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# **SYLLABI BOOK**

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## **BACHELOR OF TECHNOLOGY MECHANICAL ENGINEERING**



**Department of Mechanical Engineering  
Faculty of Technology  
Dharmsinh Desai University  
Nadiad – 387 001, Gujarat, India.**

**TEACHING SCHEME FOR THE COURSE**  
**B. TECH., MECHANICAL ENGINEERING**  
(Admission Year\_2021)

**SEMESTER I**

|          | Subject Title          | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |    |       |        |
|----------|------------------------|--------------------------|-----|------|--------------------|------|------|----|-------|--------|
|          |                        | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW | Total | Credit |
| <u>1</u> | MATHEMATICS -I         | 3                        | 1   | 0    | 60                 | 40   | 0    | 0  | 100   | 4.0    |
| <u>2</u> | THERMODYNAMICS         | 3                        | 0   | 2    | 60                 | 40   | 50   | 0  | 150   | 4.0    |
| <u>3</u> | BASIC ELECTRICAL ENGG. | 3                        | 0   | 2    | 60                 | 40   | 50   | 0  | 150   | 4.0    |
| <u>4</u> | MECHANICS              | 3                        | 0   | 2    | 60                 | 40   | 50   | 0  | 150   | 4.0    |
| <u>5</u> | COMPUTER PROGRAMMING   | 2                        | 0   | 3    | 100                | 0    | 50   | 0  | 150   | 3.5    |
| <u>6</u> | ENVIRONMENTAL STUDIES  | 2                        | 0   | 0    | 50                 | 0    | 0    | 0  | 50    | 0.0    |
| <u>7</u> | WORKSHOP PRACTICE - I  | 0                        | 0   | 2    | 0                  | 0    | 50   | 0  | 50    | 1.0    |
|          |                        |                          |     |      |                    |      |      |    | 800   | 20.5   |

**SEMESTER II**

|          | Subject Title          | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |    |       |        |
|----------|------------------------|--------------------------|-----|------|--------------------|------|------|----|-------|--------|
|          |                        | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW | Total | Credit |
| <u>1</u> | MATHEMATICS-II         | 3                        | 1   | 0    | 60                 | 40   | 0    | 0  | 100   | 4.0    |
| <u>2</u> | ENGINEERING GRAPHICS   | 3                        | 0   | 3    | 60                 | 40   | 50   | 0  | 150   | 4.5    |
| <u>3</u> | BASIC ELECTRONICS      | 3                        | 0   | 2    | 60                 | 40   | 50   | 0  | 150   | 4.0    |
| <u>4</u> | MECHANICS OF SOLIDS    | 3                        | 0   | 2    | 60                 | 40   | 50   | 0  | 150   | 4.0    |
| <u>5</u> | CHEMISTRY              | 3                        | 0   | 0    | 100                | 0    | 0    | 0  | 100   | 3.0    |
| <u>6</u> | WORKSHOP PRACTICE - II | 0                        | 0   | 3    | 0                  | 0    | 50   | 0  | 50    | 1.5    |
|          |                        |                          |     |      |                    |      |      |    | 700   | 21     |

**SEMESTER III**

|          | Subject Title                           | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |    |       |        |
|----------|---|--------------------------|-----|------|--------------------|------|------|----|-------|--------|
|          |   | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW | Total | Credit |
| <b>1</b> | MATHMATICS - III (NUMERICAL TECHNIQUES) | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| <b>2</b> | ELECTRICAL MACHINES AND DRIVES          | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| <b>3</b> | FLUID MECHANICS                         | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| <b>4</b> | MATERIAL SCIENCE AND METALLURGY         | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| <b>5</b> | KINEMATICS OF MACHINES                  | 3                        | 1   | 2    | 60                 | 40   | 25   | 25 | 150   | 5.0    |
| <b>6</b> | ENGLISH                                 | 2                        | 0   | 2    | 50                 | 0    | 50   | 0  | 100   | 3.0    |
|          |   |                          |     |      |                    |      |      |    | 850   | 24.0   |

### SEMESTER IV

|   | Subject Title                         | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |    |       |        |
|---|---------------------------------------|--------------------------|-----|------|--------------------|------|------|----|-------|--------|
|   |                                       | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW | Total | Credit |
| 1 | APPLIED THERMODYNAMICS                | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 2 | SOLID MECHANICS                       | 3                        | 1   | 0    | 60                 | 40   | 0    | 0  | 100   | 4.0    |
| 3 | MANUFACTURING TECHNOLOGY - I          | 3                        | 0   | 4    | 60                 | 40   | 25   | 25 | 150   | 5.0    |
| 4 | DYNAMICS OF MACHINES                  | 3                        | 1   | 2    | 60                 | 40   | 25   | 25 | 150   | 5.0    |
| 5 | MACHINE DRAWING & INDUSTRIAL DRAFTING | 0                        | 0   | 4    | 0                  | 0    | 25   | 25 | 50    | 2.0    |
| 6 | INDUSTRIAL MANAGEMENT AND ECONOMICS   | 2                        | 0   | 2    | 50                 | 0    | 50   | 0  | 100   | 3.0    |
|   |                                       |                          |     |      |                    |      |      |    | 700   | 23.0   |

### SEMESTER V

|   | Subject Title   | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |    |       |        |
|---|---|--------------------------|-----|------|--------------------|------|------|----|-------|--------|
|   |   | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW | Total | Credit |
| 1 | MEASUREMENT AND METROLOGY   | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 2 | HEAT AND MASS TRANSFER  | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 3 | MANUFACTURING TECHNOLOGY - II   | 3                        | 0   | 4    | 60                 | 40   | 25   | 25 | 150   | 5.0    |
| 4 | MACHINE DESIGN - I  | 3                        | 1   | 2    | 60                 | 40   | 25   | 25 | 150   | 5.0    |
| 5 | PROFESSIONAL ELECTIVE - I   | 3                        | 0   | 0    | 100                | 0    | 0    | 0  | 100   | 3.0    |
| 6 | MENDATORY COURSE - 2 (CONSTITUTION OF INDIA OR ESSENCE OF INDIAN KNOWLEDGE TRADITION) | 2                        | 0   | 0    | 50                 | 0    | 0    | 0  | 50    | 0.0    |
|   |   |                          |     |      |                    |      |      |    | 750   | 21.0   |

### SEMESTER VI

|   | Subject Title               | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |    |       |        |
|---|-----------------------------|--------------------------|-----|------|--------------------|------|------|----|-------|--------|
|   |                             | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW | Total | Credit |
| 1 | MACHINE DESIGN - II         | 3                        | 1   | 2    | 60                 | 40   | 25   | 25 | 150   | 5.0    |
| 2 | FLUID MACHINES              | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 3 | PROFESSIONAL ELECTIVE - II  | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 4 | PROFESSIONAL ELECTIVE - III | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 5 | OPEN ELECTIVE - I           | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 6 | SEMINAR                     | 0                        | 0   | 2    | 0                  | 0    | 100  | 0  | 100   | 1.0    |
|   |                             |                          |     |      |                    |      |      |    | 850   | 22     |

### SEMESTER VII

|   | Subject Title              | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |    |       |        |
|---|----------------------------|--------------------------|-----|------|--------------------|------|------|----|-------|--------|
|   |                            | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW | Total | Credit |
| 1 | CAD/CAM                    | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 2 | PROFESSIONAL ELECTIVE - IV | 3                        | 0   | 0    | 100                | 0    | 0    | 0  | 100   | 3.0    |
| 3 | PROFESSIONAL ELECTIVE - V  | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 4 | OPEN ELECTIVE - II         | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 5 | OPERATION RESEARCH         | 3                        | 0   | 2    | 60                 | 40   | 25   | 25 | 150   | 4.0    |
| 6 | PROJECT                    | 0                        | 0   | 4    | 0                  | 0    | 100  | 0  | 100   | 2.0    |
|   |                            |                          |     |      |                    |      |      |    | 800   | 21.0   |

### SEMESTER VIII

|   | Subject Title       | Teaching Scheme & Credit |     |      | Examination Scheme |      |      |     |       |        |
|---|---------------------|--------------------------|-----|------|--------------------|------|------|-----|-------|--------|
|   |                     | Lect                     | Tut | Prac | TH                 | Sess | Prac | TW  | Total | Credit |
| 1 | OPEN ELECTIVE - III | 3                        | 0   | 0    | 100                | 0    | 0    | 0   | 100   | 3.0    |
| 2 | OPEN ELECTIVE - IV  | 3                        | 0   | 0    | 100                | 0    | 0    | 0   | 100   | 3.0    |
| 3 | OPEN ELECTIVE - V   | 3                        | 0   | 0    | 100                | 0    | 0    | 0   | 100   | 3.0    |
| 4 | INDUSTRIAL TRAINING | 0                        | 0   | 24   | 0                  | 0    | 200  | 300 | 500   | 12.0   |
|   |                     |                          |     |      |                    |      |      |     | 800   | 21.0   |

## B. TECH. SEMESTER – I (CH/CL/IC/MH)

### SUBJECT: MATHEMATICS - I

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |    |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW | Prac | Total |
| 3                            | 1   | 0    | 4     | 4       | 60                 | 40    | 0  | 0    | 100   |

Reference Code BSC103

#### DETAILED SYLLABUS

##### 1 CALCULUS: INTEGRAL CALCULUS

Evolutes and involutes, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

##### 2 LINEAR ALGEBRA: MATRICES, VECTORS, DETERMINANTS, LINEAR SYSTEMS:

Matrices, Vectors: Addition and Scalar Multiplication, Matrix Multiplication, Rank of a matrix, Solutions of Linear Systems: Existence, Uniqueness, Determinants, Cramer's Rule, Inverse of a matrix, Eigen values, Eigenvectors, Symmetric, Skew-symmetric, Linear Independence of vectors, Diagonalization.

##### 3 SEQUENCES AND SERIES:

Convergence of sequence and series, Introduction to tests for convergence; Power series, Series for exponential, Trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

##### 4 MULTIVARIABLE CALCULUS (DIFFERENTIATION)

Partial derivatives, Total derivative; Tangent plane and normal line; Taylor series expansion for function of two variables, Jacobians, Maxima, minima and saddle points; Method of Lagrange multipliers, Introduction to Vector Differential Calculus; Directional derivatives, Gradient, Curl and divergence.

#### LEARNING OUTCOMES:

The students will learn:

- To apply differential and integral calculus to notions of curvature and applications of definite integrals.
- Convergence, divergence, and analysis of sequences and infinite series.
- To develop functions as a Fourier series.
- The essential tools of matrices and linear algebra including linear transformations, eigen values, diagonalization.

#### TEXT/REFERENCE BOOKS:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition, 2007.

2. G. B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
6. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
8. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East-West press, Reprint 2005.

**B. TECH. SEMESTER – I (CH/CL/IC/MH)****SUBJECT: THERMODYNAMICS**

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |     |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|-----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW  | Prac | Total |
| 3                            | 0   | 2    | 5     | 4       | 60                 | 40    | 50* | --   | 150   |

Reference Code ESC209

\* TW marks include Viva based on TW

**DETAILED SYLLABUS****1 INTRODUCTION:**

Macroscopic versus microscopic view point, thermodynamic systems and control volume, thermodynamic properties, processes and cycles, homogeneous and heterogeneous systems, thermodynamic equilibrium, quasi-static process, pure substance, concept of continuum, temperature and zeroth law of thermodynamics, ideal gas and gas laws

**2 ENERGY AND ENERGY TRANSFER:**

Forms of energy, energy transfer by heat and work, mechanical forms of work, first law of thermodynamics, energy conversion efficiencies

**3 PROPERTIES OF PURE SUBSTANCES:**

Pure substance, phases and phase change process, thermodynamic properties, property diagrams, ideal gas equation of state, van der waal equation, virial equation of state

**4 ENERGY ANALYSIS OF A CLOSED SYSTEM:**

PdV work in various quasi-static processes, energy balance, specific heats, internal energy, enthalpy and specific heats of solids, liquids and ideal gases.

**5 ENERGY ANALYSIS OF A OPEN SYSTEM:**

Conservation of mass, flow work and energy of a flowing fluid, energy analysis of steady and unsteady flow systems.

**6 SECOND LAW OF THERMODYNAMICS:**

Introduction to second law, thermal energy reservoir, heat engine, refrigerator and heat pump, Clausius and Kelvin-Planck statement, perpetual motion machines, reversible and irreversible processes, Carnot and reversed Carnot cycle, entropy principle and isentropic process, Tds and Maxwell relation.

**7 SEAM BOILERS:**

Introduction, classification, mountings and accessories, classification and comparison of boiler draught systems.

**8 APPLICATIONS OF THERMODYNAMICS:**

Construction and working of pumps, compressors, IC engine- Otto and Diesel engines, vapour compression refrigeration system, vapour absorption refrigeration system.

**TEXT/REFERENCE BOOKS:**

1. Yunus A. Cengel, Michael A. Boles., "Thermodynamics- An engineering approach", Tata McGraw Hill publishing co. ltd.
2. Nag P.K., "Engineering Thermodynamics", Tata McGraw Hill publishing co. ltd.
3. Smith J.M., Van Ness H.C., Abbott M.M, "Introduction to chemical engineering thermodynamics", McGraw Hill publishing co. Ltd.
4. Sonntag. R.E., Borgnakke, C. and Van Wylen G.J., "Fundamental of thermodynamics", John Wiley and Sons.
5. Moran M.J. and Shapiro H.N., "Fundamentals of engineering thermodynamics", John Wiley and Sons.



**B. TECH. SEMESTER – I (CH/CL/IC/MH)**  
**SUBJECT: BASIC ELECTRICAL ENGINEERING**

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |     |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|-----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW  | Prac | Total |
| 3                            | 0   | 2    | 5     | 4       | 60                 | 40    | 50* | --   | 150   |

Reference Code ESC101

\* TW marks include Viva based on TW

**DETAILED SYLLABUS**

**1 D.C. CIRCUITS**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

**2 A.C. CIRCUITS**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**3 TRANSFORMERS**

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

**4 ELECTRICAL MACHINES**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

**5 ELECTRICAL INSTALLATIONS**

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement. DC-DC buck and boost converters. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

**6 SEMICONDUCTORS, DIODES AND APPLICATIONS**

Semiconductor Diode - Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier,

Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications; Silicon Controlled Rectifier (SCR) in brief.

**TEXT/REFERENCE BOOKS:**

1. R. Muthu Subramanian, S. Salivahanan, and K. A. Muraleedharan, Basic Electrical, Electronics and Computer Engineering, 2<sup>nd</sup> Edition, Tata McGraw Hill
2. V. K. Mehta & Rohit Mehta, Principles of Electronics, 11<sup>th</sup> Edition, S. Chand & Company
3. B. L. Theraja , A. K. Theraja, Electrical Technology (Vol: II), 23<sup>rd</sup> Edition, S. Chand & Company
4. D.P. Kothari and I. J. Nagrath, Basic Electrical Engineering, 3<sup>rd</sup> Edition, Tata McGraw Hill

## B. TECH. SEMESTER – I (CH/CL/IC/MH)

### SUBJECT: MECHANICS

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |     |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|-----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW  | Prac | Total |
| 3                            | 0   | 2    | 5     | 4       | 60                 | 40    | 50* | --   | 150   |

Reference Code BSC101

\* TW marks include Viva based on TW

### DETAILED SYLLABUS

#### 1 STATICS

Resultant force for 2D and 3D force system, concept of free body diagrams, equilibrium equations for particles and rigid body subjected to 2D and 3D force system, centroid and center of gravity, moment of inertia, Friction

#### 2 DYNAMICS AND VIBRATIONS

Rotational Transformation of scalars and vectors, Newton's Laws for particle motion, Potential Energy function  $F = -\text{Grad } V$ , conservative and non-conservative forces, Conservation of momentum, angular momentum, collision, energy equation, free harmonic motion, damped harmonic motion, forced oscillation and resonance, kinematics in a coordinate system rotating and translating in a plane.

#### TEXT/REFERENCE BOOKS:

1. Engineering Mechanics, M. K. Harbola, 2nd Edition, Cengage Learning, 2013.
2. Mechanics – J P Den Hartog, Dover Publications, 2003.
3. Mechanical Vibrations - J P Den Hartog, Dover Publications, 1985.
4. Theory of Vibrations with Applications – W. T. Thomson, 5th Edition, Pearson Education, 2008.
5. Engineering Mechanics: Statics (V.1), Dynamics (V.2), J. L. Meriam and L. G. Kraige, 5th edition, Wiley, 2017.
6. Engineering Mechanics: Statics & Dynamics, Irving H. Shames, 4th edition, Pearson Education, 2005.
7. Vector Mechanics for Engineers: Statics (V.1), Dynamics (V.2), F. P. Beer and E. R. Johnston, 10th SI edition, McGraw Hill Education, 2017

## B. TECH. SEMESTER – I (CH/CL/IC/MH)

### SUBJECT: COMPUTER PROGRAMMING

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |     |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|-----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW  | Prac | Total |
| 3                            | 0   | 2    | 5     | 4       | 60                 | 40    | 50* | --   | 150   |

Reference Code ESC103

\* TW marks include Viva based on TW

#### DETAILED SYLLABUS

##### 1 INTRODUCTION:

Introduction to components of computer system, Idea of algorithm, Introduction to C, Constants, Variables & Data types in C, Managing input and Output operators.

##### 2 OPERATORS AND EXPRESSIONS:

C Operators: Arithmetic, relational, logical, increment & decrement, assignment and conditional, Arithmetic Expressions & Precedence Rule, Type conversion in C, Mathematical Functions.

##### 3 DECISION MAKING AND BRANCHING:

Decision making with If & If...else statements, goto statements.

##### 4 DECISION MAKING AND LOOPING:

The while statement, the break statement & the do... while loop, the for loop, Jump within loops - Programs.

##### 5 ARRAYS:

Array 1D, 2D, Character Array as String

##### 6 USER DEFINED FUNCTIONS:

Categories of Functions (Including using built in library), Call by Value, Parameter passing to function, Recursion.

##### 7 STRUCTURE:

Defining structure, Assigning value to the structure members, Array of structure

##### 8 POINTER:

Idea of pointer, declaration and Initialization of pointer, passing address as function argument, passing array to function using pointer.

##### 9 FILE HANDLING

(only if time is available, otherwise should be done as part of the lab)

#### TEXT/REFERENCE BOOKS:

1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

3. Yashvant Kanetkar, Let Us C, 12th Edition, BPB Publication.
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

## B. TECH. SEMESTER – I (CH/CL/IC/MH)

### SUBJECT: ENVIRONMENTAL STUDIES

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |    |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW | Prac | Total |
| 2                            | 0   | 0    | 2     | 0       | 50                 | 0     | 0  | 0    | 50    |

Reference Code MC-II

#### DETAILED SYLLABUS:

#### 1 THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, scope and importance & Need for public awareness

#### 2 NATURAL RESOURCES

Renewable and non-renewable resource: Natural resources and associated problems, Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams, and their effects on forests and tribal people, Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefit and problems, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies, Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies, Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification, Role of an individual in conservation of natural resources. Equitable use of resources of sustainable lifestyles

#### 3 ECOSYSTEMS

Concept of an ecosystem, Structure and function of an ecosystem, producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

#### 4 BIODIVERSITY AND ITS CONSERVATION

Introduction definition: Genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity, habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

#### 5 ENVIRONMENTAL POLLUTION

Definition, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear

hazards Solid waste management, causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides

## **6 SOCIAL ISSUES AND THE ENVIRONMENT**

From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns. Case studies, Environmental ethics: Issues and possible solutions, Climate change: Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies: Wasteland reclamation, Consumerism and waste products, Environment Protection Act: Air (Prevention and Control of Pollution) Act, Water (Prevention & Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

## **7 HUMAN POPULATION AND THE ENVIRONMENT**

(Population growth, variation among nations, population explosion, Family Welfare Program, environment and human health, human rights, Value education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environmental and human health, Case studies.

## **8 FIELD WORK**

Visit to a local area to document environmental assets (river/forest/grassland/hill/mountain) Visit to a local polluted site - Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems – pond, river, hill, slopes etc.

## **TEXT BOOKS/ REFERENCE BOOKS**

1. Erach Bharucha Textbook of Environmental Studies; Second Edition, Universities Press: Hyderabad, 2013.
2. Poonia, M. P.; Sharma, S. C. Environmental studies; Khanna Publishing House: New Delhi, 2017.
3. Rajagopalan, R. Environmental Studies; Oxford University Press: India, 2015.
4. Varandani, N. S. Basics of Environmental studies; Lambert Academic Publishing: Germany, 2013.
5. Basak, A. Environmental Studies; Dorling Kindersley: India, 2009.
6. Dhameja, S. K. Environmental studies; S. K. Kataria and Sons: New Delhi, 2007.
7. Rao, C. S. Environmental Pollution Control Engineering; Wiley publishers: New Delhi, 2006.
8. Brunner, R. C. Hazardous Waste Incineration; McGraw Hill: Michigan, 1989.
9. Clark, R. S. Marine Pollution; Clanderson Press Oxford: Bath, 2001.
10. Trivedy, R. K. Handbook of Environmental Laws, Acts, Guidelines, Compliances & standards; B. S. publications: Hyderabad, 2005.

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12. Agarwal, K. C. Environmental Biology; Nidi Publ.: Bikaner, 2001.
13. Bharucha, E. The Biodiversity of India; Mapin Publishing: Ahmedabad, India, 2002.
14. Cunningham, W.P.; Cooper; Gorhani, T. H. E.; Hepworth, M.T., Environmental Encyclopedia; Jaico Publ. House: Mumbai, 2001.
15. De, A. K. Environmental Chemistry; Wiley Eastern: New Delhi, 2006.
16. Gleick, H. P. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security; Stockholm Env. Institute Oxford Univ. Press: New York, 1993.
17. Hawkins, R.E., Encyclopedia of Indian Natural History; Bombay Natural History Society: Bombay, 1987.
18. Heywood, V. H.; Waston, R. T. Global Biodiversity Assessment; Cambridge Univ. Press: Cambridge, 1995.
19. Mckinney, M.L.; School, R.M. Environmental Science systems & Solutions; Web enhanced edition: USA, 1996.
20. Miller, T.G. Jr.; Spoolman, S. E. Environmental Science; Cengage learning: Wadsworth, 2014.
21. Odum, E.P. Fundamentals of Ecology; W.B. Saunders: USA, 1971.
22. Rao, M. N.; Datta, A.K. Waste Water treatment; Oxford & IBH Publ.: New Delhi, 1987.
23. Sharma, B. K., Environmental Chemistry; Goel Publ. House: Meerut, 2001.
24. Townsend, C., Harper, J.; Michael, B. Essentials of Ecology; Blackwell: Oxford, 2008.
25. Trivedi, R. K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II; B. S. Publications, Hyderabad, 2010.
26. Trivedi, R. K.; Goel, P. K. Introduction to air pollution; ABD Publishers: Jaipur, 2003.
27. Wanger, K. D., Environmental Management; W.B. Saunders Co. Philadelphia, USA, 1998



**B. TECH. SEMESTER – I (CH/CL/IC/MH)**  
**SUBJECT: WORKSHOP PRACTISE - I**

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |     |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|-----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW  | Prac | Total |
| 0                            | 0   | 0    | 2     | 1       | 0                  | 0     | 50* | 0    | 50    |

Reference Code ESC104A

\* TW marks include Viva based on TW

**LABORTORY WORKS/SCHEDULE:**

| Lab | Workshop-I  |
|-----|---|
| 1   | Introduction to Workshop, Basic Workshop types                    |
| 2   | Safety requirement in workshop, Safety rules                      |
| 3   | To Understand "5S" Concept for Workplace                          |
| 4   | Demonstration of Tin smithy Tools and it's exercise               |
| 5   | To make job for Tin smithy shop                                   |
| 6   | Demonstration of Plumbing tools, It's accessories.                |
| 7   | To make job for Plumbing shop                                     |
| 8   | Introduction to Fabrication shop, Welding Equipment               |
| 9   | To make job for Fabrication shop                                  |
| 10  | Introduction of Machine shop                                      |
| 11  | Introduction and Demonstration of Lathe machine.                  |
| 12  | Introduction and Demonstration of Milling and Radial Drilling m/c |

**TEXT/ REFERENCE BOOKS**

1. Work shop technology, A. K. Hajrachudhari & S. K. Hajrachudhari
2. ITB Hand book, Engineering industry training board
3. Work shop Technology Vol. I & II, Gupta & Kaushik

**B. TECH. SEMESTER – II (CH/CL/IC/MH)**

**SUBJECT: MATHEMATICS – II**

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |    |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW | Prac | Total |
| 3                            | 1   | 0    | 4     | 4       | 60                 | 40    | 0  | 0    | 100   |

Reference Code BSC104

**DETAILED SYLLABUS**

**1 SERIES SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS BY POWER SERIES METHOD:**

Introduction, Validity of series solution of the equation, General Method, Forms of series solution.

**2 PARTIAL DIFFERENTIAL EQUATIONS:**

Basic Concepts, Classification and Solutions of partial differential equations: Lagrange's linear equation of first order, Non-linear equations of first order-Charpit's method, Homogenous linear equations with constant coefficient to find the complementary functions and the particular integral, Introduction to non-homogenous linear equations with constant coefficients, Method of separation of variables.

**3 MULTIVARIABLE CALCULUS (INTEGRATION**

Multiple Integration: Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Introduction to Triple integrals (Cartesian), Vector line integrals, Vector surface integrals, Theorems of Green, Gauss and Stoke's.

**4 LAPLACE TRANSFORM:**

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions, Finding inverse Laplace transform by different methods, Convolution theorem, Evaluation of integrals by Laplace transform, Solving ODE by Laplace Transform method.

**TEXT/REFERENCE BOOKS:**

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40<sup>th</sup> Edition, 2007.
2. G.B.Thomas and R.L.Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
4. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9<sup>th</sup> Edn., Wiley India, 2009.
5. S. L. Ross, Differential Equations, 3<sup>rd</sup> Ed., Wiley India, 1984.

6. E. A. Coddington, An Introduction to Ordinary Differential Equations, PrenticeHall India,1995.
7. E. L. Ince, Ordinary Differential Equations, Dover Publications,1958.
8. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill,2004.
9. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2008.

## B. TECH. SEMESTER – II (CH/CL/IC/MH)

### SUBJECT: ENGINEERING GRAPHICS

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |    |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW | Prac | Total |
| 3                            | 0   | 3    | 6     | 4.5     | 60                 | 40    | 50 | 0    | 150   |

Reference Code ESC102

\* TW marks include Viva based on TW

#### DETAILED SYLLABUS

##### 1 INTRODUCTION TO ENGINEERING DRAWING

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic section curves (Ellipse, Parabola, Hyperbola), Cycloidal Curves (Cycloid, Epicycloid, Hypocycloid), Involute; Archimedean Spiral

##### 2 SOLID GEOMETRY

Projection of points, projection of lines and their applications. Projection of regular planes such as square, rectangle, triangle, circle, pentagon, hexagon, rhombus. Projection of right and regular solids inclined to both the planes (prisms, pyramids, cylinder and cone)

##### 3 ORTHOGRAPHIC PROJECTIONS

First angle and third angle projection methods, conversion of pictorial views into Orthographic projections with dimensioning, sectional orthographic projection, special sections

##### 4 SECTION OF SOLIDS AND DEVELOPMENT OF SOLIDS

Sections and Sectional Views of Right Angular Solids Covering, Prism, Cylinder, Pyramid, Cone

##### 5 DEVELOPMENT OF SURFACES

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone

##### 6 ISOMETRIC PROJECTIONS

Principles of Isometric projection – Isometric Scale, Isometric projection and view, Conversion of orthographic views to isometric projections and views

##### 7 WORKING ENVIRONMENT OF CAD SOFTWARE

Menu bar, Quick access toolbar, Dashboard/Ribbon, Toolbars, drawing space, Navigation bar (View controls: zoom, pan, orbit,), Command prompt, Status bar, Drawing Area (Background, Crosshairs, Coordinate System), Shortcut Menu, Properties manager.

##### 8 DRAWING CUSTOMIZATION

Setting up the drawing sheet (drawing sheet templates, drawing limits, drawing units etc.), Coordinate system (User coordinate system, Absolute and relative coordinates, Cartesian and Polar coordinates), Modes of drawing (Grid, Snap, Ortho, Osnap, Otrack, Polar tracking, Iso draft, etc.) Formatting (colours, line type, line weight, point style etc.).

## **9 PREPARING COMPUTER AIDED DRAWING**

Exploring various commands with exercises of Orthographic drawing views and Isometric drawing views using different drawing tools, modifying tools, dimensioning tools etc.

## **10 PLOTTING AND EXCHANGING DRAWING**

Printing/Plotting the drawing (page setup, plot area, plot scale, drawing orientation, plot options etc.), Drawing standard (DXF), Generating PDF drawing documents, file management.

### **TEXT/REFERENCE BOOKS:**

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar PublishingHouse
2. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
3. Shah P. J., (2014) Engineering Graphics, S. Chand Publishing
4. Luzadder W., Duff J., (1992), Fundamentals of Engineering Drawing, Peachpit Press
5. Gill P. S., (2009), Engineering Drawing, S. K. Kataria & Sons
6. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

## B. TECH. SEMESTER – II (CH/CL/IC/MH)

### SUBJECT: BASIC ELECTRONICS

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |    |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW | Prac | Total |
| 3                            | 0   | 2    | 5     | 4       | 60                 | 40    | 50 | 0    | 150   |

Reference Code ESC201

\* TW marks include Viva based on TW

#### DETAILED SYLLABUS

##### 1 TRANSISTOR & CHARACTERISTICS

Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration

##### 2 FIELD EFFECT TRANSISTOR (FET)

Construction, Characteristics of Junction FET, Depletion and Enhancement type Metal Oxide Semiconductor (MOS) FETs, Introduction to CMOS circuits

##### 3 TRANSISTOR AMPLIFIERS AND OSCILLATORS

Classification, Small Signal Amplifiers – Basic Features, Common Emitter Amplifier, Coupling and Bypass Capacitors, Distortion, AC Equivalent Circuit; Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies, Current Series Feedback Amplifiers; Oscillators – Classification, RC Phase Shift

##### 4 OPERATIONAL AMPLIFIERS AND APPLICATIONS

Introduction to operational amplifiers, Op-amp input modes and parameters, Op-amp in open loop configuration, op-amp with negative feedback, study of practical op-amp IC 741, and inverting and non-inverting amplifier applications: summing and difference amplifier, unity gain buffer, comparator, integrator and differentiator, Wein bridge oscillator.

##### 5 DIGITAL ELECTRONICS FUNDAMENTALS

Difference between analog and digital signals, Boolean algebra, Basic and Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification, Logic ICs, Implementation of combinational logic - half and full adder/subtractor, multiplexers, de-multiplexers.

##### 6 SENSORS & SIGNAL CONDITIONING CIRCUITS

Types of sensors – pneumatic, electromagnetic, electronic, smart sensors. Diaphragm, bellows and Bourdon tube, Resistive, Capacitive, Inductive, ultrasonic, LVDT, piezoelectric, optoelectronic transducers, thermocouple, RTD and thermistors, Application of sensors for flow, level, temperature and stress measurement, Bridge Circuit, Differential Amplifier, Instrumentation Amplifier

**TEXT/REFERENCE BOOKS:**

1. Principles of Electronics, 11th Edition By: V. K. Mehta & Rohit Mehta Publisher: S. Chand & Company
2. Electrical & Electronic Measurement & Measuring Instruments, 17th Edition By: A.K. Sawhney Publisher: Dhanpat rai
3. M. M. Mano, "Digital logic and Computer design", Publisher : Pearson Education India.

**B. TECH. SEMESTER – II (CH/CL/IC/MH)**

**SUBJECT: MECHANICS OF SOLIDS**

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |    |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW | Prac | Total |
| 3                            | 0   | 2    | 5     | 4       | 60                 | 40    | 50 | 0    | 150   |

Reference Code ESC205

\*TW marks include Viva based on TW

**DETAILED SYLLABUS**

- 1 Concept of stress and strain, elasticity, generalized Hooke's law for 3D, concept of isotropy and homogeneity, plane stress and plane strain idealization, axial, volumetric and thermal stresses and strains**
- 2 Transformation of stress and strain at a point, Principal stresses and strains, Mohr's Circle, strain rosette**
- 3 Mechanical properties of metals – elasticity, plasticity, strain hardening, hardness, toughness, fatigue, strain energy**
- 4 Force-strain-deformation analysis for axial load, flexure, shear and torsion**

**TEXT/REFERENCE BOOKS:**

1. Strength of Materials: Part– I and II, Stephen Timoshenko, 3<sup>rd</sup> Edition, CBS Publisher, 2002.
2. Strength of Materials, Sadhu Singh, 1<sup>st</sup> Edition, Khanna Book Publishing Company, 2016.
3. Advanced Mechanics of Solid, L. S. Srinath, 3<sup>rd</sup> Edition, McGraw Hill Publication, 2017.
4. Engineering Mechanics of Solids, E P Popov, 2<sup>nd</sup> Edition, Prentice Hall India Learning Pvt. Ltd, 2002.



## B. TECH. SEMESTER – II (CH/CL/IC/MH)

### SUBJECT: CHEMISTRY

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |    |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW | Prac | Total |
| 3                            | 0   | 0    | 3     | 3       | 100                | 0     | 0  | 0    | 100   |

Reference Code BSC102

#### DETAILED SYLLABUS:

#### 1 ATOMIC AND MOLECULAR STRUCTURE

Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

#### 2 SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

#### 3 INTERMOLECULAR FORCES AND POTENTIAL ENERGY SURFACES

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H<sub>3</sub>, H<sub>2</sub>F and HCN and trajectories on these surfaces.

#### 4 USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

#### 5 PERIODIC PROPERTIES

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

#### 6 STEREOCHEMISTRY

Representations of 3 dimensional structures, structural isomers and

stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

## **7 ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE**

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecules.

### **TEXT/REFERENCE BOOKS**

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins (vi) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

**B. TECH. SEMESTER – II (CH/CL/IC/MH)**  
**ESC104b WORKSHOP PRACTISE - II**

| Teaching Scheme (Hours/week) |     |      |       |         | Examination Scheme |       |     |      |       |
|------------------------------|-----|------|-------|---------|--------------------|-------|-----|------|-------|
| Lect                         | Tut | Prac | Total | Credits | Ext                | Sess. | TW  | Prac | Total |
| 0                            | 0   | 3    | 3     | 1.5     | 0                  | 0     | 50* | 0    | 150   |

Reference Code ESC104B

\*TW marks include Viva based on TW

**LABORTORY WORKS/SCHEDULE:**

| Lab | Workshop-II   |
|-----|---|
| 1   | Introduction to Carpentry Shop, application of various carpentry tools                |
| 2   | Demonstration of Carpentry Job 1 & 2  |
| 3   | To make Job 1 for Carpentry shop  |
| 4   | To make Job 2 for Carpentry shop  |
| 5   | Introduction to Black smithy shop and Demonstration of it's job                       |
| 6   | To make Job for Black smithy shop   |
| 7   | Introduction to Fitting shop, to understand application of various tools of this shop |
| 8   | Demonstration of Fitting Job  |
| 9   | To make job for Fitting shop  |
| 10  | To make job for Fitting shop  |
| 11  | Assignment for Carpentry shop   |
| 12  | Assignment for Fitting shop   |

**TEXT/ REFERENCE BOOKS**

1. Work shop technology, A. K. Hajrachaudhari & S. K. Hajrachaudhari
2. ITB Hand book, Engineering industry training board
3. Work shop Technology Vol. I & II, Gupta & Kaushik