

**COMMON POOL OF GENERIC ELECTIVES (GE) COURSES**  
**OFFERED BY DEPARTMENT OF CHEMISTRY FOR ODD SEMESTER**

**GE 1: Chemistry: Atomic Structure and Chemical Bonding**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
<b>Atomic Structure and Chemical Bonding (GE-1)</b>	<b>4</b>	<b>2</b>		<b>2</b>		<b>Basic knowledge of Chemistry</b>

**Learning Objectives**

The Learning Objectives of this course are as follows:

- To discuss the structure of atom as a necessary pre-requisite in understanding the nature of chemical bonding in compounds.
- To provide basic knowledge about ionic and covalent bonding.

**Learning Outcomes**

**By the end of the course, the students will be able to:**

- Solve the conceptual questions using the knowledge gained by studying the quantum mechanical model of the atom, quantum numbers, electronic configuration, radial and angular distribution curves, and shapes of s, p, and d orbitals
- Understand the concept of lattice energy and solvation energy.
- Draw the plausible structures and geometries of molecules using radius ratio rules, VSEPR theory and MO diagrams (homo- & hetero-nuclear diatomic molecules).

**SYLLABUS OF GE 1**

**Theory:**

**Unit – 1: Atomic Structure**

**( 14 Hours)**

Review of: Bohr's theory and its limitations, Heisenberg uncertainty principle, Dual behaviour of matter and radiation, De-Broglie's relation, Hydrogen atom spectra, need of a new approach to atomic structure. Time independent Schrodinger equation and meaning of various terms in it. Significance of  $\psi$  and  $\psi^2$ , Schrödinger equation for hydrogen atom, radial

and angular parts of the hydrogen wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation), radial and angular nodes and their significance, radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals. Significance of quantum numbers, orbital angular momentum and quantum numbers  $m_l$  and  $m_s$ . Shapes of s, p and d atomic orbitals, nodal planes, discovery of spin, spin quantum number ( $s$ ) and magnetic spin quantum number ( $m_s$ ). Rules for filling electrons in various orbitals, electronic configurations of the atoms, stability of half-filled and completely filled orbitals, concept of exchange energy, relative energies of atomic orbitals, anomalous electronic configurations.

## Unit – 2: Chemical Bonding and Molecular Structure

(16 Hours)

**Ionic Bonding:** General characteristics of ionic bonding, energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds, statement of Born-Landé equation for calculation of lattice energy (no derivation), Born Haber cycle and its applications, covalent character in ionic compounds, polarizing power and polarizability, Fajan's rules. Ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character. **Covalent bonding:** VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR ( $H_2O$ ,  $NH_3$ ,  $PCl_5$ ,  $SF_6$ ,  $ClF_3$ ,  $SF_4$ ) and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic and organic compounds. **MO Approach:** Rules for the LCAO method, bonding and antibonding MOs and their characteristics for ss, s-p and p-p combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1<sup>st</sup> and 2<sup>nd</sup> periods (including idea of s-p mixing) and heteronuclear diatomic molecules such as CO, NO and  $NO^+$ .

### Practicals:

(60 Hours)

#### (Laboratory Periods: 60)

**1. Acid-Base Titrations:** Principles of acid-base titrations to be discussed.

- (i) Estimation of sodium carbonate using standardized HCl.
- (ii) Estimation of carbonate and hydroxide present together in a mixture.
- (iii) Estimation of carbonate and bicarbonate present together in a mixture.
- (iv) Estimation of free alkali present in different soaps/detergents

**2. Redox Titrations:** Principles of oxidation-reduction titrations (electrode potentials) to be discussed.

- (i) Estimation of oxalic acid by titrating it with  $KMnO_4$ .
- (ii) Estimation of Mohr's salt by titrating it with  $KMnO_4$ .
- (iii) Estimation of oxalic acid and sodium oxalate in a given mixture.
- (iv) Estimation of Fe (II) ions by titrating it with  $K_2Cr_2O_7$  using internal indicator (diphenylamine/ N-phenylanthranilic acid).

### References:

### Theory:

1. Lee, J.D.; (2010), **Concise Inorganic Chemistry**, Wiley India.
2. Huheey, J.E.; Keiter, E.A.; Keiter; R. L.; Medhi, O.K. (2009), **Inorganic Chemistry- Principles of Structure and Reactivity**, Pearson Education.
3. Douglas, B.E.; McDaniel, D.H.; Alexander, J.J. (1994), **Concepts and Models of Inorganic Chemistry**, John Wiley & Sons.
4. Atkins, P.W.; Overton, T.L.; Rourke, J.P.; Weller, M.T.; Armstrong, F.A. (2010), **Shriver and Atkins Inorganic Chemistry**, 5<sup>th</sup> Edition, Oxford University Press.

### Practicals:

- Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C. (1989), **Vogel's Textbook of Quantitative Chemical Analysis**, John Wiley and Sons.

### Additional Resources:

1. Wulfsberg, G (2002), **Inorganic Chemistry**, Viva Books Private Limited.
2. Miessler, G.L.; Fischer P.J.; Tarr, D. A. (2014), **Inorganic Chemistry**, 5th Edition, Pearson.

## COMMON POOL OF GENERIC ELECTIVES (GE) COURSES OFFERED BY DEPARTMENT OF COMMERCE

### GENERIC ELECTIVES (GE-1): BUSINESS ORGANISATION

#### Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
<b>Business Organisation BCH: GE- 1.1</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>Pass in XII</b>	<b>NIL</b>

#### Learning Objectives

The course aims to familiarize the students with the forms of business organisation and contemporary issues.

#### Learning outcomes

The Learning Outcomes of this course are as follows:

1. examine the dynamics of the most suitable form of business organisation in different situations.
2. evaluate the various elements affecting the business environment.
3. analyse business models for different organisations.
4. record and report emerging issues and challenges of business organisations.
5. evaluate changes in the working pattern of modern organisations

#### SYLLABUS OF GE-1

##### **Unit 1: Introduction (12 hours)**

Business – Concept, nature and scope, business as a system, business objectives, business and environment interface, distinction between business, commerce and trade, Business ethics, social responsibilities of Business

##### **Unit 2: Business Enterprises (12 hours)**

Forms of Business Organisation: Sole Proprietorship, Partnership firm, Joint Stock Company, One Person Company, Cooperative society; Limited Liability Partnership; Multinational Corporations; Choice of Form of Organisation; Business Combination: Need and Objectives, Forms: Mergers, Takeovers and Acquisitions.

### **Unit 3: Business Environment (12 hours)**

Meaning and significance of Business environment, Internal and external environment, Dimensions of Business Environment; Uncertainty and business; Environmental Analysis and Diagnosis, Environment scanning techniques: SWOT and ETOP.

### **Unit 4: Entrepreneurship: Founding the Business (12 hours)**

Entrepreneur-Entrepreneurship-Enterprise; entrepreneurial ideas and opportunities in the contemporary business environment; Process of entrepreneurship; Forms of entrepreneurship; Skill India, Start-up India, Make in India, Globalisation.

### **Unit 5: Contemporary Issues of Business Organisations (12 hours)**

Emerging Issues and Challenges; Innovation in Organisational Design; Learning Organisations, Workforce Diversity, Franchising, Outsourcing, and E-commerce; Government and business interface; Sustainability; Digitalisation and Technological innovations.

### **Practical Exercise**

The learners are required to

1. complete the exercise wherein they are given different situations and scenarios to start their own business (in terms of capital, liability, the scale of operations, etc.) and are asked to select the most suitable form of business and justify the same highlighting the advantages and disadvantages of their choice.
2. identify various elements affecting the business environment and conduct a SWOT analysis for the company identified.
3. visit different enterprises and present a report on business models followed by them through a comparative analysis.
4. record and report their observations regarding the emerging issues and challenges of business organisations.
5. identify changes in the working pattern of modern organisations.

### **Essential/ Recommended Readings:**

- Basu, C. (2017). Business Organisation and Management. McGraw Hill Education.
- Chhabra, T. N. (2019). Business Organisation and Management. Sun India Publications. New Delhi.
- Drucker, P. F. (1954). The Practice of Management. Newyork: Harper & Row.
- Kaul, V. K. (2012). Business Organisation Management. Pearson Education.
- Koontz, H., & Weihrich, H. (2012). Essentials of Management: An International and Leadership Perspective. Paperback.
- Singh, B. P., & Singh, A. K. (2002) Essentials of Management. New Delhi. Excel Books Pvt. Ltd.
- Vasishth, N., & Rajput N. (2019)., Business Organisation & Management. Kitab Mahal. Delhi.

**Note: Readings will be updated by the Department of Commerce and uploaded on Department's website.**

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**

- ~~Mittra, S., Rai, S. K., Sahu, A. P., & Starn, H. J. (2020). Financial Planning. Sage Publications India Pvt. Ltd., New Delhi.~~
- ~~Sofat, R., & Hiro, P. (3rd Edition). (2016). Basic Accounting. PHI learning~~
- ~~Zokaityte, A. (2017). Financial Literacy Education. Palgrave Macmillan, London.~~

~~**Note: Readings will be updated by the Department of Commerce and uploaded on Department's website.**~~

~~**Assessment Method:**~~

- ~~1. There shall be 2 credit hours for lectures.~~
- ~~2. Theory exam shall carry 100 marks (including Internal Assessment of 25 Marks). The theory exam will be for 3 hours.~~

~~**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**~~

**GENERIC ELECTIVES (GE-3) Marketing for Beginners**

**Credit distribution, Eligibility and Pre-requisites of the Course**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Marketing for Beginners BCH: GE-1.3	4	3	1	0	Pass in XII	NIL

**Learning Objectives**

The structure of this course is to provide a basic understanding of concepts, principles, tools and techniques of marketing and to provide knowledge about various developments in the marketing scenario in India.

**Learning outcomes**

The Learning Outcomes of this course are as follows:

1. evaluate the companies following societal marketing concepts and along with their social initiatives.
2. judge the segmentation of a product, service, event, or organisation of companies.
3. analyse the process of value creation through marketing decisions involving product, pricing and distribution.
4. compare the pricing strategies of various companies.
5. explain marketing decisions involving product promotion and acquire knowledge about the various developments in the marketing area.

## SYLLABUS OF GE-3

### **Unit 1: Introduction to Marketing and Marketing Environment (12 hours)**

**Introduction to Marketing:** Concept, Scope and Importance; Marketing Philosophies; Marketing Mix for goods and services.

**Marketing Environment:** Need for studying marketing environment; Micro environment- company, suppliers, marketing intermediaries, customers, competitors, publics; Macro environment- demographic, economic, natural technological, politico-legal and socio-cultural factors.

### **Unit 2: Consumer Behaviour and Marketing Strategies (12 hours)**

**Consumer Behaviour:** Need for studying consumer Behaviour; Stages in consumer buying decision process, Factors influencing consumer's buying decisions.

**Marketing Strategies:** Market segmentation-concept and bases of segmenting consumer markets; Market Targeting; Product Positioning- concept and bases.

### **Unit 3: Product Decisions (8 hours)**

Concept and classification; Product mix; Branding; Packaging; Labeling; Product support services; Product life cycle concept and marketing strategies.

### **Unit 4: Pricing Decisions and Distribution Decisions (12 hours)**

**Pricing Decisions:** Objectives; Factors affecting the price of a product; Pricing strategies for new products- penetration pricing and skimming pricing.

**Distribution Decisions:** Channels of Distribution: types and functions; Wholesaling and retailing; factors affecting the channels of distribution; Logistics Decisions.

### **Unit 5: Promotion Decisions and Developments in Marketing (16 hours)**

**Promotion Decisions:** Communication process; Importance of promotion; Promotion tools: advertising, personal selling, sales promotion, public relations, publicity and direct marketing

**Developments in Marketing:** Sustainable Marketing; Rural marketing; Social marketing; Digital marketing – an overview.

### **Practical Exercises:**

The learners are required to

1. select the examples of companies who are following societal marketing concepts and discuss their social initiatives.
2. suggest the suitable bases for segmentation of a product, service, event, or organisation of your choice.
3. list out the companies whose product has reached the maturity stage and explain the marketing strategies adopted by them.
4. identify the companies following skimming and penetration pricing policy.
5. analyse the rural marketing strategies of a business organisation.

### **Essential/ Recommended readings**

- Baines, P. et al. (2021). Fundamentals of Marketing. Oxford University Press.
- Etzel, M. J., Walker, B. J., Stanton, W. J., & Pandit, A. (2010). Marketing. Mc Graw Hill.
- Kapoor, N. (2022). Principles of Marketing, 2nd ed. PHI learning
- Kotler, P., Armstrong, G., & Agnihotri, P. (2018). Principles of Marketing. Pearson Education. Indian edition.
- Kotler, P., Chernev, A., & Keller, K. L. (2022). Marketing Management. United Kingdom

Pearson Education.

- Levy, M., & Grewal, D. (2022). Marketing. United States: McGraw-Hill Education.
- Masterson, R. (2022), Marketing, 5ed., Sage Textbook
- Ramaswamy, N. (2018), Marketing Management, Sage Textbook
- Sharma, K. & Aggarwal S. (2021). Principles of Marketing. Taxmann Publications.

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### GENERIC ELECTIVES (GE- 4) Accounting for Everyone

#### Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Accounting for Everyone BCH: GE-1.3	4	2	1	1	Pass in XII	NIL

#### Learning Objectives

**Objective:** The course aims to help learners coming from non-commerce backgrounds acquire basic knowledge of financial accounting and to impart preliminary skills for recording various kinds of financial transactions and preparing financial statements.

#### Learning outcomes

The Learning Outcomes of this course are as follows:

1. Analyze various terms used in accounting;
2. Make accounting entries and prepare cash books and other accounts necessary while running a business;
3. Prepare profit and loss account and balance sheet;
4. Prepare accounts based on accounting software;
5. Analyze information from the company's annual report.

#### SYLLABUS OF GE-4

##### Unit 1: Introduction to Accounting and Accounting Principles (9 hours)

Accounting - Meaning, Importance, Need, objectives, advantages and limitations. Accounting as an information system, user of accounting information, sources of accounting information. Some Basic Accounting Terms –Transactions, Accounts, Assets, Liabilities, Capital, Drawings, Expenditure and Expense, Income, Revenue, Gain, Profit, Surplus, Loss, Deficit.



Accounting Principles Basis of Accounting – Cash, Accrual and Hybrid. Difference between Double Entry system and Single entry system (accounting for incomplete records).

**Unit 2: Recording of transactions (9 hours)**

Identification of transactions and events for recording, Classifications of accounts (Traditional): Personal Account, Real Account and Nominal Account, Classifications of accounts (Modern): Assets, Liabilities, Capital, Income and expenses. Accounting Equation, Rules of debit and credit. Basis of recording – vouchers, Journalising the transactions.

**Unit 3: Preparation of Accounts and Depreciation Accounting (9 hours)**

Preparation of Ledger, Cash Book including bank transactions and depreciation accounting: concept, features, causes, methods (SLM and WDV), charging to assets account.

**Unit 4: Preparation of Financial Statement (9 hours)**

Trial Balance; Concept of Revenue and Capital expenditure; Preparation of Trading and Profit & Loss Account and Balance Sheet for a sole proprietor with basic adjustments.

**Unit 5: Accounts from Incomplete Records (9 hours)**

Meaning, features, reasons and limitations of accounting from incomplete records. Determining profit and loss using the Statement of affairs method.

**Practical Exercises:**

**(30 hours)**

1. Download annual reports of business Organisations from the websites and go through the contents of the annual report and present the salient features of the annual report using some ratios and content analysis including textual analysis.
2. Prepare a bank reconciliation statement from the individual passbooks.
3. Prepare Trading and Profit & Loss Account, Balance Sheet, and Cash Flow Statement collecting necessary data from small business firms.
4. Prepare financial statements using appropriate software.

**Suggestive Readings:**

- Batra, J. K. (2018). Accounting and Finance for Non-finance Managers, Sage Textbook
- Bhupinder, Lt. (2020). Principles of Financial Accounting, Cengage.
- Goyal, B. K., & Tiwari, H. N. (2021). Financial Accounting. Taxmann Publication, New Delhi.
- Gupta, R. L., & Radhaswamy, M. (2014). Financial Accounting. S. Chand Publishing, New Delhi.
- Hatfield, L. (2019) Accounting Basics. Amazon Digital Services LLC.
- Horngren, C. T., Sundem, G. L., Elliott, J. A., & Philbrick, D. (2017). Introduction to Financial Accounting. Pearson Education, London
- Kumar, A. (2018) Financial Accounting, Singhal Publication
- Lal, J., & Srivastava, S. (2017). Financial Accounting Text & Problems. Himalaya Publishing House, Mumbai.
- Maheshwari, S. N., Maheshwari, S. K., & Maheshwari, S. K. (2018). Financial Accounting. Vikas Publishing House Pvt. Ltd, New Delhi
- Monga, J. R. (2020). Financial Accounting: Concepts and Applications. Mayur Paperback , New Delhi

- Mukharji, A., & Hanif, M. (2010). Financial Accounting. Tata McGraw Hill Publishing Co. Ltd, New Delhi
- Mukherjee, S., & Mukherjee, A. K. (2017). Financial Accounting Oxford University Press, USA
- Sah, R. K. (2020). Concept building approach to financial accounting, Cengage
- Sehgal, D. (2016). Financial Accounting. Vikas Publishing House Pvt. Ltd, New Delhi.
- Siddiqui, S. A. (2008). Book Keeping & Accountancy. Laxmi Publications Pvt. Ltd, New Delhi.
- Sofat, R., & Hiro, P. (2016). Basic Accounting, 3rd ed. PHI learning
- Tulsian, P. C. (2020). Financial Accounting. Tata McGraw Hill Publishing Co. Ltd, New Delhi.

**Note: Readings will be updated by the Department of Commerce and uploaded on Department's website.**

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**

## LIST OF COMMON POOL OF GENERIC ELECTIVES (GE) COURSES OFFERED BY DEPARTMENT OF COMPUTER SCIENCE

### CATEGORY-IV

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

#### GENERIC ELECTIVES: PROGRAMMING USING C++

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Programming using C++  Code:	4	3	0	1	Class XII pass	NIL

#### Learning Objectives

The Learning Objectives of this course are as follows:

- Introduce programming concepts using C++ to students.
- Develop structured as well as object-oriented programming skills using C++ programming language.
- Achieve competence amongst its students to develop correct and efficient C++ programs to solve problems in their respective domains

#### Learning Outcomes

Upon completion of this course, students will be able to:

- Write simple programs using built-in data types of C++.
- Implement arrays and user defined functions in C++.
- Solve problems in the respective domain using suitable programming constructs in C++.
- Solve problems in the respective domain using the concepts of object oriented programming in C++.

#### SYLLABUS OF GE

##### Theory

##### Unit – 1

##### Introduction to C++

**(9 hours)**

Overview of Procedural and Object-Oriented Programming, Using main() function, Header Files, Compiling and Executing Simple Programs in C++.

**Unit – 2** **(15 hours)**

**Programming Fundamentals**

Data types, Variables, Operators, Expressions, Arrays, Keywords, Decision making constructs, Iteration, Type Casting, Input-output statements, Functions

**Unit – 3** **(21 hours)**

**Object Oriented Programming**

Concepts of Abstraction, Encapsulation. Creating Classes and objects, Modifiers and Access Control, Constructors, Destructors, Implementation of Inheritance and Polymorphism, Template functions and classes

**Practical** **(30 hours)**

**List of Practicals:**

1. Write a program to compute the sum of the first n terms of the following series:

$$S = 1 - 2 + 3 - 4 + \dots n$$

The number of terms n is to be taken from the user through the command line. If the command line argument is not found then prompt the user to enter the value of n.

2. Write a program to display the following pattern:

```
1
22
333
4444
55555
```

The number of rows n, is to be taken from the user.

3. Write a program to compute the factors of a given number.
4. Write a menu driven program to perform the following operations on an array:
  - a. Find the minimum, maximum and average of the array elements
  - b. Search an element in the array using linear and binary search
5. Write a menu driven program to perform the following operations on a string:
  - a. Calculate length of the string

- b. Check whether the first character of every word in the string is in uppercase or not
  - c. Reverse the string
6. Create a class Triangle. Include overloaded functions for calculating the area of a triangle.
  7. Create a template class TwoDim which contains x and y coordinates. Define default constructor, parameterized constructor and void print() function to print the co-ordinates. Now reuse this class in ThreeDim adding a new dimension as z. Define the constructors and void print() in the subclass. Implement main() to show runtime polymorphism.

### Essential Readings

- Stephen Prata, C++ Primer Plus, 6th Edition, Pearson India, 2015.
- E Balaguruswamy, Object Oriented Programming with C++, 8th edition, McGraw-Hill Education, 2020.
- D.S. Malik, C++ Programming: From Problem Analysis to Program Design, 6th edition, Cengage Learning, 2013.

### Suggestive Reading

- Herbert Schildt, C++: The Complete Reference, 4th edition, McGraw Hill, 2003.
- A. B. Forouzan, Richard F. Gilberg, Computer Science: A Structured Approach using C++, 2nd edition, Cengage Learning, 2010.

**Note:** Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

## GENERIC ELECTIVES: PROGRAMMING WITH PYTHON

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Programming with Python  Code:	4	3	0	1	Class XII pass	NIL

### Learning Objectives

The Learning Objectives of this course are as follows:

- Introduce programming concepts using Python to students.
- Develop structured as well as object-oriented programming skills using Python.

- Achieve competence amongst its students to develop correct and efficient Python programs to solve problems in their respective domains.

### Learning outcomes

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

- Write simple programs using built-in data structures in Python.
- Implement arrays and user defined functions in Python.
- Solve problems in the respective domain using suitable programming constructs in Python.
- Solve problems in the respective domain using the concepts of object oriented programming in Python.

## SYLLABUS OF GE

### Theory

#### **Unit - 1 (6 hours)**

##### **Introduction to Programming**

Problem solving strategies; Structure of a Python program; Syntax and semantics; Executing simple programs in Python.

#### **Unit - 2 (15 hours)**

##### **Creating Python Programs**

Identifiers and keywords; Literals, numbers, and strings; Operators; Expressions; Input/output statements; Defining functions; Control structures (conditional statements, loop control statements, break, continue and pass, exit function), default arguments.

#### **Unit - 3 (15 hours)**

##### **Built-in Data Structures**

Mutable and immutable objects; Strings, built-in functions for string, string traversal, string operators and operations; Lists creation, traversal, slicing and splitting operations, passing list to a function; Tuples, sets, dictionaries and their operations.

#### **Unit - 4 (9 hours)**

##### **File and Exception Handling**

File handling through libraries; Errors and exception handling.

#### **Practical (30 hours)**

##### **List of Practicals:**

1. WAP to find the roots of a quadratic equation.
2. WAP to accept a number 'n' and
  - a. Check if 'n' is prime
  - b. Generate all prime numbers till 'n'

- c. Generate first 'n' prime numbers
  - d. This program may be done using functions.
3. WAP to create a pyramid of the character '\*' and a reverse pyramid

```

      *
     ***
    *****
   ********
  **********
 **********

```

```

          *****
         *****
        *****
       *****
      *****
     *****
    *****
   *****
  *****
 *****

```

4. WAP that accepts a character and performs the following:
- a. print whether the character is a letter or numeric digit or a special character
  - b. if the character is a letter, print whether the letter is uppercase or lowercase
  - c. if the character is a numeric digit, prints its name in text (e.g., if input is 9, output is NINE)
5. WAP to perform the following operations on a string
- a. Find the frequency of a character in a string.
  - b. Replace a character by another character in a string.
  - c. Remove the first occurrence of a character from a string.
  - d. Remove all occurrences of a character from a string.
6. WAP to swap the first n characters of two strings.
7. Write a function that accepts two strings and returns the indices of all the occurrences of the second string in the first string as a list. If the second string is not present in the first string then it should return -1.
8. WAP to create a list of the cubes of only the even integers appearing in the input list (may have elements of other types also) using the following:
- a. 'for' loop
  - b. list comprehension
9. WAP to read a file and

- a. Print the total number of characters, words and lines in the file.
  - b. Calculate the frequency of each character in the file. Use a variable of dictionary type to maintain the count.
  - c. Print the words in reverse order.
  - d. Copy even lines of the file to a file named 'File1' and odd lines to another file named 'File2'.
10. Write a function that prints a dictionary where the keys are numbers between 1 and 5 and the values are cubes of the keys.
11. Consider a tuple t1=(1, 2, 5, 7, 9, 2, 4, 6, 8, 10). WAP to perform following operations:
- a. Print half the values of the tuple in one line and the other half in the next line.
  - b. Print another tuple whose values are even numbers in the given tuple.
  - c. Concatenate a tuple t2=(11,13,15) with t1.
  - d. Return maximum and minimum value from this tuple
12. WAP to accept a name from a user. Raise and handle appropriate exception(s) if the text entered by the user contains digits and/or special characters.

### Essential Readings

- Taneja, S., Kumar, N., Python Programming- A modular Approach, Pearson Education India, 2018.
- Balaguruswamy E., Introduction to Computing and Problem Solving using Python, 2nd edition, McGraw Hill Education, 2018.

### Suggestive Reading

- Brown, Martin C., Python: The Complete Reference, 2nd edition, McGraw Hill Education, 2018.
- Guttag, J.V. Introduction to computation and programming using Python, 2nd edition, MIT Press, 2016.

**Note:** Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.



## COMMON POOL OF GENERIC ELECTIVES (GE) COURSES

Offered by Department of Economics

Category-IV

### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Principles of Microeconomics I ECON025	4	3	1	0	Class XII pass	NIL

#### Learning Objectives

The Learning Objectives of this course are as follows:

- This course discusses the basic principles in Microeconomics and their applications. It includes consumer's problem, demand estimation, production function, cost functions and market analysis. It illustrates how the concepts of microeconomics can be applied to analyze real-life economic situations.

#### Learning outcomes

The Learning Outcomes of this course are as follows:

- The students learn some basic principles of microeconomics of consumer and producers, and interactions of supply and demand, characteristics of perfect competition, efficiency and welfare outcomes.

#### SYLLABUS OF GE-1

##### UNIT – I: Introduction

(16 Hours)

Problem of scarcity and choice: scarcity, choice and opportunity cost; production possibility frontier; economic systems. Demand and supply: law of demand, determinants of demand, shifts of demand versus movements along a demand curve, market demand, law of supply, determinants of supply, shifts of supply versus movements along a supply curve, market supply, market equilibrium. Applications of demand and supply: price rationing, price floors, consumer surplus, producer surplus. Elasticity: price elasticity of demand, calculating elasticity, determinants of price elasticity, other elasticities

##### UNIT – II: Consumer Theory

(12 Hours)

Budget constraint, concept of utility, diminishing marginal utility, Diamond-water paradox, income and substitution effects; consumer choice: indifference curves, derivation of demand curve from indifference curve and budget constraint

**UNIT – III: Production and Costs (16 Hours)**

Production: behaviour of profit maximising firms, production process, production functions, law of variable proportions, choice of technology, isoquant and isocost lines, cost minimizing equilibrium condition

Costs: costs in the short run, costs in the long run, revenue and profit maximization, minimizing losses, short run industry supply curve, economies and dis- economies of scale, long run adjustments

**UNIT – IV: Perfect Competition (16 Hours)**

Assumptions: theory of a firm under perfect competition, demand and revenue; equilibrium of the firm in the short run and long run; Long run industry supply curve: increasing, decreasing and constant cost industries.

Welfare: allocative efficiency under perfect competition.

**Practical component (if any) - NIL**

**Essential/recommended readings**

- Mankiw, N. G. (2018). *Principles of Microeconomics* 8th ed.
- Frank, R. H., & Cartwright, E. (2010). *Microeconomics and behavior*. New York: McGraw-Hill.
- Bernheim, B., Whinston, M. (2009). *Microeconomics*. Tata McGraw-Hill.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**

**Common Pool of Generic Electives (GE) Courses  
Offered by Department of Electronic Sciences**

*Category-IV*

**GENERIC ELECTIVES (GE-1): Fundamentals of Electronics**

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
<b>Fundamentals of Electronics ELGE-1A</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>None</b>	<b>None</b>

**Learning Objectives**

The Learning Objectives of this course are as follows:

- The paper equips the learners about basic circuit knowledge to analyze electric circuits using network theorems.
- Understand diode and its applications in clipping and clamping circuits, Rectifiers and design regulated power supply using Zener diodes.
- To be able to plot the current voltage characteristics of Diode, Transistors and its different biasing conditions
- Usage of semiconductor devices in designing the circuits.

**Learning outcomes**

The Learning Outcomes of this course are as follows:

- CO1 Study basic circuit concepts in a systematic manner suitable for analysis and design and further analyze the electric circuit using network theorems.
- CO2 To understand the different types of semiconductor devices and their characteristics
- CO3 Illustrate about working of transistors, transistor-based amplifiers and its biasing.
- CO4 Explain the concepts of feedback and oscillations and construct feedback amplifiers

**SYLLABUS OF GE-1**

**UNIT – I Basic Resistive Circuit ( 12 Hours)**

Ohm's Law, resistors in series and parallel combinations. DC voltage sources: ideal and non-ideal cases; DC current sources: ideal and non-ideal cases; Introduction to Kirchhoff's current law, Kirchhoff's voltage law, voltage divider circuit, current divider circuit; source

transformations– voltage source to current source and current source to voltage source, basic problems. Resistive circuits: Thevenin's theorem, Norton theorem, Superposition theorem, Maximum power transfer theorem.

#### **UNIT – II PN-junction diode and its applications ( 12 Hours)**

PN junction, Unbiased PN junction, Forward and Reversed biased condition, IV-characteristics of PN junction diode, types of diodes – Zener diode, photo diode, LED.  
Diode circuits and power supplies. Half and full wave rectifiers, Bridge rectifier (qualitative comparison), Regulated power supply using Zener diode, Basic Clipper and Clamper circuits using diodes.

#### **UNIT – III Bipolar Junction Transistors (BJT) and Biasing ( 12 Hours)**

NPN Transistor and basic transistor action, Definition of  $\alpha$ ,  $\beta$  and  $\gamma$  and their interrelations, leakage currents, Modes of operation, Input and output characteristics of CB, CE and CC Configurations. Transistor biasing, thermal runaway, stability and stability factor, Fixed bias without and with  $R_E$ , collector to base bias, voltage divider bias and emitter bias ( $+V_{CC}$  and  $-V_{EE}$  bias), circuit diagrams and their working.

#### **UNIT – IV BJT Applications ( 12 Hours)**

BJT amplifier (CE), dc and ac load line analysis, Operating point, Concept of feedback, negative and positive feedback, advantages and disadvantages of negative feedback, voltage (series and shunt), current (series and shunt) feedback amplifiers, gain, input and output impedances. Positive feedback and Barkhausen criteria for oscillations.

#### **Practical component (if any) - Fundamentals of Electronic Lab (30 Hours) (Hardware and Circuit Simulation Software)**

##### **Learning outcomes**

CO1 Verify the network theorems and operation of typical electrical circuits.

CO2 Study various stages of a zener diode based regulated power supply.

CO3 Understand various biasing concepts, BJT based amplifiers.

1. Study and operation of digital multi-meter, function generator, regulated power supply, CRO, etc.
2. Verification of KVL and KCL.
3. Verification of Superposition theorem.
4. Verification of Thevenin's, Norton's Theorem
5. Verification of Maximum power transfer theorem.
6. To plot the IV-characteristics of a ordinary and Zener diode and LED
7. Study of Half wave and Full Wave Rectifiers
8. Study of Fixed Bias, Voltage divider bias Feedback configuration for transistors.
9. Study of transistor amplifier circuit.

Note: Students shall sincerely work towards completing all the above listed practicals for this course. In any circumstance, the completed number of practicals shall not be less than seven.

### Essential/recommended readings

1. R. L. Boylestad & Louis Nashlesky (2007), Electronic Devices & Circuit Theory, Pearson Education.
2. David A. Bell (2008), Electronic Devices and Circuits, Oxford University Press.
3. B L Theraja and AK Theraja, A Textbook Of Electrical Technology - Vol I.

### Suggestive readings

1. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill (2002)

## GENERIC ELECTIVES (GE-2): Data Engineering and Analytics

### Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Exercise		
Data Engineering and Analytics ELGE-1B	4	3	0	1	None	Basic Knowledge of Python Programming Language

### Learning Objectives

The Learning Objectives of this course are as follows:

The objective of this course is to introduce students to data analysis and impart them skills to solve data analytics problem. Data Engineering is basically designing and building pipelines that transform and transport data into a highly usable format before it reaches the Data Scientists or other end users. These pipelines must take data from many disparate sources and collect them into a single warehouse that represents the data uniformly as a single source of truth.

### Learning outcomes

The Learning Outcomes of this course are as follows:

- CO1 Use data analysis tools in the pandas library.
- CO2 Develop understanding of basic data analysis techniques.
- CO3 Collect, explore, clean, munge and manipulate data.
- CO4 Solve real world data analysis problems.
- CO5 Build data science applications using Python based toolkits.

## GENERIC ELECTIVES (GE-6) Indian English Literatures

No. of hours- 60(Theory- 45 hrs.+Tutorials-15 hrs.)

### Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
GE-6 Indian English Literatures	4	3	1	0	Passed Class XII	NIL

### Learning Objectives

The Learning Objectives of this course are as follows:

- To introduce literary texts from a range of regional, cultural, social, and political locations within India.
- To inculcate an in-depth understanding of some of the major issues shaping this literary production.

### Learning outcomes

The Learning Outcomes of this course are as follows:

- By studying this course, students will be able to comprehend regional differences in the issues discussed and in socio-cultural contexts.
- Students will be able to analyze the use of the English language by non-native speakers and writers.

### SYLLABUS OF GE-6

#### UNIT – I (15 weeks-1 hour/week)

1. Vikram Seth: *A Suitable Boy*

#### UNIT – II (15 weeks-1 hour/week)

1. Shashi Deshpande: 'The Intrusion'
2. Salman Rushdie: 'The Courter'
3. Rohinton Mistry: 'Swimming Lessons'
4. Vikram Chandra: 'Dharma'

#### UNIT – III (15 weeks-1 hour/week)

1. Kamala Das: (i) 'An Introduction' (ii) 'My Grandmother's House'

2. Nissim Ezekiel: (i) 'Night of the Scorpion' (ii) 'Goodbye Party for Miss Pushpa TS'
3. Arun Kolatkar: (i) 'The Bus'
4. Mamang Dai, 'The Sorrow of Women'

**Practical component (if any) - NIL**

**Essential/recommended readings-** as listed in the units

**Suggestive readings:**

1. Burton, Antoinette. *Dwelling in the Archive: Women Writing House, Home, and History in Late Colonial India*. Oxford UP, 2003.
2. Zecchini, Laetitia. *Arun Kolatkar & Literary Modernism in India: Moving Lines*. USA: Bloomsbury Academic, 2014.
3. Nerlekar, Anjali. *Bombay Modern: Arun Kolatkar and Bilingual Literary Culture*. Speaking Tiger, 2017.
4. Anjaria, Ulka. *Realism in the Twentieth-Century Indian Novel: Colonial Difference and Literary Form*. Cambridge UP, 2012.
5. Parashkevova, Vassilena. *Salman Rushdie's Cities: Reconfigurational Politics and the Contemporary Urban Imagination*. Bloomsbury, 2012.

**Note:** Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.



## GENERIC ELECTIVE (GE-1)

### Credit distribution, Eligibility and Pre-requisites of the Course

Course title	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Entrepreneurship Essentials - 1	4	2		2		Nil

#### Course Description:

This course provides an overview of the essential aspects of entrepreneurship, equipping students with the knowledge and skills required to identify opportunities, develop innovative business models, and launch successful ventures. The course combines theoretical lectures with practical Session, enabling students to gain hands-on experience in developing their entrepreneurial projects.

#### Learning Objectives

Students of this course should be able to:

- Understand fundamental concepts and principles of entrepreneurship, including opportunity recognition and value creation.
- Develop an entrepreneurial mindset and skills that will enable them to identify, evaluate, and pursue viable business opportunities with confidence.
- Formulate comprehensive business plans that address key elements such as market analysis, product/service development, marketing strategy, sales strategy, and financial planning.
- Enhance leadership and team management capabilities, empowering them to foster a positive and productive work environment within their ventures.
- Acquire knowledge and skills in marketing aspects of entrepreneurship, including branding, positioning, sales techniques, digital marketing, and networking.

#### Learning outcomes

At the end of this course, students should be able to:

- Understand the fundamental of entrepreneurship, importance of opportunity recognition and value creation in entrepreneurship.
- Interpret and analyze market research data and customer analysis to make informed business decisions.
- Apply entrepreneurial thinking and skills to identify and evaluate business opportunities.
- Evaluate financial data and projections to make informed financial decisions and manage cash flow effectively.
- Develop effective marketing and sales strategies by combining knowledge of customer analysis, branding, and positioning.





## SYLLABUS

### Unit 1: Introduction to Entrepreneurship and Opportunity Recognition (16 hours)

#### Classroom Sessions:

- 1.1.1 Understanding Entrepreneurship: Concepts and Importance
- 1.1.2 Why be an Entrepreneur?
- 1.1.3 Traits of Successful Entrepreneurs, Types of Entrepreneurs (entrepreneurs as leaders)
- 1.1.4 Entrepreneurial Ecosystem in India

#### Practical Sessions:

- 1.1.1 Guest Speaker Session
- 1.1.2 Entrepreneurial Mindset Assessment (GETT)
- 1.1.3 Entrepreneurial Traits Analysis and Role Play
- 1.1.4 A field trip to a local startup incubator

#### Essential Readings:

- 1.1.1 Baron, R. A., & Shane, S. A. (2008). *Entrepreneurship: A process perspective*. Cengage Learning. .
- 1.1.2 Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2019). *Entrepreneurship (11th ed.)*. McGraw-Hill Education.

#### Suggested Readings:

- 1.1.1 Shane, S. A. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Edward Elgar Publishing. .
- 1.1.2 Gupta, V. K., & Batra, S. (2019). *Entrepreneurship: New Venture Creation (2nd ed.)*. Pearson.

#### Suggested Case Studies (Indian Context):

- 1.1.1 Flipkart (Laying the foundations for the Flipkart Story)
- 1.1.2 Paytm (Launching the Digital Wallet Revolution in India)
- 1.1.3 OYO Rooms (Starting small in an unorganised sector)

### Unit 2: Entrepreneurial Mindset (16 hours)

#### Classroom Sessions:

- 1.2.1 Introduction to Entrepreneurial Mindset
- 1.2.2 Key Dimensions of Entrepreneurial Mindset and its role in Entrepreneurial Success
- 1.2.3 Developing & Cultivating an Entrepreneurial Mindset
- 1.2.4 Ethical Considerations for Entrepreneurs

#### Practical Sessions:

- 1.2.1 Mindset Reflection Exercise (Gratitude Journal, SWOT analysis, Failures and Learnings)
- 1.2.2 Interaction with a successful entrepreneur
- 1.2.3 Personal Growth Plan
- 1.2.4 Case Study Analysis

#### Essential Readings:

- 1.2.1 Neck, H. M., Neck, C. P., & Murray, E. L. (2017). *Entrepreneurship: The practice and mindset*. SAGE Publications. .
- 1.2.2 Dweck, C. S. (2006). *Mindset: The new psychology of success*. Ballantine Books.

**Suggested Readings:**

- 1.2.1 Sarasvathy, S. D. (2009). Effectuation: Elements of entrepreneurial expertise. Edward Elgar Publishing. .
- 1.2.2 Morris, M. H., Kuratko, D. F., & Covin, J. G. (2020). Corporate entrepreneurship: Entrepreneurial development within organizations. Cengage Learning.

**Suggested Case Studies (Indian Context):**

- 1.2.1 “Dhirubhai Ambani - The Visionary Entrepreneur”
- 1.2.2 Narayana Murthy - Building Infosys from Scratch
- 1.2.3 Satyam Scandal - Lessons in Corporate Ethics

**Unit 3: Business Opportunities Identification (12 hours)****Classroom Sessions:**

- 1.3.1 Identifying, Evaluating Business Opportunities and Generating Ideas
- 1.3.2 Concept of Empathy and Design Thinking
- 1.3.3 Identifying opportunities for social entrepreneurship
- 1.3.4 Feasibility & Viability Analysis

**Practical Sessions:**

- 1.3.1 Opportunity Scanning and Idea Generation Workshop
- 1.3.2 Design Thinking Challenge
- 1.3.3 Social Impact Assessment Workshop
- 1.3.4 Feasibility Study Simulation

**Essential Readings:**

- 1.3.1 Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
- 1.3.2 Bornstein, David. (2003). How to change the world : social entrepreneurs and the power of new ideas. Oxford ; New York : Oxford University Press.

**Suggested Readings:**

- 1.3.1 Baron, R. A. (2018). Opportunity recognition as pattern recognition: How entrepreneurs "connect the dots" to identify new business opportunities. Academy of Management Perspectives, 32(3), 332-345.
- 1.3.2 Timmons, J. A., & Spinelli, S. (2019). New venture creation: Entrepreneurship for the 21st century. McGraw-Hill Education.

**Suggested Case Studies (Indian Context):**

- 1.3.1 Ola Cabs - Revolutionizing the Taxi Industry
- 1.3.2 Project Chirag - Empowering Rural India with Solar Energy
- 1.3.3. Zomato - From Start-up to Unicorn

**Unit 4: Market Analysis & Customer Research (16 hours)****Classroom Sessions:**

- 1.4.1 Know your customers: Basics of Segmenting the customer and the market
- 1.4.2 Identifying Customer Segmentation and Conducting Market Research
- 1.4.3 Customer Value Proposition
- 1.4.4 Moving ahead with customer targeting

**Practical Sessions:**

- 1.4.1 Market Segmentation Activity
- 1.4.2 Designing a Market Research Plan



1.4.3 Crafting a Unique Value Proposition

1.4.4 Customer Targeting Simulation

**Essential Readings:**

1.4.1 Kotler, P., Keller, K.L., & Cunningham, P.H. (2018). Marketing Management. Pearson .

McDonald, M., & Dunbar, I. (2012). Market segmentation: How to do it, how to profit from it. John Wiley & Sons.

1.4.2 Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2014). Value proposition design: How to create products and services customers want. John Wiley & Sons. .

**Suggested Readings:**

1.4.1 Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. Journal of Marketing, 52(3),

1.4.2 Dibb, S., Simkin, L., Pride, W. M., & Ferrell, O. C. (2019). Marketing concepts and strategies. Cengage Learning. .

**Suggested Case Studies (Indian Context):**

1.4.1 Amul: Targeting Different Customer Segments

1.4.2 Flipkart: Crafting a Customer-Centric Value Proposition

1.4.3 Swiggy: Revolutionizing Food Delivery through Targeted Marketing

**COMMON POOL OF GENERIC ELECTIVES (GE) COURSES  
OFFERED BY DEPARTMENT OF MATHEMATICS  
CATEGORY-IV**

**GENERIC ELECTIVES: FUNDAMENTALS OF CALCULUS**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Fundamentals of Calculus	4	3	1	0	Class XII pass with Mathematics	NIL

**Learning Objectives**

The Learning Objectives of this course is as follows:

- Understand the quantitative change in the behaviour of the variables and apply them on the problems related to the environment.

**Learning Outcomes**

Upon completion of this course, students will be able to:

- Understand continuity and differentiability in terms of limits.
- Describe asymptotic behavior in terms of limits involving infinity.
- Understand the importance of mean value theorems and its applications.
- Learn about Maclaurin's series expansion of elementary functions.
- Use derivatives to explore the behavior of a given function, locating and classifying its extrema, and graphing the polynomial and rational functions.

**SYLLABUS OF GE**

**Theory**

**Unit – 1**

**(20 hours)**

**Continuity and Differentiability of Functions**

Limits and continuity, Types of discontinuities; Differentiability of functions; Successive differentiation: Calculation of the nth derivatives, Leibnitz theorem; Partial differentiation, Euler's theorem on homogeneous functions.

**Unit – 2****(20 hours)****Mean Value Theorems and its Applications**

Rolle's theorem, Mean value theorems and applications to monotonic functions and inequalities; Expansion of functions: Taylor's theorem, Taylor's series, Maclaurin's series expansion of  $e^x$ ,  $\sin x$ ,  $\cos x$ ,  $\log(1+x)$  and  $(1+x)^m$ ; Indeterminate forms.

**Unit – 3****(20 hours)****Tracing of Curves**

Concavity and inflexion points, Asymptotes (parallel to axes and oblique), Relative extrema, Tracing graphs of polynomial functions, rational functions, and polar equations.

**Practical component (if any) – NIL****Essential Readings**

- Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). Wiley India Pvt. Ltd. New Delhi. International Student Version. Indian Reprint 2016.
- Prasad, Gorakh (2016). Differential Calculus (19th ed.). Pothishala Pvt. Ltd. Allahabad.

**Suggestive Reading**

- Thomas Jr., George B., Weir, Maurice D., & Hass, Joel (2014). Thomas' Calculus (13th ed.). Pearson Education, Delhi. Indian Reprint 2017.

**Note:** Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

**COMMON POOL OF GENERIC ELECTIVES (GE) COURSES OFFERED**  
**BY DEPARTMENT OF OPERATIONAL RESEARCH**

*CATEGORY-IV*

**GENERIC ELECTIVES: INTRODUCTION TO OPERATIONAL  
RESEARCH AND LINEAR PROGRAMMING**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Introduction to Operational Research and Linear Programming	4	3	0	1	Class XII pass with Mathematics	Nil

**Learning Objectives**

The Learning Objective of the course is to introduce:

- Basic concepts of Operational Research and Linear Programming to the students.

**Learning Outcomes:**

After completion of the course, students will possess knowledge and skills required to:

- Gain an understanding of key concepts of Operational Research and Linear Programming and their role in various organizations.
- Describe the basic concepts of convex analysis and explain the theoretical foundations of various issues related to linear programming modelling.
- Formulate real-world problems as a linear programming model and describe the theoretical workings of the graphical and simplex method, demonstrate the solution process by hand and solver.
- Implement advanced and more economic algorithm to solve linear programming problems.

**SYLLABUS OF GE**

**Theory**

**Unit – 1 (9 hours)**

**Basics of Operational Research:** Origin & Development of Operational Research, Definition and Meaning of Operational Research, Different Phases of an Operational Research Study, Scope and Limitations of Operational Research, Mathematical Formulation of Real-Life Problems.

**Unit – 2** **(15 hours)**

Introduction to Linear Programming, Linear Programming Problem Formulation, Solution by Graphical Method. Concepts of Basis and Basic Feasible solution. Convex sets, Extreme points, Hyperplanes and Halfspaces, Convex cones, Polyhedral sets and cones.

**Unit – 3** **(9 hours)**

Theory of Simplex Method, Simplex Algorithm, Two phase Method, Charne's-M Method.

**Unit – 4** **(12 hours)**

Degeneracy in Linear Programming, Charnes' Perturbation method, Revised Simplex method.

**Practical** **(30 hours)**

**Practical/Lab to be performed on a computer using OR/Statistical packages**

1. To solve Linear Programming Problem (LPP) using Graphical Method with
  - (i) Unbounded solution.
  - (ii) Infeasible solution.
  - (iii) Alternative or multiple solutions.
2. Solution of LPP with simplex method.
3. Problem solving using Charnes-M method.
4. Problem solving using Two Phase method.
5. Illustration of following special cases in LPP using Simplex method
  - (i) Unrestricted variables.
  - (ii) Unbounded solution.
  - (iii) Infeasible solution.
  - (iv) Alternative or multiple solutions.
6. Solution to linear programming problem through revised simplex method.

**Essential Readings**

- Hadley, G. (2002). Linear programming. New Delhi: Narosa Publishing House.
- Hadley, G. (2002). Linear Algebra. New Delhi: Narosa Publishing House.
- Hillier, F.S., & Lieberman, G. J. (2010). Introduction to operations research- concepts and cases (9th ed.). New Delhi: Tata McGraw Hill (Indian print).
- Taha, H. A. (2017). Operations research - An Introduction (10th ed.). Pearson Education.
- Ravindran, A., Phillips, D. T., & Solberg, J. J. (2005). Operations research- principles and practice (2nd ed.). New Delhi: Wiley India (P.) Ltd. (Indian print).

**Note:** Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.



**REGISTRAR**

**Department of Physical Education**  
**GE Paper : GYM MANAGEMENT**  
**SEMESTER-I**

**GE : GYM MANAGEMENT**

Course Title & Code	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-Requisite of the Course (if any)
		Lecture	Tutorial	Practical/Practice		
Gym Management	04	3	0	1	XII class pass	NIL

**Learning Objective**

1. The learner will acquire knowledge, understanding and practices with applications and skills required for gym management.
2. The learner will develop understanding of the gym essentials including publicity, policy, registration, location and establishment of gym, procurement, placement & maintenance of gym equipment. Learner will be able to apply the understanding of the same for marketing, clientage, enrolments, record keeping, social activities, and public relations.
3. The learner will be able to acquire skills and competencies required for becoming a gym instructor.
4. The learner will acquire practical skills (in laboratory and field setup) in regard to calculating BMI, flexibility test (Sit and reach test, hip bend and toe touch), strength test (Bend knee sit ups, leg raise for minimal strength), cardiovascular endurance test (Harvard step test, cooper 12/9 min. run), self-evaluation (personal health and well-being), asana, aerobic schedule, weight management of the subjects. The learner will be able to compare, correlate and analyze the above learnings in real life situation.

**Learning Outcome:-**

1. The learner will be able to apply safety procedures to be followed in the gym.
2. The learner will develop the skills required for handling different gym equipment as well as management and utilization of the same.
3. The learner will be able to test, take measurements, analyze and interpret different components with the help of different equipment and tests (flexibility, strength, cardiovascular endurance).
4. The learner will be equipped with personal health and well-being for self-evaluation and of others.
5. The learner will be skilled to handle gym management economics (costing, balance sheet, promotional plans).

**THEORY SYLLABUS**

**UNIT-I**

**GYM ESSENTIALS**

**(09 hrs lecture)**

- Location and Establishment of gym (Publicity, policy, reception, information, Registration, offer of programmes), Procurement, placement & maintenance of gym Equipments
- Marketing, clientage, Enrolments, record keeping, social activities, Public Relations,
- Individualized/group grooming programme, basic concepts of financial management

**UNIT-II**

**GYM INSTRUCTOR**

**(09 hrs lecture)**

- Gym-instructor – qualification, qualities, pay-roll, Performance – evaluation, grooming and presentation
- Safety procedures to be followed in the gym.



- UNIT-III** GYM-EQUIPMENTS (09 hrs lecture)
- Introduction to different exercise equipment
    - Floorings and equipments required for aerobic-Understanding of various forms of aerobics- floor aerobics, step – aerobics, weight
      - Aerobics and aqua aerobics
- UNIT-IV** EQUIPMENTS FOR FITNESS EVALUATION AND ASSESSMENTS (09 hrs lecture)
- Measurement of Weight and Height, Calculating BMI (Body Mass Index )
  - Measurement of Fitness Components –
    - Flexibility (Sit and Reach Test, Hip Bend and Toe Touch)
    - Strength (Sit-Ups, Leg-Raise for Minimal Strength)
    - Cardiovascular Endurance (One-mile run, Physical Efficiency test, Harvardstep test)
  - Self- evaluation –Personal Health and Well-being
- UNIT-V** GYM MANAGEMENT ECONOMICS (09 hrs lecture)
- Costing, Balance sheet, Promotional plans

**PRACTICAL SYLLABUS** - 30 hrs

1. Calculating BMI
2. Flexibility Test (Sit and reach test, hip bend and toe touch)
3. Strength Test (Bend knee sit ups, leg raise for minimal strength)
4. Cardiovascular endurance test (Harvard step test, cooper 12/9 min. run)
5. Self evaluation- (Personal health and well being)
6. Any five asanas
7. Aerobic schedule
8. Weight management

**Suggested Readings:**

1. Alexandria, Virginia, “The Gym Workout” Published by Time Life Books.
2. Ann Goodsell “Your Personal Trainer, 1994.
3. Carol Kennedy Armbruster. Mary M. Yoke “ Methods of Group Exercise Instruction”, 2009.
4. Philip Mazzurco “Exerstyle”, 1985.
5. Refus, Inc, “The Body in Motion” Published by Time Life Books.
6. Sheela Kumari , Fitness, Aerobics & Gym Operations, New Delhi, Khel Sahitya Kendra, 2009.
7. Sunil Bharihoke, The Gym” , 2002.
8. Time life books, Gym workout, London times life books, 2004
9. Time life books, staying flexible, London, time life books, 2005
10. Time life books, super firm tough workouts, London times life books, 2005
11. Wayne L. Westcott, Thomas R. Bachle, “ Strength Training”, 2007.

## GENERIC ELECTIVES (GE - 2): MATHEMATICAL PHYSICS

### Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Mathematical Physics GE – 2	4	3	1	0	Class XII pass	NIL

### Learning Objectives

The emphasis of course is to equip students with the mathematical tools required in solving problem of interest to physicists. The course will expose students to fundamental computational physics skills and hence enable them to solve a wide range of physics problems.

### Learning Outcomes

At the end of this course, the students will be able to,

- Understand functions of several variables.
- Represent a periodic function by a sum of harmonics using Fourier series and their applications in physical problems such as vibrating strings etc.
- Obtain power series solution of differential equation of second order with variable coefficient using Frobenius method.
- Understand properties and applications of special functions like Legendre polynomials, Bessel functions and their differential equations and apply these to various physical problems such as in quantum mechanics.
- Learn about gamma and beta functions and their applications.
- Solve linear partial differential equations of second order with separation of variable method.
- Understand the basic concepts of complex analysis and integration.
- During the tutorial classes, students' skill will be developed to solve more problems related to the concerned topics.

### SYLLABUS OF GE – 2

#### THEORY COMPONENT

Unit 1:

**(6 Hours)**

**Fourier series:** Periodic functions. Orthogonality of sine and cosine functions, Convergence of Fourier series and Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Even and odd functions and their Fourier expansions (Fourier Cosine Series and Fourier Sine Series).

**Unit 2: (10 Hours)**

**Frobenius Method and Special Functions:** Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre and Bessel Differential Equations.

**Unit 3: (14 Hours)**

**Some Special Integrals:** Beta and Gamma Functions and Relation between them. Expression of integrals in terms of Gamma Functions.

**Partial Differential Equations:** Multivariable functions, Partial derivatives, Functions Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular geometry, Solution of 1D wave equation.

**Unit 4: (15 Hours)**

**Complex Analysis:** Functions of complex variable, limit, continuity, Analytic function, Cauchy-Riemann equations, singular points, Cauchy Goursat Theorem, Cauchy's Integral Formula, Residues, Cauchy's Residue Theorem.

**Essential readings:**

- 1) Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
- 2) Complex Variables and Applications, J. W. Brown and R. V. Churchill, 7th Ed. 2003, Tata McGraw-Hill
- 3) Advanced Mathematics for Engineers and Scientists: Schaum Outline Series, M. R Spiegel, 2009, McGraw Hill Education.
- 4) Applied Mathematics for Engineers and Physicists, L.A. Pipes and L.R. Harvill, 2014, Dover Publications.
- 5) Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd Ed., 2006, Cambridge University Press.

**Suggestive readings**

- 1) Mathematical Physics, A. K. Ghatak, I. C. Goyal and S. J. Chua, 2017, Laxmi Publications Private Limited.
- 2) Advanced Engineering Mathematics, D. G. Zill and W. S. Wright, 5 Ed., 2012, Jones and Bartlett Learning.
- 3) An introduction to ordinary differential equations, E. A. Coddington, 2009, PHI Learning.
- 4) Differential Equations, George F. Simmons, 2007, McGraw Hill.
- 5) Mathematical methods for Scientists and Engineers, D. A. Mc Quarrie, 2003, Viva Books

# GENERIC ELECTIVE (GE) COURSES

## B.A. (HONS.) PSYCHOLOGY & B.A. (HONS.) APPLIED PSYCHOLOGY

### FIRST YEAR

### SEMESTER I

#### GE 01: FOUNDATIONS OF PSYCHOLOGY

**Credit: 4 (3 Lecture + 1 Tutorial)**

#### Course Learning Outcomes

- To introduce the core concepts of psychology with an emphasis on applications of psychology in everyday life.
- To help students develop an insight into their own and others' behavior and underlying mental processes.
- To understand and be able to interweave the fundamental psychological concepts of learning, memory, motivation, and emotion.
- To understand the theoretical perspectives and research findings that have shaped some of the most important areas of contemporary psychology.

**Unit 1: What is Psychology :** Psychology as a science; Major schools of Psychology; Evolution of Psychology in India; Subfields and Applications of Psychology

**Unit 2: Mind as Information Processor:** Bottom-up and Top-down processing, Perceptual organizational processes, Acquiring Information: Learning by Association, Social Cognitive Learning, Encoding and Retrieval in Memory: Information Processing model; Why we forget? Mnemonics

**Unit 3: Self and Personality:** Nature and Perspectives (Trait and Type, Jungian Theory of Psychoanalysis, Roger's Self Theory), Measures of Personality: Inventories and Projective techniques, Culture and Personality

**Unit 4: Intelligence and Creativity:** Nature and Perspectives: Psychometric approach (Spearman's 'g' factor theory), Cognitive perspective (Fluid and Crystallized Intelligence; Triarchic Theory of Intelligence), Multiple Intelligences, Managing emotions intelligently, Nature of Creativity

**References:**

- Baron, R.A and Misra, G. (2014). Psychology (Indian Subcontinent Edition). Pearson Education Ltd.
- Ciccarelli, S. K & Meyer, G.E (2008). Psychology (South Asian Edition). New Delhi: Pearson
- Feldman. S.R. (2009). Essentials of understanding psychology (7th Ed.) New Delhi: Tata Mc Graw Hill.
- Passer, M.W., Smith, R.E., Holt, N. and Bremner, A. (2008). Psychology: The Science of Mind and Behaviour. McGraw-Hill Education. UK
- Zimbardo, P.C. & Weber, A.L. (1997). Psychology, New York: Harper Collins College Publishers.
- Robinson-Riegler, G., & Robinson-Riegler, B. (2008). *Cognitive psychology: Applying the science of the mind (2<sup>nd</sup> ed.)*. Boston: Pearson/Allyn and Bacon.
- Singh A.K (2017) संज्ञानात्मक मनोविज्ञान: Cognitive Psychology. Motilal Banarsidass Publishers Pvt.Ltd.
- Singh A.K (2017) उच्चतर सामान्य मनोविज्ञान: Advanced General Psychology. Motilal Banarsidass Publishers Pvt.Ltd.