

BHAVNAGAR UNIVERSITY  
B.E. SEM I ( C/M/IC/EC/P)  
101- COMMUNICATION SKILL

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
02		100	3			100

A. Theory

1. Technical English Writing :

(I) Preci's - Writing

(ii) Business Letters

( Inquiry- Reply to inquiry - orders and their executions- complaints and their adjustment etc.)

(iii) Technical Report Writing

( Technical Reports regarding visits, accidents, factory problems, construction of Dams, Bridge's, feasibility of establishing an industrial unit etc. )

2. 20 Units for comprehension from the prescribed book "Communication Skill " for Technical Students."

3. Grammer : Based on the exercise of comprehension units.

B. Practical : Nil.

C. Term work : Nil

D. Books : Prescribed book for comprehension .  
"Communication skill for Technical students" National Project on communication skill.

Published by : Somaiya Publications Private Ltd., Mumbai.

2 A. A Course in Technical English Book TWO for Report writing and Business Letters.

Complied by : T.T.T.I., Bhopal.

BHAVNAGAR UNIVERSITY  
B.E. FIRST YEAR (E.C.,I.C.,CIVIL,MECH.,PROD.)  
SUB :102.MATHEMATICS

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
03		100	3			100

1. Differential Calculus

- a) nth derivative, leibnitz theorem, Maclaurian's and Tailors expansions,Limits of indeterminate forms L Hospital's rule.
- b) Partial Differential Equation : Partial derivatives,Eulere's Theorem on homogeneous functions, total derivative, derivatives of implicit function,change of variables, jacobians,partial derivative of implicit function by jacobians, approximation and error,maxima and minima of function of two variables , stationary values by the method of Lagrange's undetermined multipliers.
- c) Curvature : Definition, Cartesian, polar parametric form, Newton's and series method for radius of curvature.

2. Integral Calculas

- a) Curve Tracing : Tracing of curves in Cartesian polar and parametric form, Simple standard curve, (curves of the type  $x^3 + y^3 = 3xy$ , should be omitted)
- b) Reduction Formula of following type :
- c) Beta and Gamma functions, their simple properties and relation between them
- d) Application of integral area,volume,length,of curve. Double and triple integrals, change of order of integral, change to polar form, use of double triple integral to find area, volume.

3. Infinite Series

Convergence and divergence of infinite series, geometric series, comparison test, integral test, D-Alemberts ratio test, Cauchy's root test, alternating series.

4. Complex Algebra

Argand diagram, De-moivre's theorem, roots of algebraic equation, circular functions, hyperbolic functions, logarithmic and exponential functions, separation into real and imaginary parts.

5. Matrix Algebra

Elementary transformations and rank, consistency of linear systems of equations,system of homogeneous equations, eigen value and eigen vector.

6) Vector Calculus

Differentiation of vectors, velocity & acceleration, scalar and vector points functions, vector operator del, gradient divergence and curl. Integration of vectors, line integral, circulation work. Statement of Green's and stoke's theorem.(without proof)

7. Differential equation of first order & first degree

Linear equations, Bernoullis equation, exact equations, application of differential to problems of simple electric circuits, heat flow, rate of radio active material Newton's law of cooling etc. Orthogonal trajectories.

BOOKS :

- 1 Elementary engineering mathematics by B.S.Grewal
- 2 Engineering mathematics 1&2 by P.N. Wartikar & J.N.Wartikar
- 3 Engineering mathematics 1&2 by Shantinakaran

**BHAVNAGAR UNIVERSITY**  
**B.E. 1<sup>st</sup> YEAR (ALL)**  
**103-ELEMENTS OF CIVIL ENGINEERING**

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Theory marks	Paper hrs	Pract/Oral Marks	Term work mark	
02	02	100	3	25	25	150

**[A] ENGINEERING MATERIALS :-**

**1- Introduction :-**

Scope, Importance, Their uses, General principles of selection.

**2- Basic Engineering materials :**

**I-Stone, timber, clay and ceramic materials :-Types, Characteristics and uses, refractories & tiles.**

**II- Bricks :-**

Brick earth, types, manufacturing of bricks, Standard sizes, Quality of good bricks and testing.

**III- Lime and Cement :-**

Raw materials, Composition & functions of ingredients, methods of manufacture, Types and uses, testing and storage mortar and concrete, Indian Standards.

**3- Paints & Varnishes :-**

Ingredients, Types, Properties and uses, Distemper, Characterise of pigments and Varnishes.

**4- Plastic :-**

Thermo-setting and thermo-plastic materials, Types of material and uses, properties and industrial application.

**5- Metals and alloys :-**

Ferrous and non-ferrous metals, Composition, Properties and Industrial application

**[B] SURVEYING :**

**1- Introduction :-**

Surveying and levelling, Principles, scope and importance.

**2- Chain and Compass Survey :-**

Chain, tapes, Methods, Instruments used for taking off-sets, Correction for sloping grounds, Obstacles, Accuracies, Correction, Types & uses of compass, Principles, Procedures, Angles-WCB, RB, Local attraction, Computation of angles, Declination and dip of needle examples.

**3- Levelling :-**

Definition and terms used, levelling instruments, Dumpy, Tilting and Automatic levels, Temporary and permanent adjustments, Principles, Profile levelling and cross sectioning;, Plotting, Curvature and refraction, Reciprocal levelling, methods, Precautions and corrections. Contouring, Characteristics and uses, methods, examples.

**4- Theodolite :-**

Terms, general features, Temporary & permanent adjustments, Measurement of horizontal and vertical angles, Theodolite traverse, Latitude and departure, balancing, fundamental lines / axes and their established interrelation examples.

**5- Plane table survey :-**

Principles, Instruments and accessories, methods, two point & three point problem, advantages & applications, field work, examples.

**6- Computation of areas / Volumes :-**

From field notes & plotted plans, theory and uses of plainmeter, trapezoidal, Simpson, Prismoidal formula for level sections, Capacity of reservoir, examples.

**TEXT BOOKS :**

- 1- CIVIL ENGG. MATERIALS - SHUSHIL KUMAR GURCHARANSINGH

2- CIVIL ENGG. MATERIALS - KULKARNI

3- SURVEYING - AGOR - B.C. PUNMIA-KANETKAR

**BHAVNAGAR UNIVERSITY**  
**B.E. SEMESTER- I (C/ M/ IC/EC/P)**  
**104- ENGINEERING MECHANICS**

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
02	01	100	03	25	25	150

**1. INTRODUCTION**

Scaler and vector quantities, force, composition and resolution of vectors, system of units. Units of space, time and force, derived units.

**2. STATICS :**

Idealization of bodies, rigid bodies, free body diagrams. Principle of transmissibility and superposition. Type of forces, composition and equilibrium of coplanar concurrent and non-concurrent forces parallel and non-parallel forces by analytical and graphical methods. Moment of force, couples and their properties. Equivalent force-couple systems.

Simple cases of composition and equilibrium of non coplanar, concurrent and non-concurrent force system using vector approach.

**3. BEAMS :**

Types of supports-fixed, hinged, simple and roller. Types of statically determinate beams, types of loads. Support reactions of beams. Concept of internal hinges and brackets. Computation of internal forces in simple plane trusses-analysis by various methods.

**4. CENTRE OF GRAVITY AND MOMENT OF INERTIA :**

Concept of centre of gravity of lines, plane area, volumes and bodies. Pappus Guldinus theorems. Moment of Inertia of area, parallel axes theorem and polar moment of Inertia. Mass moment of inertia of rigid bodies.

**5. FRICTION :**

Definitions of frictional forces, limiting friction, coefficient of friction, angle of friction, angle of repose, cone of friction. Laws of friction. Illustration of friction in nature and engineering, sliding of rigid bodies on horizontal and on inclined plane, wedge friction, ladder friction, belt and rope friction, screw friction.

**6. SIMPLE LIFTING MACHINES :**

Velocity ratio, mechanical advantage, efficiency and related terms. Law of machine and reversibility of machine. Simple machines like levers, inclined plane, pulley and pulley blocks, wheel and differential axle, weston pulley blocks, simple screw jack, worm and compound screw jacks, single and double purchase crab etc.

**7. KINEMATICS :**

- (a) Particle :- Relative velocity. Curvilinear motion, Normal and tangential components. Radial and transverse components. Circular motion with constant and variable angular acceleration.
- (b) Rigid bodies :- General plane motion, linear and angular velocity and acceleration. Instantaneous centre of rotation.

**8. KINETICS :**

- (a) Particle :- Mass inertia of body, Application of Newton's Law of motion, constant and variable forces for rectilinear motion including inclined plane and compound pulley arrangements. D'Alembert's principle, equation of curvilinear motion in rectangular components and in tangential and normal components. Application of torque and mass moment of inertia. Fly wheel and its function, motion of vehicles on level and banked roads. Principle of work and energy. Potential and kinetic energy, conservation of energy;

Power, Principle of impulse and momentum. Conservation of momentum and angular momentum. Impact of elastic bodies, and their nature. Loss of kinetic energy and coefficient of restitution.  
(b) Rigid body :- Equation of motion for plane motion and D'Alembert's principle. Principle of work and energy for a rigid body.

**TERM WORK :**

Term work shall consist of (a) at least eight experiments and (b) solution of atleast three problems from each topic subject to a minimum of 25.

**PRACTICAL/ORAL** examination shall consist of oral based on the subjected including termwork as above.

**TEXT BOOKS :**

- |  |  |
|--|--|
| 1. Elements of Applied Mechanics                   | - H J Shah & S B Junarkar                |
| 2. Engineering Mechanics                           | - R K Bansal                             |
| 3. Engineering Mechanics                           | - A K Tayal                              |
| 4. Engineering Mechanics<br>(Statics and Dynamics) | - Mclean and Nelson<br>(Schaum's Series) |
| 5. Elements of Applied Mechanics                   | - K L Kumar                              |

**REFERENCE BOOKS :**

- |  |                          |
|--|--------------------------|
| 1. Mechanics for Engineers (Static & Dynamics) | - Beer and Jhonston      |
| 2. Engineering Mechanics                       | - S P Timoshenko & Young |
| 3. Engineering Mechanics (Statics & Dynamics)  | - I B Prasad             |
| 4. Engineering Mechanics                       | - Higdon & Styles        |
| 5. Engineering Mechanics                       | - Siddhaye & Damle       |
| 6. Engineering Mechanics                       | - Mokashi                |

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**BHAVNAGAR UNIVERSITY**  
**B.E. FIRST YEAR - ( CIVIL / MECH./ PROD./ EC /IC )**  
**105 ELEMENTS OF ELECTRICAL ENGINEERING**

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
2	1	100	3	25	25	150

**(1) ELECTRIC CURRENT & OHM'S LAW**

Electron drift velocity - Charge Velocity and Velocity of Field Propogation - The idea of Electric Potential -Resistance - Unit of Resistance - Law of Resistance -Unit of Resistivity - Conductance & Cunductivity - Effect of temp. on Resistance- Temp. Coefficient of Resistance - Value of alpha at diff. temp. - Variation of resistivity with temp. - Ohm's Law - Resistance in series - Voltage Divider rule- Resistance in Parallel - Types of Resister - Nonlinear Resistance - Varistor - Short & Open circuit - 'Shorts ' in series & parallel circuit - " Opens " in series & parallel circuit - Division of current in parallel circuits - Equivalent Resistance - Duality between series & parallel circuit - Relative Potential - Voltage Divider Circuits - Objective tests .

**(2) WORK , POWER & ENERGY**

Heating effect of electric current - Jule's law of electric heating - Thermal Efficiency of Absolute and gravitational units.

**(3) CAPACITANCE**

Capacitor - Capacitance - Units - Capacitance of Isolated sphere - Spherical Capacitor - Parallel plate capacitor - Special cases of Parallel plate capacitor - Capacitor between two parallel Wire - Capacitor in series & Parallel - Energy stored in capacitor - Force of attraction between oppositely charged plates - charging of capacitor - Time constant - Discharging of capacitor .

**(4) MAGNETISM & ELECTROMAGNETISM**

Absolute and relative permeabilities of a medium - Law's of Magnetic Force - Field Strength - Magnetic Potential - Flux per Unit pole - Flux Density - Magnetic induction - Intensity of magnetization - susceptibility - Relation between B , H ,I - Boundary conditions - Weber & Ewings molecular theory of magnetism - Curie point - Magnetic Circuit - Definition concerning magnetic circuit - Composite series magnetic circuit - Comparison & Difference between magnetic & Electric circuit - Parallel Magnetic Circuit - Series Parallel Magnetic circuits .

**(5) ELECTROMAGNETIC INDUCTION**

Relation between magnetism & electricity - Production of induced E.M.F. & Current - Faraday's Laws of Electromagnetic induction - Direction of induced e.m.f. & current - Induced e.m.f. : Dynamically induced e.m.f. , Statically induced e.m.f. - Self induction - Coefficient of Mutual induction - Coefficient of coupling -Inductances in series & parallel .

**(6) MAGNETIC HYSTERESIS**

Magnetic hysteresis - Area of hysteresis loop - Steinmetz Law - Energy stored in magnetic field - Energy stored per unit Volume - Rise of current in inductive circuit - Decay of current in inductive circuit Time constant .

**(7) A.C FUNDAMENTALS**

Generation of alternating voltages and currents -Equations of alternating voltages and currents- definition sof cycle,time period,frequency,amplitude-Different forms of e.m.f .equation-Phase difference-R.M.S value for half wave rectified A.C -Average value-Form factor-A.C through R,C,L.

**(8) SERIES A.C CIRCUITS :**

A.C through resistance & Inductance -Power Factor-Active and reactive components of circuit currents - Q factor of a coil - Dielectric loss and p.f. of capacitor - R-L-C circuit - Resonance in R-L-C circuit - resonance curve - Q factor of a series circuit

**(9)PARALLEL A.C. CIRCUITS:**

Solution of parallel RL,RC & RLC vector or phasor method - Admittance method - Application of admittance method - Phasor algebra - Series parallel circuits - series equivalent of parallel circuit -

parallel equivalent of series circuit - Resonance in parallel circuit - Q factor of a parallel circuit.

**(10)POLYPHASE CIRCUITS:**

Generation of polyphase voltages -phase sequences - numbering of phases - interconnection of three phases - star or Y connection and delta or mesh connections - voltage,current (line and phase ) and power for three phase star and delta connected system .

**PRACTICAL/ ORAL;**

The practicals and termwork shall be based on the course under Elements of Electrical Engg. as above.About eight practicals should be performed in the laboratory.

**TEXT BOOK:**

(1)ELECTRICAL TECHNOLOGY-Volume-I by B.L. THERAJA , A.K. THERAJA

**REF. BOOKS**

1. BASIC ELECTRICAL ENGINEERING - V.N. MITTAL
2. ELECTRICAL ENGINEERING PRINCIPLES - ASHFAK HUSAIN

**BHAVNAGAR UNIVERSITY**  
**B.E. SEMESTER-I I (C/ M/ IC/EC/P)**  
**106- STRENGTH OF MATERIALS**

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
02	01	100	3	25	25	150

**1. STRENGTH AND ELACTICITY OF MATERIALS :**

**Stresses :** Axial, normal, in-plane, tensile, compressive, shear, uniform, non-uniform, simple shear, complementary shear. **Strain :** linear, shear, transverse; Poission's ratio. Elasticity : elastic, homogeneous, isotropic. Stress-strain characteristics of m.s. specimen under axial tension. Elastic constants and their relations. Stresses in composite sections. Temperature stresses.

**2. MECHANICAL PROPERTIES OF MATERIALS :**

**Metals :** Ductility, brittleness, toughness, malleability ; Behaviour of ferrous and non-ferrous metals in tension, compression shear and bending tests, standard test pieces, influence of various parameters on test results: Hooke's law, ultimate strength, limits of elasticity and proportionality, yield limit, proof stress; factor of safety, working stress, load factor. True and nominal stress, modes of fracture, characteristic stress-strain curves, strain hardening, hardness, different methods of measurement, creep of metals ; co-relation between different properties, effect of temperature; testing machines and special features; different types of extensometers and compressometers. Timber-tests and strength parallel and across the grains.

**3. BENDING MOMENT AND SHEAR FORCE :**

Bending moment and shear force diagrams in statically determinate beams subjected to different loads. Relation between bending moment, shear force, and rate of loading. Point of contraflexure.

**4. STRESS IN BEAMS :**

Theory of simple bending; bending stresses and their distribution, moment of resistance, modulus of section, built-up and composite beam sections, beams of uniform strength. Distribution of shear stresses on different beams sections.

**5. TORSION :**

Torsion of circular solid and hollow section shafts, shear stress and strain due to torsion, angle of twist, torsional moment of resistance, power transmitted by a shaft, keys and coupling, closed coiled helical springs.

**6. PRINCIPAL STRESSES AND STRAINS :**

Compound stresses, analysis of principal planes and principal stresses, Mohr's circle of stress, principal strains, angle of obliquity of resultant stresses, principal stresses in beams, principal stresses in shafts subjected to bending and torsion with and without axial stress.

**7. THIN CYLINDERS AND SHELLS :**

Thin cylinders, spheres and shells subjected to internal and external pressures, distribution of radial and hoop stresses. Compound and wire wound cylinders. Efficiency of shells and cylinders.

**TERM WORK :**

Term work shall consist of (a) at least eight experiments and (b) solution of atleast three problems from each topic subjecte to a minimum of 25.

**PRACTICAL/ORAL** examination shall consist of oral based on the subjected including termwork.

**TEXT BOOKS :**

- |   |                 |
|---|-----------------|
| 1. Mechanics of Structures Vol-I        | - S B Junarkar  |
| 2. Strength of Materials                | - G H Ryder     |
| 3. Strength of Materials Vol-I          | - Punmia & Jain |
| 4. A text book of Strength of Materials | - R K Bansal    |

**REFERENCE BOOKS :**

- |                           |                            |
|---------------------------|----------------------------|
| 1. Mechanics of Materials | - Timoshenko & Young       |
| 2. Mechanics of Materials | - Timoshenko & Gere        |
| 3. Strength of Materials  | - M Nash [Schaum's series] |
| 4. Mechanics of Materials | - F P Beer & E R Jhonston  |

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**BHAVNVAGR UNICERSITY  
FIRST YEAR (C/M/IC/EC)  
107-ENGINEERING GRAPHICS**

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
02	04	100	04	50	50	200

**(A) PLANE GEOMETRY AND MACHINE PARTS**

1. Introduction to Engineering Graphics

Principles of projection lines and dimenstioing

B.I.S. Code of pratice ( SP - 46 )

Scale, Representative fraction, plane scale vernier scale. And scale of chords.

2. ENGINEERING CURVES.

Classification and construction of engineering curvers such as conics ,cysloidal curves ,invlute ,spirals.

3. LOCI OF POINTS

Loci of points on simple Mechanism like slider crank Mechnism, four bar chain Mechanism etc.

4. FASTENING AND DONNECTING METHODS

Screw threads, bolts nut stud, locking devices simple riveted and welded joints, couplings, bearings, cotton joints, pinjoints,

**(B) SOLID GEMETRY :**

5. INTRODUCTION TO PROJECTION OF POINT, LINE AND PLANE :

Projection of line inclined to both planes & simple cases, True length of straight line and its inclination with reference planes ( traces are not included ) Projections of planes on Principle and auxiliary planes.

6. INTRODUCTION TO PROJECTION OF SOLIDS, SECTION OF SOLLDS AND INTER PENETRATION OF SOLIDS.

Classification of solid projection of right and recular solids with their axis inclined to both planes, projection of sphere section of pyramid, cone, prism and cylinder, methods of determining line of intersection and curve of interaction.

■ Intersection of prism to prism, cone to cylinder to cylinder, cylinder to cone, cylinder to prism.

7. DEVELOPMENT OF SURFACES :

Parallel line development, radial line development and development of sphere.

**(C) ORTHO GRAPHIC PROJECTIONS :**

8. ORTHO GRAPHIC PROJECTIONS :

Conversion of pictorial views into orthographic views, Different types of sections such as full, half, offset, broken, removed, revolved etc., sectional views, orthographic reading, missing line problems.

**(D) CIVIL ENGINEERING DRAWING :**

1. BASIC CONCEPT :

Preparation of working drawing ( including plan, elevation, section ) of single storey buildings and factories from a given line sketch OR from given measurements; Types of drawings, line plan, foundation plan and detailed drawing of door, window, ventilator, chhajjas, beam, column, foundations, floor, etc.

2. FUNCTIONAL PLANNING :

Principles of planning of small residential and industrial buildings, minimum standards as per I.S. code, main provisions of building bylaws for residential and industrial buildings, climatic consideration for planning of buildings.

3. PREPARING SKETCHES FOR BUILDING COMPONENTS :

Type of walls, doors, windows, columns, beams, floors, roofs & slabs, foundation for building and heavy machines, symbols for different materials in section, electrical installation and wiring diagram for buildings,brick bonds.

**TERM WORK :** Part A. B. & C the following to be prepared on A. Side drawing sheet in the drawing halls of the college with sketch book.

1. Loci of points
2. Engineering curves
3. Projection of points, lines & Planes.
4. Orthographic projection with section (2 Problems in first angle and 1 problem in third angle )
5. Reading of orthographic views and missing lines/missing views.
6. Projection of solids and section of solids.
7. Development of surfaces and interpenetrating of surfaces.

8. Isometric projections/views.
9. Sketch book containing sketches of m/c parts, pipe drawing lines, dimensioning scale ets.

PART D : Four drawing sheets in A2 size.

PRACTICAL/ORAL : The practical/oral marks shall consists of oral exam based on subject inclusive of termwork prepared.

TEXT BOOKS :

1. Engineering Drawing ( Vol-I & II ) by P.J.Shah
2. Engineering Drawing by N.D. Bhatt
3. Machine Drawing by N.D. Bhatt
4. Civil Engineering Drawing by Guruchansingh
5. Civil Engg. Drawing by Malik & Meo.

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BHAVNAGAR UNIVERSITY  
B.E. FIRST YEAR (C/M/IC/EC)  
108 ELEMENTS OF MECHANICAL ENGINEERING

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
02	01	100	3	25	25	150

(A) THEORY :

- (1) Definition of system, surroundings, thermal equilibrium, expansion work, first law of thermodynamics, perpetual motion of the first order, internal energy, flow & non flow processes general energy equation for steady flow non-flow energy equation & their applications in various processes.
- (2) Properties of Gas : Expansion & compression of gas, point & Path functions, various process. Like constant volume, constant pressure Isothermal adiabatic and Polytropic and throttling etc.
- (3) Properties of Steam : Difference between gas and vapour, phase diagram, Effect of pressure on the boiling point of water, Generation of steam, conditions of steam, Properties of steam, Use of steam tables, Internal energy of steam, Methods of determinations of dryness fraction of steam.
- (4) Steam Boilers and Performance of Boilers : Function, classification, terms used, study of Lancashire, Locomotive, Cochran & Babcock & Wilcox boilers, Equivalent evaporation, Boiler efficiency, Boiler power.
- (5) Boiler Mountings & Accessories : Boiler mountings, safety valves, water level indicators, pressure gauge, steam stop valve, Feed check valve, Blow off cock, manhole Fusible plug. Economiser. Air preheater, Superheaters, Feed pumps, Injectors.
- (6) Draught Definition, classification, Function of chimney Natural draught, height of chimney, condition for maximum discharge through a chimney, efficiency, Draught losses, Artificial draught, Advantages of Mech. Draught. Forced and balanced draught, draught gauges.
- (7) Steam Engines : Classification, parts of a simple steam engine and its function, working of a steam engine, Hypothetical indicator diagram, m. e. P., diagram factor, Theoretical power and its measurement.
- (8) Introduction of heat and mass transfer : Basic equations for conduction convection, radiation, their applications to simple problems.
- (9) Fuels : Classification, calorific values and its determination, experimental determination, combustion of a fuel, minimum quantity of air required, excess air, determination of the flue gas analysis by weight and volume, complete combustion of fuel air/fuel ratio.
- (10) I.E. Engines : Classification, construction, four and two stroke engines, its comparison, Carnot cycle, diesel & dual cycle, their efficiency and m.e.p., & power, petrol engine, diesel engine, valve timing diagram, governing of I.C. engine, methods of starting of T.C. Engines.

(B) PRACTICAL/ORAL :

The practical work shall consist of laboratory study work/experimental work on the topics mentioned under theory.

(C) TERM WORK :

The term work shall consist of laboratory study work, experimental work done under practical and shall be written and submitted in the form of report/journal.

(D) REFERENCE BOOK :

- |   |                          |
|---|--------------------------|
| 1. Heat Engines                             | by Pandya & Shah.        |
| 2. Heat Engineering                         | by Ballaney.             |
| 3. Thermal Engineering                      | by Sarao.                |
| 4. Heat Engines                             | by Patel & Karamchandani |
| 5. Engineering Thermodynamics               | by Gupta & Prakash.      |
| 6. Thermodynamics & Heat Power Engg. Vol-I. | by Mathur & Mehta        |

BHAVNAGAR UNIVERSITY  
B.E. FIRST YEAR (C/M/IC/EC)  
109 MODERN WORKSHOP PRACTICE

Teaching scheme marks Hours per week		Exam scheme				Total
Theory	Practical	Teory marks	Paper hrs	Pract/Oral Marks	Term work mark	
	02				100	100

(A) Theory

(A) PRACTICALS:

- (a) **Carpentry**: The modern workshop practice shall consists of study of timber classification , seasoning and preserving , defects in timber , study of ply wood , hardwood , maisonette , glues, varnishes and polishes.
- (b) **Fitting**: Study of nature of work done in a fitting shop , fitting tools and their uses , simple exercises involving cutting , fitting , drilling and taping operations.
- (c) **Soldering and Brazing** : Study of Soldering and brazing practices & different equipment's , tools , materials used therein.
- (d) **Plumbing** : Study of plumbing practices & tools used.
- (e) **Welding and sheetmetal shop** : Study of nature of workdone in welding and sheet metal shop, tools and equipment's used in welding and sheetmetal shop, study of manual metal are and gas welding, joint preparation. Simple exercises in are welding and gas welding, simple exercise involving development of surfaces of sheet metal working processes.
- (f) **Foundry** : Study of processes in a foundry, study of hand tools and equipment's used in a foundry, pattern types, materials and allowances, moulding methods, casting practices, casting defects, study of mould preparation.
- (g) **Machine shop** : Study of nature of work done in a machine shop, study of lathes, drilling machine, milling machine, shaper and planers.

Note : Study shall contain above methioned topics in details and it should be submitted as part of termwork.

(2) Jobs as mentioned below shall be done as practical work for hand on skill development.

- |                          |        |
|--------------------------|--------|
| I. Carpentry             | 1 Job. |
| II. Fitting              | 1 Job. |
| III. Soldering & Brazing | 1 Job. |
| IV. Welding              | 1 Job. |
| V. Sheet metal shop      | 1 Job. |
| VI. Machine shop         | 1 Job. |

The above term work shall be prepared strictly within the four walls of college workshop.

(C) Term Work : The term work shall consist of practical work done under para (1) and (2) both

(D) Books :

- |                                     |                                  |
|-------------------------------------|----------------------------------|
| 1. Workshop Technology Vol-I,II&III | by W.A.J.Chapman E.L.B.S.London. |
| 2. Senior workshop calculations     | by W.A.J.Chapman;E.L.B.S. London |
| 3. Workshop Technology Vol-I &II    | by Hayara Chandhary.             |