearson, 1978
3. K. Sydsaeter and P. Hammond, *Mathematics for Economic Analysis*, Pearson Education Asia, Delhi, 2005
4. Strang Gilbert, *Linear Algebra and its Application*; 4<sup>th</sup> Edition, Cengage Learning, 2005

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**Total Marks : 50**

**Paper Code: BNHRAE240T**

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**ENGLISH COMMUNICATION - II**

**Module 1: Literature**

**Short Stories :** The Last Leaf – O Henry, The Astrologer’s Day – R.K. Narayan, The Postmaster – Rabindranath Tagore

**Poems :** The Listeners – Walter de la Mare, The Highway Man – Alfred Noyes, Stopping by the Woods – Robert Frost

**Module 2: (Language)**

**Monologue:** Narrate the story of *The Astrologer’s Day*, *The Listeners* and *Stopping by the Woods* in form of a prose monologue

**Dialogue writing :** Narrate the story of *The Astrologer’s Day* and *The Listeners* in the form of a dialogue

**Group discussion :** Discuss in your group: 1) ‘*The Astrologer’s Day*’ is a snapshot of contemporary India; 2) ‘*The Listeners*’ evokes a sense of mystery; 3) The image of love as depicted in ‘*The Last Leaf*’; 4) The Theme of romance in *The Highway Man*; 5) Themes in *Stopping by the Woods*. 6) The theme of Individual aspiration in *The Postmaster*.

**Interview :** Face an interview on the topics 1) the ‘relevance of astrology in the scientific age;’ 2) ‘significance of art’ in life with reference to

*The Last Leaf*; 3) The correlation between 'love' and 'sacrifice' with reference to *The Highway Man*. 4) Reflections on life in *Stopping by the Woods*. 5) Human relationship with reference to *The Postmaster*.

**Comprehension:** Answer questions from the select sections of *The Last Leaf* or *The Postmaster*.

**Summary and paraphrasing:** Paraphrase the poems, '*The Highway Man*' and '*The Listeners*' and *Stopping by the Woods*.

**Write a report on any given topic**

**Write a letter as per the given directions**

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**Total Marks : 50**

**Semester: II**

**Paper Code: BNHRAE250T**

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## ENVIRONMENTAL STUDIES

**Unit 1 : Natural Resources : Renewable and Non-renewable Resources :** 6 Lectures

- a) Land resources and land use change; Land degradation, soil erosion and desertification.
- b) Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- c) Disaster management: floods, earthquake, cyclones and landslides. Resettlement and rehabilitation of project affected persons; case studies.

**Water:** Use and over-exploitation of surface and groundwater, floods, droughts, conflicts over water (international & inter-state).

- d) Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

**Unit 2 : Environmental Management: Laws, Policies & Practices :** 7 Lectures

UN Initiatives and International agreements: Montreal and Kyoto protocols, Paris Climate Summit (2015) and Convention on Biological Diversity (CBD).

Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Green Politics, Earth Hour, Green Option Technologies, ISO standards: ISO 9000 and 14000. Environmental communication and public awareness, Role of National Green Tribunal; EIA Formulations, stages, Merits and demerits: case studies (e.g., CNG vehicles, Bharat IV stage)

Environment Laws: Environment Protection Act (1986); Air (Prevention & Control of Pollution) Act (1981); Forest Conservation Act (1980); Water (Prevention and control of Pollution) Act (1974); Wildlife Protection Act (1972), Biodiversity Act (2002)

**Unit 3 : Human Population and the Environment :** 2 Lectures

Human population growth: Impacts on environment, human health and welfare. Family Welfare Programs, Human Rights.

Environmental movements: Chipko, Silent valley, Bishnoi, Narmada Bachao Andolan, Nava Danya.

Role of Information Technology (IT) in environment and Human Health

**Unit 4 : Field work / Paper Writing :** Equal to 5 Lectures

Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.

Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.

Study of common plants, insects, birds and basic principles of identification.

Study of simple ecosystems-pond, river, Delhi Ridge, etc.

#### **Text Books :**

1. M. Basu and S. Xavier, *Fundamentals of Environmental Studies*, Cambridge University Press, 2016.
2. A. K. Mitra and R. Chakraborty, *Introduction to Environmental Studies*, Book Syndicate, 2016.
3. E. Enger and B. Smith, *Environmental Science: A Study of Interrelationships*, 12th edition, McGraw-Hill Higher Education, 2010.

#### **Suggested Reading :**

1. B. Gleeson and N. Low, *Global Ethics and Environment*, London, Routledge, 1999.
2. P.H. Gleick, *Water in Crisis*, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford University Press.
3. Grumbine, R. Edward, and M.K. Pandit. *Threats from India's Himalaya dams*. Science, 2013, 339: 36-37.
4. McCully, P. 1996, *Rivers no more: the environmental effects of dams*, Zed Books, 29-64.
5. McNeill, John R., *Something New Under the Sun: An Environmental History of the Twentieth Century*, 2000.
6. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*, Tripathi 1992.
7. *World Commission on Environment and Development*, Our Common Future, Oxford University Press, 1987.
8. M.K. Ghosh Roy, *Sustainable Development (Environment, Energy and Water Resources)*, Ane Books Pvt. Ltd., 2011.
9. M. Karpagam and Geetha Jaikumar, *Green Management, Theory and Applications*, Ane Books Pvt. Ltd., 2010.
10. Bala Krishna Moorthy, *Environmental Management*, PHI learning Pvt. Ltd, 2012

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## **SEMESTER: III**

**Total Marks: 100**

**Paper Code: BNHRCC310T**

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### **INTERMEDIATE MICROECONOMICS – I**

#### **Learning Objective:**

1. To provide a sound knowledge so that students are able to analyze behaviour of rational consumer and firm.
2. To provide students the knowledge of consumer's choice under uncertainty so that they are able to learn how uncertainty and information can affect decision of a rational consumer.

3. To provide knowledge of different forms of market structures and also of input market.
4. To expose students to various government policies such as tax, subsidy, import quota, price ceiling, price floor and their effects on consumers and producers.

**Course Outcome :**

On completion of this course, the students will be able:

1. To learn how to optimally allocate scarce resources for different commodities.
2. To be able to learn how each rational consumer makes his consumption choice to maximize the utility from scarce resource.
3. To learn the how each firm makes its production choice in order to maximize profit or minimize cost of production.
4. To comprehend how market price and output decision is taken in different market structures.
5. To be able to analyze pricing by firms with market power.
6. To be able to solve the problems applied to microeconomic theory.

**Course Outline :**

**1. Consumer Theory:**

Preference; utility; budget constraint; choice; demand; buying and selling; intertemporal choice; Income consumption curve and Engel curve, Price consumption curve, revealed preference; Choice under risk and uncertainty.

**2. Production & Costs:**

Technology; production with one and more variable inputs; Average product, Marginal product and Total product; isoquants, returns to variable factors and returns to scale; short run and long run costs; relation between short run and long run costs: application of envelope theorem.

**3. Perfect Competition:**

Assumptions; short run and long run equilibrium; Application of tax and subsidy.

**4. Monopoly:**

Sources of Monopoly; Equilibrium, Application of tax and subsidy, Price Discrimination

**5. Input Market:**

Derived demand for input, marginal product and marginal revenue product, input demand for competitive firm and competitive industry, returns to scale and product exhaustion. Input demand under monopoly and monopsony: Role of Trade Union.

**Reading / Reference Lists:**

1. Anindya Sen, *Microeconomics: Theory and Applications*, Oxford University Press, 1999
2. David M. Kreps, *A Course in Microeconomic theory*, Princeton University Press, 1992
3. Hugh Gravelle & Ray Rees, *Microeconomics*, 3<sup>rd</sup> Edition, Pearson Education India, 2004
4. Michael D. Whinston & B. Douglas Bernheim, *Loose-Leaf for Microeconomics*, McGraw-Hill Education
5. Robert S. Pindyck, Daniel Rubinfeld & Prem L. Mehta, *Microeconomics*, 7<sup>th</sup> Edition, Pearson Education India, 2009
6. Varian, Hal R, *Intermediate Microeconomics: A Modern Approach*, 8<sup>th</sup> Edition, W. W. Norton &

Company Inc, 2009

7. Walter Nicholson & Christopher Snyder, *Microeconomic Theory: Basic Principles and Extensions*, 11<sup>th</sup> Edition, Cengage, 2014

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**Total Marks:** 100

**Paper Code:** BNHRCC320T

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## **INTERMEDIATE MACROECONOMICS–I**

### **Learning Objective :**

1. To provide the students with knowledge of demand-supply situation in the economy.
2. To expose student to the concept of balance of payments accounts and determination of national income in open economy
3. To provide knowledge of different types of exchange rate and how rise and fall of a country's currency affects its economy
4. To expose student to concept of inflation and unemployment and their affect on the economy.

### **Course Outcome:**

1. To learn the basics of National Income Accounts of a country.
2. To be able to learn how fiscal policy and monetary policy operate, pros and cons of both the policies.
3. To learn how national income is determined in open economy.
4. To be able to analyze how equilibrium takes place both in goods market and foreign market and how this equilibrium is affected by fiscal policy and monetary policy.

### **Course Outline :**

#### **1. Aggregate Demand and Aggregate Supply Curves :**

Derivation of aggregate demand and aggregate supply curves; interaction of aggregate demand and supply: comparative static exercises: fiscal policy, monetary policy, wage-cut (Keynes effect) Expectation & Aggregate supply curve: alternative models: sticky wage, worker's misperception model, incomplete information model & sticky price model.

#### **2. Inflation, Unemployment and Expectations:**

Phillips curve; adaptive and rational expectations; policy ineffectiveness debate; Monetary policy and time inconsistency model.

#### **3. Balance of Payments & Exchange Rate :**

Balance of Payment accounts in an open economy; Determination of National Income, Introduction of foreign Country & repercussion effect - open economy multiplier with & without repercussion effect; Fixed & Flexible Exchange Rate: adjustment of demand and supply of Foreign Exchange, Effect of devaluation on output and trade balance; Marshall-Lerner Condition, J-Curve effect; Mundell Fleming Model under alternative exchange rate regimes; Asset approach and overshooting of exchange rates

## Reading / Reference Lists:

1. Andrew B. Abel and Ben S. Bernanke, *Macroeconomics*, 7<sup>th</sup> edition, Pearson, 2011
2. Errol D'Souza, *Macroeconomics*, 1<sup>st</sup> Edition, Pearson, 2009
3. Olivier Blanchard, *Macroeconomics*, 5<sup>th</sup> Edition, Pearson Education, 2009
4. Paul R. Krugman, Maurice Obstfeld and Marc Melitz, *International Economics*, 9<sup>th</sup> Edition, Pearson Education, 2012
5. N. Gregory Mankiw. *Macroeconomics*, 7<sup>th</sup> edition, Worth Publishers, 2010.
6. Rudiger Dornbusch, Stanley Fischer and Richard Startz, *Macroeconomics*, 11<sup>th</sup> Edition, McGraw Hill Education, 2010
7. Rudiger Dornbusch, *Open Economy Macroeconomics*, Basic Books, 1980
8. Steven M. Sheffrin, *Rational Expectations*, 2<sup>nd</sup> Edition, Cambridge University Press, 1996

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**Total Marks:** 100

**Paper Code:** BNHRCC330T

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## STATISTICAL METHODS FOR ECONOMICS

### Learning Objective :

1. To develop the knowledge of statistical tools for empirical economics.
2. To develop the ability to interpret the numerical information that forms the basis of economic problems.
3. To provide the theoretical concepts, tools and methods of statistics as well as the opportunity to work through example problems.
4. To develop the student's ability to deal with numerical and quantitative issues of economics.

### Course Outcome:

On completion of this course, the students will be able to

1. Describe and discuss the key terminology, concepts tools and techniques used in statistical analysis.
2. Critically evaluate the underlying assumptions of analysis tools.
3. Understand and critically discuss the issues surrounding sampling and significance.
4. Discuss critically the uses and limitations of statistical analysis.
5. Solve a range of problems using the techniques covered.
6. Conduct basic statistical analysis of data.

### Course Outline:

#### 1. Descriptive Statistics :

Presentation of Data; Frequency Distribution; Measures of central tendency, Dispersion, Moments, Skewness and Kurtosis; Bivariate Frequency Distribution – correlation and regression.

#### 2. Index Number:

Price and quantity index number; Different formula; Tests for an ideal index; application - Cost

of living index; Real GDP.

**3. Univariate Probability Distribution:**

Discrete distribution - Binomial, Poisson; Continuous Distributions -Uniform, Normal, Exponential (Properties of each distribution; mean and variance).

**4. Jointly Distributed Random Variables :**

Density function of Bivariate normal distribution and obtaining means, variances and correlation coefficients.

**5. Sampling :**

Concept of sampling and random sampling. Principal steps in a sample survey; methods of sampling; -SRSWR, SRSWOR, Stratified sampling. Sampling vs non-sampling error.

**Reading / Reference Lists:**

1. Jay L. Devore, *Probability and Statistics for Engineers*, Cengage Learning, 2010.
2. John E.Freund, *Mathematical Statistics*, PrenticeHall, 1992.
3. A.M. Mood, F.A.Greybill and D.C.Boes, *Introduction to the theory of statistics*, McGraw Hill Education, 1974.
4. Richard J. Larsen and Morris L.Marx, *An Introduction to Mathematical Statistics and its Applications*, PrenticeHall, 2011.
5. R.V.Hogg and A.T.Craig, *An Introduction to Mathematical Statistics*, 3<sup>rd</sup> Edition, Macmillan Company, 1970
6. William G. Cochran, *Sampling Techniques*, JohnWiley, 2007

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**Total Marks:** 100

**Paper Code:** BNHRGE340T

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**STATISTICS-I**

**Learning Objective :**

1. To provide an introduction to probability and statistics with applications.
2. To develop the understanding of the theoretical background of the statistical tools will help to develop the complete understanding for the subject.

**Course Outcome:**

On completion of this course, the students will be able to

1. How to calculate and apply measures of central tendency and measures of dispersion -- grouped and ungrouped data cases.
2. How to apply discrete and continuous probability distributions to various economic problems.
3. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting.
4. To create and explain index numbers, WPI, CPI.
5. To learn different concepts of sampling and technique of different sampling methods.
6. Perform ANOVA and F-test.

## Course Outline:

### Unit - I:

1. Nature of statistical data –inaccuracies and approximation, interpolation Newton's forward, backward and Lagrangian.
2. Tabular and graphical presentation of non-frequency type data
3. Univariate frequency distributions and their graphical representation
4. Measures of Central tendency-The mean, median mode and other quartiles
5. Measures of Dispersion
6. Moments, Skewness and Kurtosis
7. Bivariate frequency distribution-Simple and multiple correlation and regression
8. ANOVA Tables

### Unit - II : Probability and Distribution :

1. Introduction to Probability theory
2. Probability measure/ Probability set function.
3. Probability Space.
4. Conditional probability and independence, Bayes Theorem.
5. Random variables: discrete and continuous types
6. Properties of distribution functions, mass functions and density functions.
7. Expectations of a random variable.
8. Transformations of variables: discrete and continuous types.

### Reading / Reference Lists:

1. David Freedman, Robert Pisani and Roger Purves, *Statistics*, 4<sup>th</sup> Edition, W. W. Norton & Company, 2014
2. A.M. Goon, M.K. Gupta, B. Dasgupta, *Fundamentals of Statistics: Volume 1&2*, World Press Private Ltd, 2013.
3. Robert V. Hogg, Joseph W. McKean and Allen Thornton Craig, *Introduction to Mathematical Statistics*, 6<sup>th</sup> Edition, Pearson, 2004
4. Sheldon M. Ross, *Introduction to Probability Models*, 11<sup>th</sup> Edition, Academic Press, 2014

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**Total Marks : 100**

**Paper Code: BNHRSE350T**

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## DATA ANALYSIS

### Learning Objective:

1. To develop the knowledge of statistical tools for quantitative data analysis.
2. To develop the knowledge of statistical tools for qualitative data analysis

### Course Outcome:

On completion of this course, the students will be able to

1. To demonstrate the univariate, bivariate and multivariate data analysis techniques.

2. To perform the data analysis using various software packages (MS Excel).
3. Effectively visualize the data and interpret the data.
4. To learn the process of reporting the results.
5. To evaluate the Indian data.

**Course Outline:**

1. Sources of data; Population census versus sample surveys; Random sampling; Designing of questionnaire pre-testing of questionnaire for collection of primary data.
2. Descriptive statistics: mean, median, mode, measures of dispersion, skewness and kurtosis, simple correlation; rank correlation. Graphical representation of data sets: pie chart, bar chart; linear and nonlinear curve fitting; Introduction to probability theory; random sampling using random number table, ANOVA based Tests.
3. Analysis of Indian Data: Economic Survey, RBI Bulletin on currency and finance, ASI DATA, Foreign Trade Statistics, NSS Consumer surveys.

**Reading / Reference Lists :**

1. A.M. Goon, M.K. Gupta, B. Dasgupta, *Fundamentals of Statistics: Volume 1&2*, World Press Private Ltd, 2013.
2. M.R. Spiegel, *Theory and Problems of Probability and Statistics*, Schaum Outline Series, 1980
3. Official websites of RBI, Government of India, NSS, ASI.
4. W. G. Cochran, *Sampling Techniques*, 3<sup>rd</sup> Edition, Wiley, 1977.
5. P. H. Karmel and M. Polasek , *Applied Statistics for Economists*, 4<sup>th</sup> edition, Pitman, 1978

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**SEMESTER: IV**

**Total Marks: 100**

**Paper Code: BNHRCC410T**

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**INTERMEDIATE MICROECONOMICS - II**

**Learning Objective:**

1. To provide students with the knowledge of basic microeconomics that they need to think like an empirical economist or a policy maker.

2. To help students to expand the knowledge on different market structures.
3. To provide students basic knowledge of information economics
4. To analyze economic situations with the techniques of game theory

**Course Outcome:**

1. To learn about different forms of market structures.
2. To be able to learn game theory and how to use those techniques to analyze an economic situation
3. To be able to solve the problems applied to microeconomic theory
4. To apply economic theory to diverse real-world situations

**Course Outline:**

**1. Market Structure and Game Theory:**

Monopolistic competition; Game theory and oligopoly.

**2. General Equilibrium, Efficiency and Welfare :**

Equilibrium and efficiency under pure exchange and production; Overall efficiency and welfare economics, Fundamental theorems of Welfare Economics.

**3. Market Failure :**

Externality and solution – Pigouvian taxation and subsidy, Coase solution; Public goods and markets with asymmetric information.

**Reading / Reference Lists :**

1. Hal R. Varian, *Intermediate Microeconomics, a Modern Approach*, 8<sup>th</sup> edition, W.W. Norton and Company, Affiliated East-West Press (India), 2010.
2. C. Snyder and W. Nicholson, *Fundamentals of Microeconomics*, Cengage Learning (India), 2010.
3. David M. Kreps, *A Course in Microeconomics*, Princeton University Press, 1992
4. Jean Tirole, *Theory of Industrial Organization*, MIT Press, 1988.
5. Robert Gibbons, *A Primer in Game Theory*, Princeton University Press, 1992.
6. Erik Rasmusen, *Games and Information: An Introduction to Game Theory*, Basil Blackwell, 1999.
7. K. Binmore, *Fun and Games: A Text on Game Theory*, Oxford University Press, 1991.
8. Anindya Sen, *Microeconomics: Theory and Applications*, Oxford University Press, 1999.
9. Pindyck and Rubinfeld, *Microeconomics*, 8<sup>th</sup> Edition, Pearson Education, 2017
10. Hal R. Varian, *Microeconomic Analysis*, 3<sup>rd</sup> edition, W.W. Norton and Company, 1992

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**Total Marks: 100**

**Paper Code: BNHRCC420T**

**INTERMEDIATE MACROECONOMICS - II**

**Learning Objective :**

1. To expose students to modern and dynamic theories related to consumption and investment activities taken place in economy.
2. To provide students adequate information about the money market, different theories on money demand including the role of the banking system in determining the money supply
3. To expose students to critical evaluation macroeconomic policies under different economic situations
4. To provide students the knowledge of economic growth theory

**Course Outcome :**

1. To be able to learn about money market and different theories of money demand
2. To be able to explore main aspect of economic growth theories
3. To be able to relate macroeconomic theory to current macroeconomic issues in economy
4. To be able to analyze macroeconomic policies under different economic situations

**Course Outline :**

**Module1 :**

**1. Schools of Macroeconomic Thoughts:**

Classicals; Keynesians; Rational expectations and New-Keynesians: Menu costs, wage price spiralling, coordination failure.

**2. Microeconomic Foundations :**

- a) **Consumption:** Keynesian Consumption Function, Fisher's Theory of Optimal Intertemporal Choice, Life-Cycle and Permanent income Hypotheses, rational Expectations and Random Walk of Consumption expenditure
- b) **Investment :** Keynesian theory of Investment; determinants of business fixed investment ; residential investment and inventory investment.
- c) **Demand for money :** Keynesian theory of regressive expectations; Tobin's theory of speculative demand for money; Baumol Tobin's Model of Transaction Demand for money

**Module2 :**

**1. Economic Growth:**

Harrod-Domar model; Solow model; golden rule; technological progress and elements of endogenous growth.

**Reading / Reference Lists:**

1. Andrew B. Abel and Ben S. Bernanke, *Macroeconomics*, 7<sup>th</sup> edition, Pearson, 2011
2. Chandana Ghosh and Ambar Ghosh, *Macroeconomics*, PHI Publishers, 2011
3. Errol D'Souza, *Macroeconomics*, 1<sup>st</sup> Edition, Pearson, 2009
4. Olivier Blanchard, *Macroeconomics*, 5<sup>th</sup> Edition, Pearson Education, 2009
5. Paul R. Krugman, Maurice Obstfeld and Marc Melitz, *International Economics*, 9<sup>th</sup> Edition, Pearson Education, 2012
6. N. Gregory Mankiw. *Macroeconomics*, 7<sup>th</sup> edition, Worth Publishers, 2010.

7. Rudiger Dornbusch, Stanley Fischer and Richard Startz, *Macroeconomics*, 11<sup>th</sup> Edition, McGraw Hill Education, 2010
8. Amartya Sen, *Growth economics*, Penguin modern economic readings, 1970
9. Charles I. Jones, *Introduction to Economic Growth*, 2<sup>nd</sup> edition, W.W. Norton & Company, 2002.
10. Robert J. Gordon, *Macroeconomics*, Prentice-Hall India Limited, 2011.

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**Total Marks : 100**

**Paper Code: BNHRCC430T**

## **INTRODUCTORY ECONOMETRICS**

### **Learning Objective :**

1. To develop the knowledge of statistical tools to understand the properties of a regression analysis.
2. To develop the knowledge of understanding the statistical properties of the regression result.
3. To develop the capability to handle the situations where the underlying assumptions of the regression analysis is violated.
4. To develop the ability to apply the knowledge in real-life data and interpretation of the results.

### **Course Outcome :**

1. To understand the appropriate regression analysis for a given data set.
2. To analyze the performance of the regression analysis using the appropriate statistical tools.
3. To understand the violation of the assumptions of these analysis and remedies for these problems.

### **Course Outline:**

#### **1. Simple Linear Regression Model: Two Variable Case**

Estimation of model by method of ordinary least squares; properties of estimators; goodness of fit; tests of hypotheses; scaling and units of measurement; confidence intervals; Gauss-Markov theorem; forecasting.

#### **2. Multiple Linear Regression Model :**

Estimation of parameters; properties of OLS estimators; goodness of fit -  $R^2$  and adjusted  $R^2$ ; partial regression coefficients; testing hypotheses – individual and joint; functional forms of regression models.

#### **3. Violations of Classical Assumptions :**

Consequences, Detection and Remedies: Multicollinearity; Heteroscedasticity; Serial correlation.

#### **4. Specification Analysis:**

Omission of a relevant variable; Inclusion of irrelevant variable; Tests of specification errors.

**5. Dummy variable:**

Dummy variable for changes in intercept term, slope coefficient; Dummy variable trap; Dummy variable test.

**6. Time-Series Analysis:**

Models of Time Series: White noise, Random Walk, Moving Average, Auto Regressive Process, Auto Regressive Moving Average Process; Different components of time series and their measurements.

**Reading / Reference Lists:**

1. Christopher Dougherty, *Introduction to Econometrics*, Oxford University Press, 2011.
2. Damodar N. Gujarati and Dawn C. Porter and Sangeetha Gunasekar, *Basic Econometrics*, 5<sup>th</sup> edition, McGraw-Hill Education, 2012
3. Jeffrey Wooldridge, *Introduction to Econometrics: A modern approach*, 5<sup>th</sup> edition, Cengage Learning, 2014.
3. Jan Kmenta, *Elements of Econometrics*, Indian Reprint, Khosla Publishing House.
4. John Johnston and John Enrico DiNardo, *Econometric Methods*, 4<sup>th</sup> Edition, McGraw-Hill Education, 1997.
5. G.S. Maddala, *Introduction to Econometrics*, Macmillan USA, 1988

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**Total Marks : 100**

**Paper Code: BNHRGE440T**

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**STATISTICS - II**

**Learning Objective :**

1. To provide an introduction to probability and statistics with applications.
2. To develop the understanding of the theoretical background of the statistical tools will help to develop the complete understanding for the subject.

**Course Outcome :**

1. How to calculate and apply measures of central tendency and measures of dispersion -- grouped and ungrouped data cases.
2. How to apply discrete and continuous probability distributions to various economic problems.
3. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting.
4. Create and explain index numbers, WPI, CPI
5. Learn different concepts of sampling and technique of different sampling methods.
6. Perform ANOVA and F-test.

## Course Outline :

### Unit –I :

1. Basic concepts of Statistical Inference: Population & parameter, random sample & statistic; Point and Interval Estimation, confidence level, testing of hypothesis; Distributions of functions of random variables; Sampling distribution of a statistic and its standard error; Elements of hypothesis testing: Null and alternative hypotheses, simple & composite hypotheses, critical region, type I and type II errors, level of significance, size, power, p-value. Exact tests and confidence intervals: classical and p-value approaches.
2. Categorical data: Tests of proportions, tests of association and goodness-of-fit using Chi-square test, Yates' correction.
3. Tests for the significance of correlation coefficient. Sign test for median, Sign test for symmetry, Wilcoxon two-sample test.
4. Analysis of variance, one-way and two-way classification. Brief exposure of three basic principles of design of experiments: treatment, plot and block. Analysis of completely randomized design randomized complete block design.

### Unit –II :

5. **Time Series** :Components of time series; Decomposition of time series- Additive and multiplicative model with their merits and demerits; Measurement of trend by method of free-hand curve, method of semi-averages and method of least squares; Measurement of seasonal variations by method of ratio to trend.
6. **Index numbers** : Definition; Criteria for a good index number; Different types of index numbers; Construction of index numbers of prices and quantities; Consumer price index number; Uses and limitations of index numbers.
7. **Statistical Quality Control**: Importance of statistical methods in industrial research and practice; Determination of tolerance limits; Causes of variations in quality: chance and assignable; General theory of control charts, process & product control; Control charts for variables: X- bar and R-charts; Control charts for attributes: p and c-charts.
8. **Demographic Methods** : Introduction; Measurement of population, rates and ratios of vital events; Measurement of mortality: CDR, SDR (w.r.t. Age and sex), IMR, Standardized death rates; Life (mortality) tables: definition of its main functions and uses; Measurement of fertility and reproduction: CBR, GFR, and TFR; Measurement of population growth: GRR, NRR.

### Reading / Reference Lists:

1. Brockwell and Davis, *Introduction to Time Series and Forecasting*, Springer, 1996
2. G. Casella , and R. L. Berger, *Statistical Inference*, 2<sup>nd</sup> Edition, S. Chand ( G/L) & Company Ltd, 2001
3. A.M. Goon, M.K. Gupta, B. Dasgupta, *Fundamentals of Statistics: Volume 1&2*, World Press Private Ltd, 2013
4. D.C. Montgomery, *Introduction to Statistical Quality Control*, Wiley India Pvt. Ltd, 2008
5. A.M. Mood, F.A. Graybill, and D.C. Boes, *Introduction to the Theory of Statistics*, 3<sup>rd</sup> Edition, McGraw-Hill Education, 2001
6. P. Mukhopadhyay, *Applied Statistics*, Books and Allied (P) Ltd, 1999

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## RESEARCH METHODOLOGY

### Learning Objective :

1. To develop the knowledge of principles for research.
2. To develop the knowledge of how to identify a research problem, research objective and research questions.
3. To enable the students to formulate the research strategy, research ethics, different data collection methods

### Course Outcome :

1. Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling.
2. Have basic knowledge on strategy for literature review, objective of literature review and use of literature review.
3. Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis.
4. Have basic awareness of data analysis, sampling and hypothesis testing procedures.
5. to learn the process of reporting the research findings.
6. to conduct an article or research paper.

### Course Outline :

1. Sources of data; Population census versus sample surveys; Random sampling; Designing of questionnaire pre-testing of questionnaire for collection of primary data.
2. Descriptive statistics: mean, median, mode, measures of dispersion, skewness and kurtosis, simple correlation; rank correlation. Graphical representation of data sets: pie chart, bar chart; linear and nonlinear curve fitting; Introduction to probability theory; random sampling using random number table, ANOVA based Tests.
3. Analysis of Indian Data: Economic Survey, RBI Bulletin on currency and finance, ASI DATA, Foreign Trade Statistics, NSS Consumer surveys.

### Reading / Reference Lists :

1. A.M. Goon, M.K. Gupta, B. Dasgupta, *Fundamentals of Statistics: Volume 1&2*, World Press Private Ltd, 2013
2. M.R. Spiegel, *Theory and Problems of Probability and Statistics*, Schaum Outline Series, 1980
3. Official websites of RBI, Government of India, NSS, ASI.
4. P.H. Karmel and M. Polasek, *Applied Statistics for Economists*, 4<sup>th</sup> edition, Pitman, 1978.
5. W. G. Cochran, *Sampling Techniques*, 3<sup>rd</sup> Edition, Wiley, 1977.

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**INTERNATIONAL ECONOMICS****Learning Objective:**

1. Recognize the cause of trade, sources of the gains from trade and the domestic and international distribution of those gains.
2. Examine instruments and consequences of trade policy measures—including tariffs and quantitative restrictions
3. Understanding the concept of various forms of exchange rate for conceptualising BOP for a country.

**Course Outcome:**

1. Have a good conceptual understanding of the key concepts of international trade.
2. Ability to outline the development trade theory historically, differentiating standard classical and orthodox trade theories.
3. To understand the processes of international economic relations and conceptualizing its impact on international trade.
4. To acquire skills that would help those to take rational decisions in issues related with the international economy.

**Course Outline :**

1. Basics of trade; Comparative advantage; externalities; International equilibrium; offer curves, ToT and stability; Walrasian static stability and Marshall-Lerner condition; Gains from Trade.
2. Comparative versus Absolute Advantage; David Ricardo's theory of comparative advantage; One-factor economy, production possibility frontier, relative demand and relative supply, terms of trade; Trade in Ricardian world, Determination of intermediate ToT, Complete specialization & GFT
3. Factor Endowment & Trade (Heckscher-Ohlin-Samuelson Model): H-O theorem and physical vs. price definitions of factor abundance; Properties of the HO model: Factor intensity ranking, one-to-one correspondence between commodity price ratio & factor price ratio (Stolper-Samuelson theorem), One to one correspondence between endowment ratio and production proportion (Rybczynski theorem); Taste bias and invalidation of HO theorem; Leontief Paradox; FPE theorem and sources of its disruption.
4. Trade Policy: Partial Equilibrium Analysis of Tariff - cost-benefit, Quota, Quota- Tariff equivalence & non-equivalence, monopoly effects of quota, subsidy and voluntary export restraint; General Equilibrium Analysis- distinction between large and small economy, welfare effects of a tariff on small country and large country. Tariff ridden offer curve, Tariff war, Optimum tariff for large economy, Metzler's Paradox.
5. Open Economy Macroeconomics: Concepts of Exchange rate – Real and Nominal exchange rate, REER and NEER; Purchasing Power parity; Concepts of Spot and Forward market; Hedging and

Covered interest parity condition; India's BOP and exchange rate policy.

**Reading / Reference Lists :**

1. P. Krugman and M. Obstfeld, *International Economics*, 8th Edition, Pearson Education, 2008
2. R. Caves, J. Frankel and R.W. Jones , *World Trades & Payments* ,9th Edition, Pearson Education, 2002
3. Rajat Acharyya, *International Economics: An Introduction to Theory and Policy*, Oxford University Press India, 2013
4. Francisco L. Rivera-Batiz and Luis A. Rivera-Batiz, *International Finance and Open Economy Macroeconomics*, Pearson Education, 1993

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**Total Marks : 100**

**Paper Code: BNHRCC520T**

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**DEVELOPMENT ECONOMICS**

**Learning Objective :**

1. To understand the notion of economic development, its measurement and its various obstacles.
2. To understand the problems of underdevelopment and ways to overcome those problems.
3. To understand the concept of poverty, inequality and also to learn about commonly used inequality and poverty measures.

**Course Outcome :**

1. To be able to understand theoretical models related to development economics.
2. To be able to analyse the various issues related to developed and less developed economies.

**Course Outline :**

1. **Conceptions of Development:** Alternative measures of development, documenting the international variation in these measures, comparing development trajectories across nations and within them.
2. **Development Strategies:** Balanced versus Unbalanced growth; Big push theory.
3. **Dual economics structure:** Surplus labour and disguised unemployment; Lewis model; Harris- Todaro model.
4. **Poverty and Inequality:** Definitions, Measures and Mechanisms: Inequality axioms; a comparison of commonly used inequality measures; poverty measurement; Gender inequality; HPI; Kuznets` inverted-U hypothesis: testing and explanation, Inequality as a constraint to growth-basics of Galore-Zeira model

**Reading / Reference Lists :**

1. Debraj Ray, *Development Economics*, Oxford University Press, 2009.
2. Partha Dasgupta, *Economics, A Very Short Introduction*, Oxford University Press, 2007.
3. Kaushik Basu, *The Oxford Companion to Economics in India*, Oxford University Press, 2007.
4. Amartya Sen, *Development as Freedom*, Oxford University Press, 2000.

5. Kaushik Basu, *Analytical Development Economics*, Oxford University Press, 1997.
6. Michael P. Todaro and Stephen C. Smith, *Economic Development*, 10th Edition, Pearson Education, 2009.

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**Total Marks : 100**

**Paper Code: BNHRDS530T**

## **TOPICS IN MICROECONOMICS**

### **Learning Objective :**

1. To provide an advanced level knowledge regarding the decision making of rational consumers and firms.
2. To provide students with the basic concept of economics of information.
3. To provide the students with advanced level knowledge of game theory techniques

### **Course Outcome:**

1. To able to understand how efficient allocation of resources takes place in a free market economy.
2. To able to solve problems and applications related to microeconomics theory.
3. To learn about different measures of risk aversion

### **Course Outline:**

1. **Optimization in Economic Theory:** Value function, Envelope theorem and Duality approach. Applications: a) Indirect utility function and its properties; Roy's identity; Expenditure function and Shepherd's lemma; Slutsky equation b) Cost function and its properties; Shepherd's lemma and conditional factor demand functions c) Profit function and its properties; Hotelling's lemma; Unconditional factor demand functions and supply function
2. **Game Theory Basics:** Normal form game and Extensive form games with perfect information; The game tree; strategies; sub game perfection; backward induction. Applications: a) Cournot Equilibrium b) Stackelberg Equilibrium c) Tragedy of commons
3. Expected utility Theorem; measures of risk aversion. Applications- a) investment in risky assets b) insurance c) the principal agent problem: adverse selection and moral hazard

### **Reading / Reference Lists:**

1. Martin J. Osborne, *An Introduction to Game Theory*, Oxford University Press, New Delhi, 2004
2. R. Gibbons, *Game Theory for Applied Economists*, Princeton University Press, 1992
3. Avinash K. Dixit, *Optimization in Economic Theory*, 2<sup>nd</sup> Edition, Oxford University Press, 1990
4. P. K. Dutta, *Strategies and Games*, The MIT Press.
5. Hal. R Varian, *Intermediate Microeconomics, A modern Approach*, 3<sup>rd</sup> Edition, WW Norton and Company Inc., 2010
6. D. Fudenberg and J. Tirole, *Game Theory*, MIT Press, 1991

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**Total Marks : 100**

**Paper Code: BNHRDS540T**

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## APPLIED ECONOMETRICS

### Learning Objective :

1. To develop the theoretical as well as the applied knowledge of econometric tools.
2. Provide skills to understand the suitable models for a given data set.

### Course Outcome:

1. To understand the appropriate regression analysis for a given data set.
2. To analyze the performance of the regression analysis using the appropriate statistical tools.
3. Ability to handle different types of dataset.

### Course Outline:

1. Stages in empirical econometric research
2. Review of Multiple Linear Regression Model; Regression Diagnostics and Specification: Model misspecification, functional forms; model selection.
3. Limited dependent variables: Logit and Probit models for binary responses, Tobit models for truncated data.
4. Time-Series Analysis  
Models of Time Series: White noise, Random Walk, Moving Average, Auto Regressive Process, Auto Regressive Moving Average Process; Different components of time series and their measurements.
5. Panel Data Models: Methods of estimation; fixed effects model; random effects model
6. Applications of Econometric Software Packages: STATA/ E-VIEWS

### Reading / Reference Lists:

1. Damodar N. Gujarati and Dawn C. Porter and Sangeetha Gunasekar, *Basic Econometrics*, 5<sup>th</sup> edition, McGraw-Hill Education, 2012.
2. G. S. Maddala and Kajal Lahiri, *Introduction to Econometrics*, Wiley, 2009.
3. Jeffrey Wooldridge, *Introduction to Econometrics: A modern approach*, 5<sup>th</sup> edition, Cengage Learning, 2014.

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## SEMESTER : VI

Total Marks : 100

Paper Code: BNHRCC610T

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## PUBLIC ECONOMICS

### Learning Objective :

1. It develops an analytical framework that facilitates the evaluation of public policy and subsequently informs the public debate.
2. To understand the economics of government expenditure and taxation.

3. To use economic analysis to predict and verify the effects of government intervention on behavior of individuals, households, and firms.
4. To discuss the implications of policy for efficiency and equity.

**Course Outcome :**

On completion of this course, the students will be able to:

1. Describe the major items of government revenue and expenditure.
2. Compare explanations for government intervention.
3. Demonstrate why competition is efficient
4. Explain the sources of market failure and potential policy responses
5. Discuss the design of the tax structure using the concepts of efficiency and equity
6. Describe how the level of government expenditures is determined
7. Demonstrate how the interaction between jurisdictions affects the choice of policy
8. Employ economic analysis to evaluate policy proposals.

**Course Outline :**

1. Nature and Scope of Public Economics Definition and Scope of Public Economics; Externalities, Market Failure and Government Intervention; Coase Theorem; Public Expenditure to finance Development.
2. Theory of Public Good Overview of Public Good; Characteristics of Pure Public Good; Distinction between Pure Public Good and Private Good; Market Failure in case of Pure Public Good; Optimal provision of Public Goods; Private Provision and Public Provision of Public Goods; Lindahl Equilibrium, Voting Equilibrium.
3. Taxation Classification of Taxes; Canons of Taxation; Benefit Principle; Equal Sacrifice Principle; Ability to Pay Principle; Incidence and Burden of Taxes; Effects of taxation on income distribution, work efforts, and on savings; the Laffer curve; Optimal Taxation.
4. Public Expenditure and Public Debt Meaning and Classification of Public Expenditure; government budget and its types; government expenditure and tax multipliers, balanced budget multiplier; Fiscal Federalism in India; Meaning of Public Debt; Sources of Public Borrowings: internal and external borrowing; Effects of Public Debt.

**Reading / Reference Lists :**

1. A. B. Atkinson and J. E. Stiglitz, *Lectures on Public Economics*, McGraw-Hill Education, 1980.
2. Amaresh Bagchi (ed), *Readings in Public Finance*, Oxford University Press.
3. J. E. Stiglitz, *Economics of Public Sector*, 3<sup>rd</sup> Edition, W. W Norton and Company Inc., 2000.
4. J. Hindriks and G. D. Myles, *Intermediate Public Economics*, The MIT Press; Annotated Edition, 2006.
5. R.A. Musgrave and P.B. Musgrave, *Public Finance in Theory & Practice*, 5<sup>th</sup> edition, McGraw-Hill Education, 1989.

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## INDIAN ECONOMY

### Learning Objective :

1. The primary objective of this course is to provide a macroeconomic understanding of the Indian Economy since Independence.
2. To develop basic knowledge of factors governing Indian economy and its growth.
3. Understand the role of the Indian economy in the global context.

### Course Outcome :

1. Develop ideas of the basic characteristics of Indian economy, its potentials.
2. Grasp the importance of planning undertaken by the government of India, have knowledge on the various objectives, failures and achievements as the foundation of the ongoing planning and economic reforms taken by the government.
3. To understand the basic characteristics of economic development and growth of Indian economy.
4. To analyze new economic policies (privatization, liberalization and globalization) in India.
5. Ability to understand the problems and measures in their contextual perspective.

### Course Outline :

1. Economic Development since Independence: Major features of the economy at independence; growth and development under different policy regimes—goals, constraints, institutions and policy framework; an assessment of performance— sustainability and regional contrasts; structural change, savings and investment.
2. Population and Human Development: Demographic trends and issues; education; health and malnutrition.
3. Growth and Distribution Trends and policies in poverty; inequality and unemployment.
4. Economic Reforms in India: Economic Reforms in Trade, Finance and regulatory framework.
5. International Comparisons: growth and human development.

### References :

1. Jean Dreze and Amartya Sen, *An Uncertain Glory: India and its Contradictions*, Princeton University Press, 2013.
2. Pulapre Balakrishnan, The Recovery of India: Economic Growth in the Nehru Era, *Economic and Political Weekly*, November, 2007.
3. Rakesh Mohan, Growth Record of Indian Economy: 1950-2008. A Story of Sustained Savings and Investment, *Economic and Political Weekly*, May, 2008.
4. S.L. Shetty, India's Savings Performance since the Advent of Planning, in K.L. Krishna and A. Vaidyanathan, *Institutions and Markets in India's Development*, 2007.
5. T. Dyson, India's Demographic Transition and its Consequences for Development in Uma Kapila, *Indian Economy Since Independence*, 19th edition, Academic Foundation, 2008.

6. Aniruddha Krishna and Devendra Bajpai, –Lineal Spread and Radial Dissipation: Experiencing Growth in Rural India, *Economic and Political Weekly*, September, 2011, 1992-2005,
7. Kaushik Basu and A. Maertens, *The New Oxford Companion to Economics*, Oxford University Press, 2013.
8. Sukhamoy Chakraborty, *Development Planning, The Indian Experience*, Oxford University Press.
9. Uma Kapila, *Indian Economy Since Independence*, 19th edition, Academic Foundation, 2008.
10. Isher J. Ahluwalia and I.M.D. Little, *India's Economic Reforms & Development*, 2<sup>nd</sup> Edition, Oxford University Press, 2012
11. Vijay Joshi and I.M.D. Little, *India's Economic Reforms 1991- 2001*, Oxford University Press, 1996

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**Total Marks : 100**

**Paper Code: BNHRDS631T**

## **MONEY & FINANCE**

### **Learning Objective :**

1. To provide an overview to the students to the theory and functioning of the monetary and financial sectors of the economy.
2. It highlights the organization, structure and role of financial markets and institution in the globalized era.

### **Course Outcome :**

On completion of this course, the students will be able:

1. To understand the working of the financial institutions.
2. To analyse the policies pertaining to the monetary policies and financial markets.

### **Course Outline :**

1. Introduction to Money and Banking: Role of Financial Intermediaries; Theory of determination of money supply- money multiplier approach.
2. Monetary Policy: Multiple objectives of the Central Bank; Choice of targets- Money supply or interest rate; Rules versus Discretion- Time inconsistency problem; Taylor rule and its macroeconomic implications.
3. Financial Globalization and Financial Crisis: Financial Markets and Instruments; Problem of asymmetric information- adverse selection and moral hazard in financial markets; Financial acceleration hypothesis.
4. Financial Structure and Alternative Source of Financing: The Modigliani-Miller Theorem on equivalence between debt and equity; Breakdown of the equivalence; Role of net worth in determining fragility of the financial system; Some recent examples including financial meltdown in USA.

### **References :**

1. B.B. Blejer, & M.B. Skreb, *Financial Policies in Emerging Markets*, MIT Press, 2002.

2. F. Mishkin and S. Eakins. *Financial Markets and Institutions*, 8<sup>th</sup> Edition, Pearson Education, 2015.
3. Peter Bofinger, Julian Reischle, Andrea Schächter, *Monetary Policy- Goals, Institutions, Strategies and Instruments*, Oxford University Press, 2001.
4. R. Mohan, *Growth and Financial Stability-Central Banking in an Emerging Market*, Oxford University Press, 2011.
5. Rudiger Dornbusch, Stanley Fischer and Richard Startz, *Macroeconomics*, 11<sup>th</sup> Edition, McGraw Hill Education, 2010.
6. Stephen Ross, Randolph Westfield, Jeffrey Jaffe, *Corporate Finance*, 11<sup>th</sup> Edition, McGraw-Hill Education, 2016.
7. T. A. Knoop, *Modern Financial Macroeconomics-Panics, Crashes, and Cirises*, Wiley-Blackwell.
8. X. Freixas, & J. Rochet, *Microeconomics of Banking*, MIT Press.

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**Total Marks : 100**

**Paper Code: BNHRDS640J**

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## **DISSERTATION**

Group project with individual viva.

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