SHRI VILEPARLE KELVANI MANDAL`S
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
FULL TIME
DISCIPLINE : MECHANICAL ENGINEERING.   w.e.f. batch admitted june 2008 (progressivly)

SEMESTER : FIRST.   **Effective from the academic term:**
JULY-NOV.2008

TECHNICAL & EXAMINATION SCHEMES

Sr no	SUBJECT	SUBJECT CODE	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION &MARKS			SCHEME OF EXAMINATION						Group Compulsory/ Optional	Scheme L/Pr/Cr.
			L	P	D	T	Cr	NP	HRS	Mks	SSL	Theory paper	T/W	Pract.	Oral	TOTAL		
1	Communication skill	SS-23	3	-	-	-	3	1	3	100	20	80	-	-	-	100	B*	303
2	Mathematics 1	MA-15	3	-	-	1	4	1	3	100	20	80	-	-	-	100	B*	404
3	Chemistry	SC-27	4	4	-	-	8	1	3	100	20	80	25	50	-	175	B*	448
4	Applied Mechanics	AM-16	3	2	-	-	5	1	3	100	20	80	25	-	-	125	C*	325
5	Engineering Drawing 1	ME-16	2	-	6	-	8	1	3	100	20	80	50	-	50	200	C*	268
6	Workshop Technology	ME-26	-	5	-	-	5	-	-	-	-	-	50	-	50	100	C*	055
	TOTAL		15	11	06	01	33	-	-	-	100	400	150	50	100	800		
			Total periods (33)								Total marks = (800)							

     * Compulsory   L – Lecture period   SSL - Sessional
     # Internal only   P – Practical period   T/W – Term work
     ** External only   D – Drg. Practical period   Pract. - Practical
(1) Unless stated, T.W. will be assessed by considering   T – Tutorial period   Cr. - Credits
    the external examiner based on the continuous assessment by   NP – No. of papers
    the concerned internal faculty   MKS – Marks
(2) Unless stated, practical/oral(P/O),oral will be jointly
    by the internal & external examiners.
(3) Each lecture/practical/drawing/tutorial is one hour duration.

(1) SUBJECT DETAILS :

Course : Mechanical Engg (ME)	**Semester : I**
1.1 Communication Skill (SS-23)	**Duration : 16 Weeks**
Group : Basic (B*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEME :

Scheme of Instructions and Periods per Week					No. of papers, duration and Marks			Scheme of Examination						Scheme L/Pr/Cr
L	P D	T	Cr	NP	Hrs	Mks	SSL	Th paper	T/W	Prac	Oral	Total	
3	- -	-	3	1	3	100	20	80	-	-	-	100	303

(3) RATIONALE :

In take level of the students is S.S.C or is Equivalent. These students have studies English for minimum of 6 years. Expected level of heir Active Vocabulary is 2500 words from the Nagpur list of High Frequency words. However, in practice it was found that the students, practically from the vernacular medium have only 1500 words at their command. They need to have course in English subject to offset this situation. Therefore, the first semester engineering course students need to study English.

Further, in this age of information, Communication Skill is essential to everyone. This is equally true in the case of Engineers. Engineers having sound knowledge of the technical subjects should be able to communicate the same to his superiors, peers and subordinates in their routine work environment.

Having a sound Communication Skill will enable the engineering students to learn and interprets the subject effectively. This saves time and money and enhances the effectiveness of the engineer's performance.

(4) OBJECTIVES :

(i) The student will increase his English vocabulary to a minimum of 2500 words (Nagpur List) through the prescribed text and grammar exercises by various techniques such as synonyms, Antonyms, One word substitutes, Prefixes & Suffixes and Comprehension of new words, Idioms and Prepositional Phrases. Students will be able to use principles to solve problems in Mathematics at Higher Semester level.

(ii) Students will understand the various uses of grammar items such as Voice in English sentences, Degrees of Comparison, Tenses, Direct and Indirexct Speech in formation of various kind of sentences.

(iii) Students will master the important structures of English sentences to enhance their communication skill so that they can interact (orally and in writing) with people at different levels and in different situations with confidence.

(iv) This subject will enable the engineering students to understand the following:
        Effective Oral Communication
        Better Written Communication
        How to Improve Human Relations
        How to Improve Barriers to Communication
        The need for Enhancing Personality

(5) DETAILED CONTENTS :

Chapter	Content **SECTION – I**	Marks	Hours
01	**Five lessons as five units from the prescribed English Book as described in the section 'Reference' Below**	20	08
02	**Parts of Speech** 2.1 Nouns, Pronouns & Adjectives 2.2 Verbs & Adverbs 2.3 Prepositons, Conjunctions, etc.	06	01
03	**Sentences** 3.1 Synthesis of Sentences 3.2 Tenses 3.3 Degree of Comparison 3.4 Transformation of four kinds of sentences- Assertive, Imperative, Interrogative and Exclamatory	10	02
04	**Essay/Paragraph/Report Writing** 4.1 Long Essay 4.2 Short Paragraph 4.3 Report Writing-Visits, Accidents, Trouble, Maintenance, Memo	16	05
05	**Letters** 5.1 Formal & Informal 5.2 Letters for Inquiry, Order, Complaint, Application for Job	16	05

		SECTION – II		
06	**Dialogue Writing**		06	01
07	**Technical Description** 7.1 Theory and Practice (Language)		08	02
08	**Business Correspondence** 8.1 Importance of Business Correspondence Format of a Business Letter 8.2 Types of Layout 8.3 Cardinal Qualities of Business Letter		24	08
09	**Notices and Instructions** 9.1 Theory and Layout 9.2 Types of Notices 9.3 Tender Notice (Theory and Specimen)		24	06
10	**Background of Industry** 10.1 Definition of Terms-Industry, Industrialisation, Etc. 10.2 Factors of Production, Infrastructure 10.3 Industrial Estates Small Scale Industries, Trade Unions.		10	02
		Total	**(82)**	**(24)**

06 IMPLEMENTATION STRATEGY (PLANNING) :

(i) Five units from the prescribed text book (English fir Technical Students-T.T.T.I. Chandigarh), Lessons in the prescribed text book are used as guidelines for explaining the techniques os essay/dialogue writing.

(ii) Teaching Plan

(iii) Grammar items are covered along with the units of lessons

(iv) Home assignments and class room participation

(7) REFERENCE BOOKS :

Sr. No.	Author	Title	Year of Publication	Publishers & Address
1.	Dr. (Mrs.) Urmila Rai Dr. S.M. Rai	Business Communication	2002	Himalaya Publishing House
2.	Edited Lessons	Communication Skill for	1998	Somaiya Publications

		Technical Students(National Projrct on Communication Skill, Chandigarh)		Pvt. Ltd., Mumbai & New Delhi
3.	Wren & Martin	Grammar & Compositon	2002	Chand Publications, New Delhi
4.	J.C.Nesfield	English Grammar, Compositon & Usage	1994	Mc.Milan, Madras
5.	Krishna Mohan Meera Banerji	Developing Communication Skill	2004	McMilan India Ltd., New Delhi

1. SUBJECT DETAILS :

Course: mechanical	**Semester: I**
Duration: 16 weeks	
Subject: 1.2 Mathematics-I	**Code : MA-15**

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2. TEACHING AND EXAMINATION SCHEME :

Scheme of instruction and periods per week					No. of papers, duration and Marks			Scheme of Examination						Scheme L/Pr/Cr
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
3	-	-	1	4	1	3	100	20	80	-	-	-	100	404

3. RATIONALE :

Algebra, Trigonometry and Coordinate Geometry are introduced as prerequisite for the topics to be studied later on to solve the engineering problems.

4. OBJECTIVES:

1. The students will be able to use the Mathematical Methods to solve the engineering
    problems.
2. Students will be able to use principles to solve problem in Mathematics at Higher Semester level

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
	Section-I		
01	**1.0 Trigonometry**		
	1.1 Trigonometric ratio of any angle, Definition of Radian, length of arc of sector $s = r\theta$, area of Sector $A = \dfrac{1}{2}r^2\theta$	08	02
	1.2 Trigonometric ratios of allied, compound angles and multiple angles	24	06
	1.3 Inverse trigonometric functions	12	04
	1.4 Properties and solution of triangle	12	04
	1.5 Solution of Trigonometric equation by graph	06	02
(02)	**Matrices**		

2.1	Definition of a matrix of order mxn.type of matrices	02	01
2.2	Addition and substraction of two matrices	04	01
2.3	Multiplication of a matrix by a scalar, multiplication of two matrices.	04	01
2.4	Singular and Non-singular matrics. Transpose of a matrix. Adjoint of matrix, Inverse of a matrix A by findings Adj. A solution of simultaneous equation by using a matrix	10	03
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		(82)	**(24)**

SECTION-II

(03) Algebra

3.1	Determinant	18	05
3.2	Partial fractions	16	04
3.3	Binomial Theorem	24	08
3.4	Progression (A.P./G.P.)	16	04
3.5	Permutations and Combinations	08	03

	Total	**(82)**	**(24)**

(6) IMPLEMENTATION STRATEGY (PLANNING)
Conducting lectures as per the teaching plan and conducting tutorials.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Year of Publication	Publishers & Address
(i)	S.P.Deshpande	Mathematics for Polytechnic Students-I & II	1998	Pune Vidyarthi Graha Prakashan Pune-30
(ii)	G.V. Kumbhojkar	Engineering Mathematics – I & II	1999	Jamnadas & Co.
(iii)	Patel/Rawal & others	Applied Mathematics-I	2002	Nirali Prakashan, Mumbai

1. SUBJECT DETAILS:

Course : mechanical	Semester : I
Subject : Chemistry	Duration :16 Weeks Code : SC – 27
Group : Basic	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction and periods per week					No. of papers, duration and marks			Scheme of examination						Scheme L/Pr/Cr
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
4	4	-	-	8	1	3	100	20	80	25	50	-	175	4 4 8

3. RATIONALE :

This subject is classified under the category of Basic Sciences. It intends to develop the understanding of fundamental principles of chemistry and also impart knowledge of various engineering material. This will form the base for the better understanding of the other core technology and technological subjects of different branches.

4. OBJECTIVES :

After studying the subject the student will be able to
1. Understand basic principles of chemistry.
2. Apply the principles to other subject.
3. Identify different engineering materials.
4. Compare the properties of different engineering materials and select engineering materials for various purposes.
5. Apply his knowledge on day to day basis.

5. DETAILED CONTENTS :
SECTION-I

Chapter Content   Marks   Hours

1.   **1.0 Atomic Structure:**   16   07
       1.1 Bohr's Theory of an atom
       1.2 Quantum numbers
       1.3 Orbits and orbitals, shape of s and p orbitals
       1.4 Pauli's exclusion principle
       1.5 Hund's rule
       1.6 Aufbau principle
       1.7 Electronic configuration of first twenty elements
       1.8 Study of inert gases
       1.9 Nuclear stability mass defect and binding energy
       1.10 Bonding electrovalency and covalency.

       Applications

       Civil engineering
       To understand the behavior of any material
       Mechanical engineering

Material sciences , behavior of material for various applications
Electrical engineering
Fundamental of electricity like conductivity, resistivity, selection of materials
Electronics
To understand semiconductors, diodes, transistors
Plastic engineering
Polymerization , bonding
Chemical engineering
Reaction of different types, bonding ,unit operations, chemical process technology

Practice :
i) Volumetric analysis
ii) Qualitative analysis

2.	**2.0 Electrochemistry :**	10	05

2.1 Atom, ion
2.2 Arrhenius.theory, degree of ionization
2.3 Mechanism of electrolysis
2.4 Numerical problems based on its applications industrial 2.5 Applications of electrolysis

Applications

Civil engineering
Corrosion control
Mechanical engineering
Electroplating of various materials, in foundry for making patterns and moulds ,material science
Electrical engineering
Electrochemical reactions , batteries, electrochemical cells
Electronics
Manufacture of PCB
Plastic engineering
Electroplating of different plastic materials
Chemical engineering
Electroplating, different electrolysis process, unit operations, chemical process technology, distillation and filtration

3.	**3.0 pH** –	04	02

3.1 Concept of pH
3.2 pH scale applications of pH in industry
3.3 Examples based on hydrogen ion and hydroxyl ion

concentration

Applications

Civil engineering
Concreting and quality of water
Mechanical engineering
Selection of water fir cooling towers, other air-conditioning and refrigeration purposes, boilers , lube oils
Electrical engineering
Transformer oils and other instruments
Electronics
Manufacture of PCB
Plastic engineering
Reactions conditions, ABS plastic and alloys
Chemical engineering
Reaction conditions instrumentation, plant utility, chemical reaction engineering and pollution

4. **4.0 Metallurgy :**   16   07
    4.1 Types of metals & properties
    4.2 General metallurgical processes
    4.3 Metallurgy of iron- extraction of iron by blast furnace 4.4
    Classification of steel – Based on its carbon content and
        its applications. Properties of cast iron, wrought iron
        and steel. Effects of elements on properties of steel
    4.5 Heat treatment of steel – Hardening tempering,
        annealing and normalizing
     4.6 Metallurgy of aluminum by Hall's process.

Applications

Civil engineering
Engineering material
Mechanical engineering
Manufacturing of engineering tools and machine parts
Electrical engineering
Electrical engineering materials
Electronics
PCB and parts of machines
Plastic engineering
Machines and reinforced plastics
Chemical engineering
Metals for construction of plant utilities

5. **5.0 Alloys :** 09 02
5.1 Definition and purposes of alloying
5.2 Methods of preparation of alloys
5.3 Properties, composition and application of certain non ferrous alloys.
(i) Duralumin (ii) Magnalium (iii) Monel metal
(iv) Alnico (v) Babbitt metal (vi) Gun metal
(vii) Brass (viii) Bronze

Applications

Civil engineering
Engineering material
Mechanical engineering
Material sciences
Electrical engineering
Soldering and welding
Electronics
Thermocouple and soldering
Plastic engineering
Alloys and moulds
Chemical engineering
Petrochemicals , material of construction, chemical process technology

6. **6.0 Corrosion :** 18 07
6.1 Definition and types of Corrosion
6.2 Mechanism of corrosion
6.3 Factors affecting corrosion
6.4 Methods of prevention of corrosion.
    (i) Applying protective coatings on the surface of metal by hot dipping – galvanizing and tinning.
    (ii) Metal cladding.
    (iii) Electroplating.
    (iv) Spraying.
    (v) Sherardizing.

Applications

Civil engineering
Building repair and maintenance, concreting
Mechanical engineering
Selection of materials and prevention against corrosion
Electrical engineering

Dam conditions, maintenance of appliances, transmission of cables

Electronics
Machine parts and machine frames

Plastic engineering
Fiber reinforced plastics, bridges

Chemical engineering
Chemical process technology, pollution, material of construction

7.	**7.0 Protective Coatings :**		09	02

7.1 Paints
7.2 Characteristics of good paint
7.3 Constituents of paints and their applications
7.4 Varnishes
7.5 Types & characteristics of varnishes
7.6 Applications

Applications

Civil engineering
Engineering materials

Mechanical engineering
Material sciences

Electrical engineering
Electrical instruments & materials

Electronics
PCB making

Plastic engineering
Galvanizing , electroplating & plastics paints

Chemical engineering
Chemical process technology, pollution, material of construction

SECTION – II

8.	**8.0 Water :**		22	09

8.1 Impurities in natural water, physical and chemical characteristics of drinking water.
8.2 Hard water - Expression and estimation of hardness of water
8.3 Examples on the removal of hardness of water
8.4 Disadvantages of hard water in domestic industrial applications. Boiler feed water – Disadvantages due to hard water in the boiler

8.5   Methods of softening hard water.
   (i)   Deionisation process.
   (ii)   Calgon process.
   (iii)   Soda ash process.
   (iv)   Permutit – Zeslite process disadvantages of hard water in domestic and industrial applications.
8.6   Sterilization of water – chlorination + ozonisation
8.7   Sewage – disadvantages & treatment

Applications
Civil Engineering
Concreting
Mechanical Engineering
Hydraulics, Boilers and Engines
Electrical Engineering
Maintenance of machines, Batteries and Inverters
Electronics
Water Base Indicators
Plastic Engineering
Estimation and Manufacture of Resins
Chemical Engineering
Plant Utility, Heat Transfer Operations, Pollution and Pollution Control

Practice :
i) Determination of hardness of water
ii) Determination of chloride content of water

9.   **9.0 Fuels :**   18   08
   9.1 Definition and classification of fuels
   9.2 Calorific value of fuel units and definition
   9.3 Coal types and analysis of coal.
           i)   proximate ii) Ultimate analysis
   9.4 Characteristics of a good fuel
   9.5 Crude petroleum – catalytic cruding fractional distillation
      of crude petroleum.
      Knocking of petrol in internal combustion engine and
      octane number.
   9.6 Gaseous fuel – Calorific value, composition and
      applications of   i) water gas   ii) LPG   iii) Coal gas
       iv) Producer gas v) Natural gas

Applications
Civil Engineering
Manufacturing of bricks and Preparation of Concrete mixtures
Mechanical Engineering

Thermodynamics, thermal engines, Power Engines
Electrical Engineering
Power generating stations
Electronics
Preparation of spare parts of machines
Plastic Engineering
Soldering and Welding
Chemical Engineering
Plant Utility, Petrochemicals

10. **10.0 Lubricants :**   18   08
    10.1 Definition and types of lubricants
    10.2 Types of lubrication fluid film lubrication
         Boundary lubrication, extreme pressure lubrication
    10.3 Properties of lubricants.
          i) Degree of acidity ii) Saponification number iii)
          Viscosity iv) Viscosity index v) Flash and fire point
          vi) Pour point + Cloud point.
          Working of Penskey Martin's apparatus to determine
          flash and fire point. Working of redwood viscometer to
          determine viscosity.

    Applications
    Civil Engineering
    Selection of lubrication for civil work and small machines
    Mechanical Engineering
    I.C. Engines, other types of Engines, Machines
    Electrical Engineering
    Maintenance and working of machines
    Electronics
    Maintenance of machines and its parts
    Plastic Engineering
    Silicon release and mould release agents
    Chemical Engineering
    Chemical Process Technology, Plant Utility, Petrochemicals
    and unit operations

    10.4   Functions and Engineering applications of lubricants

    Practice :
    Demonstration of following experiments :
        i)   Abel flashmeter
        ii)   Redwood viscometer
        iii)   Penskey Marteins apparatus

11. **11.0 Rubber and Plastics :**   10   04

11.1 Plastics – Definition – types of plastics
11.2 Properties of plastics
11.3 engineering application of plastics
11.4 Rubber – natural and synthetic rubber properties –
    elasticity, abrasion resistance Tack industrial
11.5 Applications of rubber.

Applications
Civil Engineering
Preparation of Plumbing machines parts, taps, washers etc.
Mechanical Engineering
Manufacturing Processes
Electrical Engineering
Preparations of Electric wires and cables
Electronics
Preparations of PCB and wires of machines.
Plastic Engineering
Plastic Technology, Packaging, Co-polymer of Plastics and Additives.
Chemical Engineering
Chemical Process Technology, Petrochemicals

12.   **12.0 Pollution and its control :**   14   03
      12.1 Causes of pollution – air pollution types of air pollutants.
          Gases – sulphur dioxide, sulphur trioxide carbon
           monoxide, nitrogen dioxide, carbon dioxide, control of air
            pollution.
      12.2 Water pollution :
          Sources of water pollution, methods of preventing water
           pollution.
      12.3 Radioactive pollution
      12.4 Noise pollution
      12.5 Disadvantages of pollution
      12.6 Control of Pollution

      Applications
      Civil Engineering
      Drainage and Water Supply, Sewage Treatment
      Mechanical Engineering
      Thermodynamics and I.C. Engines
      Electrical Engineering
      Recycling of Electrical Goods
      Electronics
      Recycling of Electronic Goods
      Plastic Engineering

Recycling of Plastics, Pollution control, Chlorofluoro Carbons
and Decrease of carbons in Atmosphere
Chemical Engineering
Pollution Control and Waste Disposal, Plant Utility
And Petrochemicals.

Total Number of Marks=82; Theory Hours= 32; Practical Hours= 64

6. IMPLEMENTATION STRATEGY (PLANNING) :
   1. **Theory topics and practice experiments should be done simultaneously. This will help the students to understand the topics.**
   2. Question papers for the periodical test should cover the topics which have been taught. To test the understanding.

7. REFERENCE :

Sr.No.	Author	Title	Publishers & Address
1.	Jain and Jain	Chemistry of Engineering Materials	Dhanpat Rai Publishing Co. New Delhi
2.	Narkhede & Thatte	Engineering Chemistry	-
3.	Mahadeokar & Dr. U.P. Kodgire	Chemistry for Engineering students	Everest Publishing House, Pune
4.	B.S. Godbole	Applied Chemistry	Satyaprakashan, New Delhi

1SUBJECT DETAILS :

Course : Mechanical Engineering	Semester : 1
	Duration : 16 Weeks
Subject : Applied Mechanics	
	Code : AM-16
Group : C* Core	Compulsory

1. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination scheme and Maximum marks							
Theory Hrs per Week	Practical Hrs Per Week		Paper			Theory Marks Reduced To	Sessional Marks Reduced To	Term Work	Practicals /Orals	Total
			Hrs	N/P	Mks					
3	2	5	3	1	100	80	20	25		125

2. RATIONALE :

Applied Mechanics is the study of forces and their effect on the moving or stationery bodies. Also the concept of mechanics will be useful to understand the further subjects' materials and structures, analysis of structures and design.

3. OBJECTIVES:

Students will be able to:
(1) Understand the force / force system air their effect on a body.
(2) Apply the concept of mechanics to the real situation.
(3) Build the pre-requisite of higher semester subject related to designs.

4. DETAILED CONTENTS:

Section I

Chapter	Topics	Period	Marks
1	**Introduction to Mechanics**	02	06

    1.1   Mechanics definitions, Statics & Dynamics,

            Kinematics, Kinetics

    1.2   Fundamentals units of measurements (FPS,MKS,SI),

            Derived Units, Conversion of Units, Scalars & Vectors
            with examples

    1.3   Definition of particle, body and rigid body, mass &

            Weight.

2	**Resolution of Forces**	04	14

    2.1 Concept of force, definition, units, graphical
        Representation of force

    2.2 Concept of System of forces, non-coplanar, coplanar,
        Concurrent, Parallel, non-concurrent& non-parallel
        Forces.

    2.3 Resolution of a force into two components along any
         Directions.

    2.4 Resolution of a force into two components at right
        Angles to each other by analytical method.

(Applications levers, chain & links, connected bodies like trains etc.)

3	**Composition of Forces**	04	14

    3.1 Composition, Resultant of force
    3.2 Law of Parallelogram of forces,
    3.3 Moment of force, couples lever arm,
    3.4 Varignon's theorem
    3.5 Resultant of Coplanar concurrent, parallel,
       And non-concurrent, non parallel forces

(Applications in shafts, crane, joints of trusses, etc.)

4	**Equilibrium**	06	20

    4.1 Definition of equilibrant, relation between Resultant and
       Equilibrant, Conditions of Equilibrium Types of
       Equilibrium Stable, Unstable and Neutral equilibrium

4.2 Equilibrium of coplanar concurrent forces, Lami's theorem

4.3 Equilibrium of coplanar parallel forces & coplanar
  Non-concurrent Forces.

4.4 Analytical conditions of equilibrium for coplanar concurrent
  nt & non-concurrent forces.

 (Applications of crane stability, link mechanism, inclined
Plane, wedges, anchor blocks for water pipelines, balance,
lever, pulley and pulley blocks)

PRACTICALS :

(a) Simple roof truss

(b) Bell Crank Lever

(c) Levers of different types

(d) Extension of springs

(e) Compression of Springs

5	**Beam Reactions**	4	14

4.1   Types of supports(Constraints, simple, Roller, hinged

  And fixed.

4.2   Types of Beams, simply supported, hinged and roller

  Supported, cantilever, overhanging Beams.

5.3   Types of loads, point(concentrated) load, uniformly
  Distributed load(U. D. L), Uniformly Varying Load
  (U.V.L)*.

5.4   Problems on above combination of loads.

(Applications like bearings of shafts, guy, rocker and roller
 support of railway bridges)

*No problems on U. V. L

6.   **Centre of Gravity**   04   14
   6.1 Centre of Gravity of Solids, Control of plain laminar,
        Definition.
   6.2   Concept of parallel forces applied to find c.g and centroid
         , centroidal/c.g. axes of a body/lamina, c.g of basic
         Regular shapes.
   6.3   Applications like floating bodies, damns and retaining
         wall sections beams columns sections(rolled steel)
         Simple and built up sections.
   Practical :
      (a)Centroid of plane laminas.

Section II

7. **Friction**   04   14
   7.1 Definition, types of friction, statics friction, dynamic
        Friction.
   7.2 fundamental laws of statics friction, coefficient of
        Friction, cone of friction, angle of friction, angle of
        Repose, rolling friction.
   7.3 study of inclined plane, wedge and block system,
        Ladder friction.
   (Application of in cluches, brakes, dynamometers, journals,
    Belt and rope drives, stators and rotar in electrics motors,
    Bearings)
   Practical :
   (a)Friction between wooden surfaces.
   (b) Friction between wooden surfaces and glass, metal
        Surfaces

8.   **Rectilinear Motion**   04   14

        8.1 Definition of kinematics, rectilinear motion, displacement
            Speed, velocity acceleration.
        8.2 Equation of rectilinear motion with uniform acceleration.
        8.3 Velocity – time diagrams, motion under gravity.
        (Application to velocity of connecting rod, piston crank
        etc., v- t diagram for electric traction)

9.   **Force, mass and acceleration.**   3   10

        9.1 Newton's laws of motion, relation between force, mass
            And acceleration.
        9.2 Applications like motion of train on slopes etc.
        9.3 Concept of Momentum and Impulse, conservation of momentum.
        (Application like centrifugal devices, motion of train on
         Slopes etc. power hammers, pile driving, fly presses etc.)

10.   **Work, energy and power.**   04   1 14

        10.1 Work done by a body, definition, application.
        10.2 Energy definition and types, potential and kinetic
            energy, conservation of energy and applications like
            Energy stored in Fly wheel, water reservoirs etc.
        10.3 Power definition, application to rated power
            Machine (motors) and efficiency calculations.
        (Application like energy stored in a flywheel, water reservoir, power
        requirements of machines, efficiency calculations in machines)

11.   **Simple lifting machines (Application topic)**   4   14

        11.1 Definition : Mechanical advantage, velocity ratio,
            efficiency, relation between them, friction in machines
            In terms of load and effort.
        11.2 Law of machines, maximum MA, Maximum efficiency,

Condition of reversibility of machine.

11.3 Study of machines—simple and differential axle and Wheel.

11.4 Weston differential pulley block, simple screw jack, worm and worm wheel, single and double purchase Crab winch, system of pulleys.

12	**Graphics Statics.**	5	16

12.1 Space diagram, Bows Notation

12.2 Law of triangle of forces, polygon of forces, force/vector Diagram.

12.3 Resultant and Equilibrium of Concurrent forces.

12.4 Polar diagram, funicular polygon.

12.5 Resultant and Equilibrium of Non-Concurrent forces And non- parallel forces.

12.6 Applications in finding reactions of beams, stresses In simple frames.

Total 48 164

6. PRACTICALS:

Term Work consists of Journal containing minimum 10 experiments performed of the following in the Laboratory.

1) Extension / Compression of the spring.
2) Bell Crank Lever.
3) Two/Three Sheave Pulley Block.
4) Simple Screw Jack.
5) Single / Double Purchase Crab Winch.
6) Differential Axle & Wheel.
7) Centroid of Plane Lamina.
8) Sheer Leg & Derrick Crane.
9) Resultant of Non Concurrent Non Parallel Forces.
10) Friction.
11) Jib Crane.
12) Graphic Statics.
13) Moment of Inertia of Flywheel.

7. Reference Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	Dhade & Jamdar	Applied Mechanics	2nd	2002	Central Techno Publishers, Nagpur
2.	R. S. Khurmi	Applied Mechanics	19th	2001	S. Chand & Company Ram Nagar, New Delhi- 110 055
3.	A. K. Tayal	Engineering Mechanics Statics & Dynamics	9th	1998	Umesh Publications
4.	Sunil M. Deo	Applied Mechanics Vol. I & II	7th	2004	Nirali / Pragati Publications Mumbai
5.	M. D. Dayal	Applied Mechanics	1st	2000	Nandu Publishers Chembur, Mumbai-71.

1. SUBJECT DETAILS:

Course: Mechanical Engineering (ME)	**Semester : I** **Duration : 16 Weeks**
Subject: Engineering Drawing – I	**Code : ME-16**
Group : Core (C*)	**Compulsory**

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Week	Practical Hrs per Week		Paper			TH	Sessional	T/W	Oral	Total
			Hrs	NP	Mks					
02	06	08	3	01	100	80	20	50	50	200

3. RATIONALE:

Engineering drawing is a language of engineers. It is classified as engineering science subject. It describes scientific facts, principles and technique of drawing in order to visualize and express the ideas and to convey the instructions through drawings without ambiguity. In engineering drawing – I, student will study concept of orthographic projections, isometric projection, isometric view, ideas of two dimensional and three dimensional objects, oblique, projections, curves etc.

4. OBJECTIVES:

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
	SECTION-I		
01	**1.0 Introduction :**		02
	1.1 Importance of Engineering Drawing for the study of technical courses		
	1.2 Drawing instruments, types of lines and dimensioning (lettering and numbering for term work or assignment)		03
	Practice :		09
	1. A2 size sheet to be drawn containing four problems on letter lines and dimensioning techniques.		
	2. Home Assignments: One sheet containing four problems		

| 02 | **2.0 Principle, Planes and Quadrants:** | - | 02 |

2.0 Principle, Planes and Quadrants: — - — 02
2.1 Concept of principle planes and quadrants
2.2 I and III angle method of projections

3.0 Orthographic Views : — - — 02
3.1 Projections of various objects having flat and curved surfaces
   using 1st and 3rd angle projection method.
Practice: — - — 12
1.One sheet on orthographic projection for objects with linear
   features

4.0 Conversion of Pictorial View : — 20 — 05
4.1 Conversion of pictorial views in to non-sectional
   orthographic views. The objects may have slots, holes
   cavities etc.
Practice: — - — 12
1. One sheet with non sectional orthographic views for the
   objects with curvilinear features.
2. Home Assignments: One sheet containing four problems

5.0 Oblique Projections : — 30 — 04
5.1 Oblique projections of curvilinear feature on non oblique plane
   only.
Practice: — - — 12
1.One sheet having four problems of oblique projection for
   the curvilinear features on non oblique plane.
2. Home Assignments: One sheet containing four problems

6.0 Engineering curves : — 30 — 04
6.1 Cycloidal curves: Cycloid, epicycloids, hypocycloid
   (Simple cases)
6.2 Involute of circle and polygon (simple cases)
6.3 Helix on cylinder (not on cone)
Practice: — - — 12
1. One sheet with four Problems containing cycloid, epicycloids,
   hypocycloid , Involute and Helix.
2. Home Assignments: One sheet containing four problems

SECTION-II

7.0 Conversion of Pictorial View in Sectional Orthographic: — 20 — 04
7.1 Conversion of pictorial views with cutting plane into
   sectional orthographic projection (full section only)
Practice:
1. Four problems on sheet(full section plane)

	2. Home Assignments: One sheet containing four problems		12

08	**8.0 Isometric Views and Projections:**	40	05

8.1 Isometric Views and Projections of linear and curvilinear
   features.

Practice: 12
1. One sheet with four problems on Isometric view having
   linear and curvilinear features.
2. On sheet with four problems on Isometric projection having
   linear and curvilinear features.
3. Home Assignments: One sheet containing four problems

09	**9.0 Engineering Curves:**	20	04

9.1 Ellipse: Oblong, arcs of circle and concentric circle method.
9.2 Parabola: Eccentricity and rectangular methods.
9.3 Hyperbola : Eccentricity and rectangular methods.
Practice:
1. Four problems on Ellipse Parabola and Hyperbola   12
2. Home Assignments: One sheet containing four problems

6. IMPLEMENTATION STRATEGY (PLANNING) :

 In depth study and understanding of the subject will be implemented by adoption of
 the following strategy :
  1. Theory Teaching Plan
  2. Term Work Plan for practical giving problems to draw in the class.
  3. Home assignment to practice at home
  4. Conduct of three periodical test
  5. Use of OHP models and charts during theory class and practical periods

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	N.D.Bhatt and Panchal	Geometrical and Machine drawing	14th	2000	Rupalee Pub.Opp. Amul Dairy, Court Rd, Anand
2.	R.K. Dhawan	Engineering drawing	2nd	2001	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055
3.	R.K. Dhawan	Machine drawing	2nd	2001	S.Chand & Co. Ltd ,Ram Nagar New Delhi-110 055
4.	M.L. Dabhade	Engineering Graphics	4th	1995	Mrs.VA.Velhankar 1030, Model Colony,

					B-12,Akash Ganga Pune-411 016

Course: Mechanical   **Semester - I**
Sub : Workshop Technology   (ME-26)   **Duration – 16 weeks**
Group: Core(C)   **Compulsory**

2) Teaching and Examination Scheme

Scheme of Instructions &	No. of Papers, Duration &	Scheme of Examination	Scheme L/Pr/Cr

Periods / Week					Marks									
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Practical	Oral	Total	
-	5	-	-	5	-	-	-	-	-	50	-	50	100	055

3) Rationale

   Production is a value adding activity, where raw material is converted into finished goods, by using different resources like man, machine, materials, methods etc. Handling of different tools & equipments is a part of production system. So students should be aware of methods of handling of different tools and safe practices. This subject deals with identification of tools, its applications, precautions, handling procedures, etc.

Objectives
   1) The students will be able to understand workshop activities.
   2) They will be able to select right tools and right manufacturing processes for performing the job correctly.
   3) They will be able to use different fitting tools like files, hacksaws, hammers, try square, chisel (cross-cut chisel), centre punch etc and carpentry tools like cross-cut saw, jack plate, firemen chisel, rasp file, marking gauge, mallet, scriber etc.
   4) They will be able to read dimensions and able to do marking required for making the job.
   5) Practical
      5 periods per week (two times)

Sr No	Title	Hrs
1)	Dimension of carpentry tool & one carpentry joint	(25)
2)	One pattern	(25)
3)	Demonstration of fitting tools & one job of drilling and tapping	(15)
4)	One job of keyway Sawing/filing	(15)

Total – 80

Assignment: (1) Notebook containing the procedure and the diagram of above jobs.
              (2) Notebook containing write-up from Workshop practices TTTI Bhopal book
                     on above hand tools.

SHRI VILEPARLE KELVANI MANDAL`S

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

FULL TIME

DISCIPLINE: MECHANICAL ENGINEERING.   **w.e.f. batch admitted june 2008 (progressive)**

SEMESTER: SECOND   **Effective from the academic term: DEC-08/JAN- MAY 09**

TECHNICAL & EXAMINATION SCHEMES

Sr no	SUBJECT	SUBJECT CODE	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION &MARKS			SCHEME OF EXAMINATION						Group Compulsory/ Optional	Scheme L/Pr/Cr.
			L	P	D	T	Cr	NP	HRS	Mks	SSL	Theory paper	T/W	Pract.	Oral	TOTAL		
1	Development of Generic skills	DG-1	2	-	-	1	3	1	3	100	20	80	-	-	-	100	B*	303
2	Mathematics-II	MA-25	3	-	-	1	4	1	3	100	20	80	-	-	-	100	B*	404
3	Physics	SC-17	4	4	-	-	8	1	3	100	20	80	25	50	-	175	B*	448
4	Engineering Drawing -II	ME-36	2	-	6	-	8	1	4	100	20	80	50	-	50	200	C*	268
5	Fabrication Technology	ME-46	2	4	-	-	6	1	3	100	20	80	25	-	50	175	C*	246
6	Fundamental of Computer Networking & System	CA-54	2	4	-	-	6	-	-	-	20	-	50	50	-	120	C*	246
	TOTAL		15	12	06	02	35	-	-	-	120	400	150	100	100	870		
			Total periods (35)								Total marks = (870)							

1. Subject Details

Course: mechanical Engineering	Semester: II
Subject: Development of Generic Skills	Code :DG-1
Group: Basic (B*)	Compulsory

2.Teaching and Examination Scheme

Teaching Scheme			Examination Scheme							
Theory Hrs Per Week+T	Practical Hrs per Week	Credits	Hrs	NP	Mks	Th	Sess	T/W	Prac	Total
2+1	--	03	03	01	100	80	20	--	--	100

3. RATIONALE

The skills of Project Management have become important in all types of business and at all levels of work hierarchy. The purpose of development of Generic Skills is to develop the necessary skills, which will make students confident and competent in managing and executing engineering projects.

4. GENERAL OBJECTIVES

Over a period of time it has been observed that effectively of polytechnic students, their utility at work place can be enhanced by imparting generic skills right from entry in the polytechnic. The generic skills are life skills, they are lifelong skills, whose edge needs to be sharpened every moment.

The content is divided into 4 logical units:
1. Information
2. Communication Skills
3. Self Development
4. Task Management

It is designed by keeping self in focus with a clear objective of developing Generic Skills, to enhance the capabilities in the field of searching, assimilating and using information on job. Developing self and managing given tasks, finally to present himself as a technomenger.

It is an effort to develop student that enables him to be successful in finding a practical and reaction solution to any problem he comes across. It covers more or less all aspects of life skills. The development of subject is progressively ascending parallel to development of study in polytechnic.

5. Theory Contents:
1. Information Sources   (Periods:2hrs; Mks-10)
Introduction, Types of Information sources, Print Media, Documentary Sources, Non-Documentary Sources, Non-Print Media, Electronic Media, Conclusion.

2. Information Centre   (Periods:2hrs; Mks-10)
Introduction, Classification, Services, Conclusion.

3. Procedure for Information Search (Periods:4hrs; Mks-20)
Introduction, Need of Approach, Types of Approach, Steps for Information Search, Preparation of Biographic Card, Preparation of Index Card, Conclusion.

4. Learning (Periods: 4hrs; Mks-20)
Introduction, Concept of Learning, Basic Model of Learning, Principles of Learning, Conclusion.

5. Memory & Cognition   (Periods: 4hrs; Mks-20)
Introduction, Basic Concepts, Dual Store Model of Memory, Sensor register Characteristics, Attention,: Factors affecting attention, Figure Ground Rule, Working memory(WM); Characteristics of WM, Control Processes in WM, Long Term Memory in LTM: Characteristics of LTM, Control Processes in LTM, Organization of knowledge, Conclusion.

6. Meta Cognition & Study Strategies (Periods:4hrs; Mks-20)
Introduction, Meta Cognitive Knowledge, Self Regulated Learning, Effective Learning and Study Strategies(Covert): Selective attention, Maintain Rehearsal, Meaning learning Reflection, Internal Organization, Elaboration-----** Visualization, Effective learning strategies: Effective reading, Effective listening, Notes Taking, Conclusion.

7. Learning on Job (Periods: 4hrs; Mks-20)

Introduction, Definition, Identify General and Specific Skills, Workplace as a System, Types of System, Conclusion.

8. Learning Practical Skills (Periods: 2hrs; Mks-10)
Introduction, Process of Performing the job, Domains of Learning Job, Conclusion.

9. Testing of Acquired Skills (Periods:2hrs; Mks-10)
Introduction, Objectives, Process for Skill Analysis, Conclusion.

UNIT II COMMUNICATION SKILLS
10. Basis of Communication (Periods:2hrs; Mks-10)
Definition, Concept of Communication, Communication Cycle, Communication, Conclusion.

11. Techniques of Communication   (Periods: 2hrs; Mks-10)
Introduction, Oral Communication, Written Communication, Body Language, Conclusion.

S. No.	Main Topics	No of Contact Hrs	Marks	Weightage %	#M/E/D
1	**Information sources**	**2**	**10**	**7**	**E**
2	**Information Centre**	**2**	**10**	**7**	**E**
3	**Process For Information Search**	**4**	**20**	**11**	**M**
4	**Learning**	**4**	**20**	**11**	**M**
5	**Memory and Cognition**	**4**	**20**	**12**	**M**
6	**Meta Cognition & Study Strategies**	**4**	**20**	**12**	**D**
7	**Learning on Job**	**4**	**20**	**12**	**E**
8	**Learning Practical Skills**	**2**	**10**	**7**	**E**

9	Testing of Acquired Skills	2	10	7	D
10	Basic of Communication	2	10	7	E
11	Techniques of Communication	2	14	7	E
	Total	**32**	**164**	**100%**	**#**

Section I
1. Information Sources
2. Information Centre
3. Procedure for Information Search
4. Learning
5. Memory & Cognition

Section II
6. Meta Cognition and Study Stratifies
7. Learning on Job
8. Learning Practical Skills
9. Testing of Acquired Skills
10. Basic of Communication
11. Techniques of Communications

Total Theory Hours : 32 Hrs.

Reference Books:
Learning to learn by Kenneth A. Kiewra
Independent Study techniques by P.D. Kulkarni & B.B. Sharma

Additional References:
101 ways to better communication by Elizabeth Hieney.

1. SUBJECT DETAILS:

Course: CE/ME/EE/IE/PL/CH/DE	**Semester: II**
Subject: Mathematics – II (MA-25)	**Duration: 16 Weeks**
Group: Basic (B *)	**Compulsory**

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instruction and Periods per week					No of papers, duration and Marks			Scheme of Examination						Scheme L/Pr.Cr.
L	P	D	T	Cr	Np	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
3	-	-	1	4	1	3	100	20	80	-	-	-	100	404

3. RATIONALE:

1. Creating aptitude for Mathematics of Higher Semesters

2. Focusing attention of problem solving in liberal sense. This aspect should take care of

    (a) Intelligent combination of techniques.

    (b)   Mathematization or mathematical modeling of problems involved in various branches of knowledge.

3. Nurturing the higher order mental process of logical reasoning with rigor and precision.

4. OBJECTIVES:

There topics are introduced as

1. Prerequisite for many topics such as integral calculus, differential equations, Fourier series etc. to be studied later.
2. To introduce the applications commonly required.

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours

SECTION – I

01	**Co-ordinate Geometry**		
	1.1 Straight line: Slope of a line; X and Y intercepts of a line, point of Intersection of two straight lines, Acute angle between intersecting lines, Perpendicular distance of a point from the line, distance between two parallel lines.	12	40
	1.2 Circle: Centre-Radius form of an equation of a circle, General equation of a circle.	10	32
	1.3 Equation of a chord, tangent and normal to any circle.	02	10
		(24)	**(82)**

SECTION – II

02.	**Complex Number**		
	2.1 Definition of a complex number	02	06
	2.2 Elementary Operations	02	06

2.3 Polar form of a complex number, exponential form of a complex number		04	14
2.4 Argand diagram		02	06
3.	**Vector Algebra**		
	3.1 Sealars and Vectors	01	04
	3.2 Addition of Vectors.	01	04
	3.3 Dot product and cross product	01	04
	3.4 Scalar triple product	01	04
	3.5 Application: work done by a force, moment of a force about a point. Area of a parallelogram Area of a triangle .Volume of the parallepiped	04	08
04.	**Function**		
	4.1 Values of a function, type of functions	02	10
	4.2 Limits	04	16
		(24)	**(82)**

6. IMPLEMENTATION STRATEGY (PLANNING):

Conducting lectures as per the teaching plan and conduction tutorials.

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Year of Publication	Publishers & Address
1.	S. P. Deshpande	Mathematics for Polytechnic Students – I & II	1998	Pune Vidyarthi Graha Prakashan, Pune-30
2.	G. V. Kumbhojkar	Engineering Mathematics-I & II	1999	Jamnadas & Co
3.	Patel /Rawal & others	Applied Mathematics-I	2002	Nirali Prakashan, Mumbai

1.SUBJECT DETAILS :

Course: Mechanical Engineering	Semester : II Duration: 16 weeks
Subject : PHYSICS	Code : SC – 17
Group: Basic B*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks								Scheme
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	T/W	Pract	Total	
			Hrs.	Np	Mks						
04	04	08	03	01	100	80	20	25	50	175	448

3. RATIONALE: The student has to attain a remarkable knowledge level regarding properties of materials and laws of Physics. This foundation is required at the First Year Diploma Level of various branches of Engineering and is laid by incorporating a Theory and Practical approach with due stress on practical application aspect of the subject. This is emphasized by widening scope for laboratory work, selecting such text and specialized reference books.

4. OBJECTIVES: After acquiring knowledge of Laws of Physics and co-relation of its Principles, the Student will:

      (i)   Be able to understand Application (of theoretical principles) to work

      (ii)   Appreciate the importance of precision involved in measurements.

5. DETAILED CONTENTS:
A. THEORY CONTENTS :

                              Marks   Period

Unit: Introductory talk   -   02

To understand : Assertion of the statement which specifies relation between Engineering
                and Applied Physics.
                Importance of implementing precision measurements.

Chapter: (i) Subject introduction with review of past work – `Science`, Physics`, Matter
             and its structure, forms; `Physics` as science of measurement; unit; systems-
             CGS, MKS etc. multiplies and submultiples
         (ii) SI units and Standards- meter(m), kilogram (kg), second (s), degree Kelvin
             (K), candela (cd), ampere (A), mole

SECTION-I

	Marks	Hours

Unit- I General Physics   26   08

Chapter 1 : Elasticity
1.1 Elasticity, perfectly elastic, plastic',' rigid body.
1.2 Stress, Strain, Hooke`s law; Modulus of elasticity.
1.3 Young`s modulus, Bulk modulus, Rigidity modulus; Poisson`s ratio.
1.4 Young`s modulus by Searle`s apparatus, constant of elasticity. by
     Searle`s method.
1.5 Elastic behavior of wire
1.6 Engineering applications.
1.7 Numerical problems.

Chapter 2: Viscosity
2.1 Viscosity, Streamline flow; critical Velocity.
2.2 Newton`s Formula; Coefficient of viscosity; `poise`.
2.3 Poiseuille`s equation, Poiseuille`s Method
2.4 Stokes` law; Stokes; formula; Stokes method.
2.5 Reynold`s number.
2.6 Applications.
2.7 Numerical problems

Unit-II Heat and Thermodynamics   28   08

Chapter 3: Thermometry :
3.1 Zeroth law of thermodynamics.

3.2 Platinum resistance thermometer, Standard gas thermometer,

Chapter 4 Specific heats of gases – Cp and Cv
4.1 Specific heat at constant pressure and at constant volume-
Molar, In terms of enthalpy
4.2 Relation between Cp and Cv
4.3 Numerical problems

Chapter 5 Concepts of Thermodynamics
5.1 Heat and energy; Joule`s law; Mechanical equivalent of heat.
5.2 First law of thermodynamics
5.3 Isothermal and Adiabatic Processes
5.4 Thermodynamics processes- Reversible; Irreversible.
5.5 Cycle P-V diagram
5.6 Elementary ideas of heat engine
5.7 Concept of entropy

Chapter 6: Heat Transfer – Conduction

6.1 Heat conduction- idea of steady states; temperature gradient ; co-efficient of thermal conductivity.
6.2 Thermal conductivity of a good conductor- Searle`s method
6.3 Thermal conductivity of an insulator- lee's method.
6.4 Thermal conductivity of rubber tube by calorimetric
6.5 Temperature of interface
6.6 Numerical problems

28   08

Unit III Sound

Chapter 7 Simple Harmonic Motion (S.H.M.)

7.1 General equations of S.H.M.; Graphical representations;
    Characteristics of S.H.M.
7.2 Numerical problems

Chapter 8: Waves and Oscillations

8.1 Progressive waves(transverse and longitudinal)-equation.
8.2 Principle of superposition; Stationary waves.
8.3 Free oscillation and forced oscillations, resonance.
8.4 Vibrations of air column-velocity of sound by resonance tube
    closed at one end.
8.5 Vibrations in strings- frequency of A.C Supply by Sonometer

8.6 Numerical problems.

Chapter 9: Intensity of Sound

9.1 Loudness and phon

(Absolute) intensity of sound; standard intensity; intensity
level in bel, decibel Logarithmic law
9.2 Data for various sources of sound and their intensity in
decibel.

Chapter 10 Acoustics and reverberation:

10.1 Reverberation, Sabine`s formula Conditions for good acoustics,
Noise reduction and sound insulation Numerical problems
10.2 Ultrasonic-production and Application; Sonic, Subsonic,
Supersonic.

SECTION-II

24   06

Unit IV Optics

Chapter 11 Photoelectricity:
11.1 Photoelectric effect- Planck`s  hypothesis Einstein`s equation;
Characteristics
11.2 Photocell- photo emissive; photo conductive; photovoltaic
Applications Numerical problems

Chapter 12 Elementary ideas of Interference, Diffraction and Polarization

12.1 Interference Conditions for steady interference pattern, Thin films, Newton`s rings, optical flatness, Applications
12.2 Diffraction, Grating, Applications

12.3 Polarization, Polarimeter; Photoelasticity, Applications

<div align="right">30   10</div>

Unit V Electricity and Magnetism

Chapter 13 Static electricity

13.1 Coulomb`s law; Electric field; Intensity, Electric line of force
Flux density; Electric potential-Absolute,Numerical problems
Potential; Potential difference (p.d.); Expression for potential
at a point

13.2 Capacitance;` farad`;Principle of capacitor, Capacitor; Parallel
plate capacitor; Combinations: Capacitors " In Series ", " In
Parallel; Energy of capacity; Numerical problems.

Chapter 14 Current Electricity

14.1 Specific resistance; Ohm`s law as applied to complete circuit- e.m.f. and p.d.

14.2 Wheatstone`s network and Wheatstone`s bridge (W.B.) (metre
bridge) Post Office Box (P.O.B.)

14.3 Potentiometer

14.4 Application

14.5 Numerical Problems.

Chapter 15 Electromagnetism

15.1 Current carrying conductor in the magnetic field, 'ampere' the SI
Unit of current.

15.2 Rectangular coil carrying current placed in uniform magnetic field,
Galvanometer-Moving coil' 'Mirror', Current Sensitivity.

15.3 Principle of Shunt, Ammeter, Voltmeter.

Chapter 16 Magnetism

16.1 Magnetic materials; Dia, Para and Ferromagnetism; Modern

concept of magnetism.

16.2 Susceptibility,Magnetic hysteresis; Magnetic shielding.

16.3 Applications.

Chapter 17 Thermoelectricity

17.1 Thermocouple, Seebeck and Peltier effect; thermo e.m.f vs temperature relation.

17.2 Thermocouple as thermometer

28   10

Unit VI: Modern Physics:

Chapter 18 Bohr`s Theory for hydrogen atom

18.1 Bohr`s postulates

18.2 Radii of orbits and energies; Ryderg constant; Bohr model-Energy level diagram for hydrogen atom and spectral series.

Chapter 19 Crystal Structure

19.1 Crystalline and Amorphous solids, , Unit cell space-lattice cubic crystal structures- simple cubic(S.C), Body centred cubic (B.C.C), Face centred cubic (F.C.C),Atomic radius Co-ordination number, Number of atoms per unit cell; Atomic radius, Packing density..

19.2 Atomic planes and spacing, Miller indices.

Chapter 20 Elementary ideas of Lasers and Masers

20.1 Introduction related to acronym Spontaneous and stimulated (Induced) emission, Essential requirements of laser- Active medium, Resonant cavity, Pumping.

20.2 Ammonia maser, Ruby Laser; Helium –Neon Laser.
20.3 Energy and momentum of laser photon, Properties and applications.

20.4 Holography .

Chapter 21 Band theory of solids ; Semiconductors

21.1 Energy bands in solids and classification of materials in to conductorsm semiconductors and insulators.

21.2, semiconductors Intrinsic ; Extrinsic – P Type and N Type; P-N junction.

Chapter 22 Elementary ideas of Fibre optics and Superconductivity

22.1Total internal reflection and critical angle; wave guide for light, Optical fibre- Step index, Graded index ; Applications.

22.2Principle of Superconductivity –Zero ohmic resistance; critical field; Meissner effect; Super conducting state, materials, properties and applications

LIST OF EXPERIMENTS

Experiments to be performed :

Section-I (ANY 09)

1	Use of Measuring Instruments – Vernier Callipers, Micrometer Screw Gauge, Spherometer
2	Elastic Constants by Searle's Method
3	Young''s Modulus by Searle's Apparatus
4	Surface Tension by Capillary Rise Method OR Viscosity by Poiseuille's Method ORViscosity by Stokes' Method.
5	Thermal Conductivity of a Good Conductor by Searle's Apparatus
6	Ratio of Specific Heats Cp/Cv by Clement and Desorme's Apparatus
7	Thermal Conductivity of Rubber Tube by Calorimetric Method.
8	Thermal Conductivity of an Insulator by Lee's Method
9	Velocity of Sound by Resonance.
10	Velocity of Sound by C.R.O
11	Frequency of A.C. Supply by Sonometer and Verification by C.R.O.

Section – II (ANY 08)

12	Study of Spectrometer (Minimum Deviation and Refractive Index and Angle of Prism

13	Wavelength of Laser Beam (He-Ne) by Diffraction Grating.
14	Specific Rotation by Polarimeter
15	J' by Electrical Method and Specific Heat of Oil by Electrical Heating.
16	Use of Wheatstone's Bridge and Post Office Box (Resistance, Specific Resistance and Temp.Coefficient of Resistance).
17	Use of Potentiometer (Principle, Comparison of e.m.f.s of Cells, Internal Resistance of Cell and Calibration of Voltmeter with the Principle COMPULSORY and ANY ONE of the Other Three).
18	Wavelength of Light by Diffraction Grating
19	Determination of Rydberg Constant.
20	Study of Crystal Structure.

Demonstration Experiments : (ANY 07)

(i)	e.m.f. of a Thermocouple
(ii)	Spectra of Ionised Gases
(iii)	Poisson's Ratio for Rubber Tube
(iv)	Study of Photocell
(v)	Temperature of Flame (Optical Pyrometer)
(vi)	Hysteresis by C.R.O.
(vii)	Study of Newton's Rings
(viii)	Study of Para and Diamagnetism by Electromagnet
(ix)	Study of Ultrasonics
(x)	Study of Photoelastic Bench
(xi)	Optical Principles of O.H.P
(xii)	Use of Precision Measuring Instruments (Dial Vernier, Dial Micrometer, Travelling Microscope etc.)

Term-Work :

Compulsory term-work on the list of experiments written in a journal and carrying 50 marks on timely submission basis specified at the index sheet of Physics Journal.

Scheme of Practical Examination :

1	Each candidate will be examined in one experiment from among those prescribed in the syllabus. The duration of the experiment will be two hours
2	Each candidate will be asked to draw by lots any two experiments (one from section-I and the other from section-II). Out of the experiments so drawn by him/her, he/she will be asked to prefer any one experiment which he/she will be able to perform with confidence.
	Change of experiment shall be discouraged and if absolutely necessary, 05 marks will be deducted for the same after due verification of the laboratory records of the candidate.
3	The performance of the candidate in the practical examination will be assessed out of 50 Marks as shown in the following scheme

Scheme of assessment :

    (a) Connections, adjustment and Observations ………. 20 Marks
    (b) Circuit diagram, figures and tabulation ……………10 Marks
    (c) Formula, calculations and graphs if any …………...10 Marks
    (d) Oral ………………………………………………... 5 Marks
    (e) Correct answer or appropriate result ………………. 5 Marks

                                                  _____
                             Total :   <u>50 Marks</u>

4	Each candidate will be jointly examined by both external and internal examiners
5	Certain demonstration experiments are coupled with certain conventional experiments during the examination. Marks allotted for demonstration experiments are 15 and marks for conventional experiments are 35. The conventional experiment is assessed out of 50 as mentioned under 4 in the above scheme and then converted out of 35. Assessment of a demonstration experiment is judged by answers (Oral or Written) given by candidate in front of the relevant demonstration set up.
6	If any candidate is unable to draw a correct circuit diagram, the same may be given by the examiner on request so that the candidate may continue the experiment. However, five marks will be deducted for the same
7	**While assessing, the overall performance and the ability of the candidate to handle the apparatus independently, will be considered**

6. IMPLEMENTATION STRATEGY (PLANNING) :

  1. Theory- Lesson Plan

  2. Practical – Scheme of marking for T/W; Scheme of assessment for Pract. Exam.

7. (a) TEXT BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	R.K.Gaur and S.L. Gupta	Engineering Physics	Any	181-96 2001 Reprint 2004	Dhanpat Rai & Sons.
2.	M.R. Shrinivasan	Physics for Engineers	Any	1976	New Age International
3.	P.G. Kshirsagar and M. N. Avadhunulu	A Text Book of Engineering Physics	Any	1992 Reprint 93, till 05	S. Chand and Co. Ltd

| 4. | Gambhir, Durgapal and Banerjee | Introductory Physics, Vols. 1, 2 and 3 | Any | 1972 | Wiley Eastern |

(b) REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	Resnik and Halliday	Physics, Vols. 1 and 2	Any	1986	Wiley Eastern.
2.	B.L. Theraja.	Engineering Physics	Any	1062 Reprint 74-87 1975, 76,78,79,80, 81,82,83	S. Chand & Co. Ltd
3.	B.L. Theraja.	Modern Physics	Any	1062 Reprint 74-87 1975, 76,78,79,80, 81,82,83	S. Chand & Co. Ltd

1. SUBJECT DETAILS :

Course: Mechanical Engineering	Semester : II **Duration : 16 Weeks**
Subject: Engineering Drawing – II	Code : ME-36
Group :Core C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme			Examination Scheme							
Theory Hrs Per Week	Practical Hrs per Week	Credits	Hrs	NP	Mks	Th	Sess	T/W	Prac	Total
02	06	08	04	01	100	80	20	50	50	200

3. RATIONALE:

Engineering drawing is a language of engineers. It is classified as engineering science subject. It describes scientific facts, principles and technique of drawing in order to visualize and express the ideas and to convey the instructions through drawings without ambiguity. In engineering drawing – II students will study interpretation of give orthographic views to find out the missing views/sectional, no-sectional or orthographic views. It also gives concept for straight lines, planes and solids in space. They are introduced to various machine drawing by screw fastness keys and couplings.

4. OBJECTIVES :

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
	SECTION-I		
01	**1.0: Missing Views :**	30	07
	1.1 Given two views (f.v. – t.v. or f.v.s.v.) deriving the third view-non sectional or sectional.		
	1.2 Full section		
	1.3 Half section		
	1.4 Offset section concept.		
	Practice:		24
	1.Two sheets with four problems each.		
	2. Home Assignments: Two sheet containing four problems		
02	**2.0 Projection of Straight Lines :**	20	04
	2.1 Projections of lines inclined to both the reference planes (no traces)		
	Practice: 1. One sheet with four problems		12
	2. Home Assignments: One sheet containing four problems		
03	**3.0 Projection of Planes :**	30	06
	3.1 Projection of planes – regular polygons and circle. inclined to both the reference planes.		
	Practice: 1. One sheet with four problems	-	12
	2. Home Assignments: One sheet containing four problems		
	SECTION – II		
04	**4.0 Projections of Solids :**	30	05
	4.1 Projection of solids like prisms, pyramids, cylinders and cones with axis inclined to both the reference planes.		
	Practice: 1. One sheet with four problems	-	12
	2. Home Assignments: One sheet containing four problems		
05	**5.0 Thread Profiles and Screw Fasteners :**	20	05

5.1 Different profiles of threads

5.2 Conventional representations of left hand – right hand threads, single and multistart square threads, external and internal threads.

5.3 Different types of nuts.

5.4 Different types of bolts.

5.5 Lock nuts (Castle, slotted nut, simond's nut etc) use of plane and spring washers.

Practice: 1. One sheet with Problems on various screw   -   15
            fastners to be sketched by free hand.

2. Home Assignments: One sheet containing four problems

| 06 | **6.0 Keys and Couplings :** | 30 | 05 |

6.1 Detail and assembly drawing of different keys and couplings i.e. flange, oldhalm, flexible, universal etc.

Practice: 12

1. One sheet with problems of keys and coupling to be sketched by free hand and problem on drawing of assembly of a coupling.   09

2. A problem of a coupling to draw the details from the assembly.

3. Home Assignments: One sheet containing four problems

6. IMPLEMENTATION STRATEGY (PLANNING) :

In depth study and understanding of the subject will be implemented by adoption of the following strategy :

6. Theory Teaching Plan
7. Term Work Plan for practical giving problems to draw in the class.
8. Home assignment to practice at home
9. Conduct of three periodical test
10. Use of OHP models and charge during theory class and practical periods

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	N.D.Bhatt and Panchal	Geometrical and Machine drawing	14th	2000	Rupalee Pub.Opp. Amul Dairy, Court Rd, Anand
2.	R.K. Dhawan	Engineering drawing	2nd	2001	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055
3.	R.K. Dhawan	Machine drawing	2nd	2001	S.Chand & Co. Ltd ,Ram Nagar New Delhi-110 055
4.	M.L. Dabhade	Engineering Graphics	4th	1995	Mrs.VA.Velhankar 1030, Model Colony, B-12,Akash Ganga Pune-411 016

Information to the paper setter/examiner

regarding the distribution of topics section wise :

SECTION – I

Sr.No.	Topics	Periods	Marks
1	Sectional Views : • Full section, half sectioned offset section concept.		-
2	Missing Views : • Given two views (f.v.- t.v. or f.v.s.v.) deriving the third view non sectional or sectional.		25
3.	Projection of straight lines : • Projections of lines inclined to both the reference planes (no traces)		10
4.	Projection of planes : Projection of plane – regular polygons and circle. inclined to both the reference planes.		15

SECTION – II

5.	Projections of solids : Projection of solids like prisms, pyramids, cylinders and cones with axis inclined to both the reference planes	15

6.	Thread profiles and screw fasteners :
	   • Different profiles of threads
	   • Conventional representations of left hand –
	     right hand threads, single and multistart
	     square threads, external and internal threads
	   • Different types of nuts
	   • Different types of bolts
	   • Lock nuts (Castle,slotted nut simond's nut
	     etc. use of plane and spring washers.)
		15

7.	Keys and couplings :
	   • Detail and assembly drawing of different keys
	     and couplings i.e. flange, oldhalm, flexible,
	     universal etc.
		20

1. SUBJECT DETAILS :

Course: All	**Semester: II**
Subject: Fabrication Technology	**Duration: 16 Weeks**
Code: ME – 46	
Group: Core (C*)	**Compulsory**

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credit	Examination Scheme and Maximum Marks						
Theory Hrs. per week	Practical Hrs. per week		Papers		TH	Sessional	T/W	Practical	Total
			Hrs	Paper No.	Marks	Marks	Marks	Marks	Marks
02	04	06	03	01	80	20	25	50	175

3. RATIONALE :

Fabrication technology is a subject of engineering which deals with sheet metal works. Practical applications of sheet metals, press tools terminology. Applications of press tools. Various fabrications process like welding, brazing, soldering and its practical application in day to day life.

4. OBJECTIVES :

It develops understanding of properties of sheet metal. This helps to understand working & maintenance of welding equipments. Knowledge of welding, Brazing, Soldering processes, cold & hot working processes.

5. DETAILED CONTENTS :

<u>**SECTION – I**</u>

Chapters	Contents	Marks	Hours

			Th	Pr
1.	**Sheet Metal Works :**	20	05	
	Ferrous & Non ferrous materials require for making sheets, sheet metal tools. Properties of sheet metal, sheet metal gauge. Sheet metal joints: types of Hems & seams.			
2.	**Introduction to Press Tools :**	40	06	
	Concept of shearing & punching. Principles & Methods of shearing. Definition of Blanking & Punching. Types of dies like progressive, compound & combination die. Terminology used in dies.			
3.	**Mechanical cold working of Metals:**	22	05	
	Terminology used for Bending & Rolling. Definition of rolling & bending. Different types of cold working processes like drawing, deep drawing, forming, peening, extrusion, ring rolling & bending.			
Total		82	16	

SECTION – II

			Th	Pr
4.	**Mechanical Hot working of Metals:**	18	03	
	Meaning of Hot working, Recritelization temperature, Different types of Hot working processes.			
5.	**Welding:**	18	05	
	Principle of welding, weldability, welding Representation, various welding joints. Different types of Gas welding processes & detail of Oxy-acetylene process. Different type's arc welding processes like carbon, Twin carbon, Shielded metal, Submerged, TIG, MIG, and Plasma are welding.			
6.	**Brazing:**	10	03	
	Definition. Material used for brazing, flux used in brazing, flux materials, Brazing process.			
7.	**Soldering:**	10	02	
	Definition. Material used for soldering, flux used in brazing, flux materials, soldering process.			

8.	**Bolted Joints:**	14	03	
	Thread terminology. Left hand & Right hand threads. Types of bolts, nuts locking arrangements for nuts.			
Total		82	16	

Teaching Plane	Use of Overhead Projector, charts & Caulk Board.

TERM WORK :

Sr.No.   JOBS

Hours

01.	Job of arc welding.	10 Hrs.
02.	Demonstration of gas welding.	10 Hrs.
03.	One job of sheet metal working including bending and shearing (Involved riveting also).	20 Hrs.
04.	One simple job involving soldering/brazing.	20 Hrs.
05.	One job of preparing nut and bolts using dies and taps.	20 Hrs.
		80 Hrs.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Lesson Planning
2. Use of Transparencies (OHP)
3. Practical jobs/demonstration
4. Use of hand tools and machine tools

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	S.K. Hajara Choudhury, A.K. Hajara Choudhury	Elements of workshop technology (vol.I)	9th	1997	Media promoters and publishers Pvt. Ltd.
3.	F.J.M. Smith	Basic Fabrication and welding Engg.	3rd	1984	Longman Craft student series Engg.

1.Subject Details

Course: Mechanical Engineering	Semester I
	Duration: 16 weeks
Subject: COMPUTER CONCEPTS AND NETWORKING	**Code :** CA-14
Group: Core	Compulsory

2.Teaching and Examination Scheme

Teaching Scheme			Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Wk.	Pract Hrs per wk	Tut Hrs per wk		Paper			TH Reduced to	Sessional Marks	T/W	Pract l	Total
				Hrs.	N/P	Mks					
2	4	-	4	-	-	-	-	50	50	50	150

3. RATIONALE:

This subject envisages to make the students know the fundamentals of computer systems and its organization. It will enable the students to comprehend the organisation and working of various units of personal computer system for storing and processing information. It will also help the students to have hands on experience of operating systems and different application software used for office automation, day to day problems sharing in particular for creating business documents, data analysis graphical representations and business presentations. It also deals with basics of Internet technology available services internet connectivity and accessing information on internet. The student will also familiarize themselves with case study on Linux o.s., its design architecture, command structures, utilities and Linux.

4. OBJECTIVES:

The student will be able to:
1. Get familiarized with computerisation.
2. Utilise computers in engineering /technical field.
3. Use computer concepts for Microsoft applications
4. Prepare Inplant/Project reports.
5. Promote Computer Literacy and Programming Skills.
6. Made to expose towards computer area.
7. Learn networking concepts
8. Operate Internet/e-mail facility
9. Study of Linux as Operating System and Shell Programming.

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
1	**1.0 Fundamentals of Computer concepts** 1.0 To acquaint with computer Hardware and Software, To get familiar with various operating system (DOS); 1.2 To use DOS internal commands ;To familiarise with DOS external commands; 1.3 To study of computer specifications PC,PC-XT, PC-AT, Pentium and its applications, 1.4 General architecture of computers; Computer peripherals (I/O Device),CD player , Storage units , floppy diskette , printers and output peripherals; 1.5 General computer terms, computer software, applications software, operating systems, utilities packages, languages, advantages of software and application packages. Practice: 1. Study of Computer hardware and peripherals	20	06

2.	**2.0 Introduction to Windows:**
	2.1 Structure of a Window, Basic techniques for working in Windows.
	2.2 Using Menus
	2.3 Working with A dialogue box, Type of Options
	2.4 Starting Windows , Task Bar, Start Menu
	Practice: 1. Study of DOS Internal and External Commands
	    2.Getting started with Windows by using different menus and working with dialogue box
	    3. Study of Control panel , Screen saver and Help commands using Windows
		10	05

3.	**3.0 Introduction to WORD package** 3.1 Starting Word; The Word Screen; Getting to Word Document: 3.2 Typing and Editing : Editing text, Copying and Moving, Typing Special Characters (Symbols); 3.3 Some common features: Changing the case of text, Moving &	15	02

	copying text with drag and drop, Justifying text.
	3.4 Creating bulleted & numbered lists, Arranging and moving between open documents.
	3.5 Finding and replacing, formatting.
	3.6 Using the spell checker, Checking grammar.
	Practice: 1. Creating, Editing and Saving a document , Table using Word package creating
	  2. Document with Table ,editing using special characters & saving.
	  3. Study of tool bar menus like Standard , Formatting , Tables and Borders
	  4. Study of spell check , find , replace , go to , page setup , print preview and print commands.		

4	**4.0 Concepts of POWER POINT**
	 4.1 What is Business graphics : Types of Business Graphics, How to make an effective presentation,
	4.2 Physical aspects of presentation; A Presentation Graphics package ;
	4.3 Creating a presentation : creating a Title slide, Creating a Graph, Creating Tables, Make Organization Chart, To Save and close presentation; Working with Tools: Create , Edit, Move, Delete , Resize , Format text object, Working with Graphics tools;
	4.4 Slide show
	Practice: 1. Creating a new presentation and getting acquainted with various menus like FILE, EDIT, VIEW, INSERT, FORMAT, TOOLS, SLIDESHOW
	  2 Choosing Auto Layout and working with tools and to prepare a slide show
	  3. To study special effects using one slide show demonstration
		15	02

5	**5. 0 Fundamentals of EXCEL** 5.1 Starting EXCEL: What is a spreadsheet creating & editing spreadsheet, modifying the sheet. 5.2 Study of Toolbars, Formula bar and Status bar. 5.3 Inserting Header and footer, cells, rows, columns, worksheet. 5.4 Formatting individual cells row, column, sheet, manipulating data by using Sort. 5.5 Saving and Retrieving saved worksheet. Practice: 1.Creating Spread Sheet for various combination of computational tables.	15	02
	SECTION-II		
6	**6.0 Linux Fundamentals** 6.1 Linux Fundamentals:- Basics of Unix and Linux. 6.2 Multi-User and Multitasking capacities of Linux, change of password, the file types, structure of file system, important	25	06

	directories of the file system. Practice: 1.Linux basic commands. 2.Linux Advanced commands		

7	7.0 Introduction to Shell Programming :
	7.1 What is Shell
	7.2 Tools for working with Linux and Shell programming, Function of Shell
	7.3 Access permission of file in Linux, editing files with V1, important commands related to V1 editor.
	7.4 Introduction to Bash Shell Basics, Shell Bash variables, basics scripts element (input/output).
	7.5 Simple Shell Programs.
	Practice: 1.CREATING FILE USING V1 editor, editing, saving file and quit from V1 editor.
	        2. Study of different run levels.
	        3. Shell programming-I
	        4. Shell programming-II.
	        5. Study of KDE environment
		24	05

8	8.0 Networking and LAN commands
	8.1 Network Concept and classification;
	8.2 Local Area Network(LAN) : LAN Topology, LAN Software/ Operating System.
	8.3 LAN commands and elementary Administrative commands like ATTACH, BROADCAST CAPTURE, LOGIN, LOGOUT, MAP, REVOKE, RIGHTS, SYSCON, SYSTIME.
	Practice: 1. Networking concepts and LAN commands.
	        2.Introduction to administrative command like Create
	
	        Users, Mapping , Assigning , etc.
		20	02

9	**9.0 Introduction to INTERNET :** 9.1 What is INTERNET, Application of INTERNET 9.2 E-mail, TELNET, WWW, Study of various search engine using LYNX, LOGIN PROCEDURE. 9.3 Study of INTERNET EXPLORER, Creating mailing account, Difference between SHELL and TCP/IP account. 9.4 Surfing using WORLD WIDE WEB information relating to employment, education, alumni. Practice: 1. Internet terms , Use of Shell account and study of mailing , Software to send & receive mail on Hard Disk. 2. To study internet explorer package & retrieve education related information from TCP/IP account and downloading procedure.	20	02

Note:- Minimum of twelve experiments must be performed /completed in journal for approval of term work acceptance other than the 75% requirement of attendance.

Sr. No.	Main Topics	No. of Contact Hrs.	Marks	Weightage %	# M / E / D
1.	Fundamentals of Computer concepts	06	20	12	E
2.	Introduction to Windows	05	10	07	E
3.	Introduction to WORD package	02	15	09	M
4.	Concepts of POWER POINT	02	15	09	M
5.	Fundamentals of EXCEL	02	15	09	M
6.	Linux Fundamentals	06	25	16	M
7.	Introduction to Shell Programming	05	24	14	M
8.	Networking and LAN commands	02	20	12	M
9.	Introduction to INTERNET	05	26	16	E
	Total	32	164	100%	#

(# M=Most Essential,   E=Essential,   D=Desirable)

6. IMPLEMENTATION STRATEGY (Planning)
   i) Teaching Plan
  ii) Lesson Plan
 iii) Assignments

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & address
1	Hunt & Shelly.	Computer and Common sense			
2	V. Rajaraman	Computer Fundamentals			(Prentice hall)
3		PC Guide for Windows			(ITC Publication / Galgotia publication)
4	Galgotia.	Learning Word 6.0 for Windows step-by-step			
5	Preilerson	Linux: The computer reference – 5/E			
6		Unleashed Linux			

7		Mastering MS Office			BPP Publication
8	U.D. Black	Data Communications and Distributed Networks			Prentice-Hall

SHRI VILEPARLE KELVANI MANDAL`S
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

FULL TIME

DISCIPLINE: MECHANICAL ENGINEERING.   **w.e.f. batch admitted june 2008 (progressive)**

SEMESTER: THIRD   **Effective from the academic term: JULY-NOV.2009**

TECHNICAL & EXAMINATION SCHEMES

Sr no	SUBJECT	SUBJECT CODE	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION &MARKS			SCHEME OF EXAMINATION						Group Compulsory/ Optional	Scheme L/Pr/Cr.
			L	P	D	T	Cr	NP	HRS	Mks	SSL	Theory paper	T/W	Pract.	Oral	TOTAL		
1	Engineering Drawing –III	ME-37	2	-	6	-	8	1	4	100	20	80	50	-	50	200	C*	268
2	Power Engg –I	ME-38	3	2	-	-	5	1	3	100	20	80	50	50	-	200	C*	325
3	Manufacturing process	ME-39	2	4	-	-	6	1	3	100	20	80	50	-	50	200	C*	246
4	Basic Electrical & Electronics	EE-32	4	2	-	-	6	1	3	100	20	80	50	25	-	175	C*	426
5	Mathematics – III	MA-35	3	-	-	1	4	1	3	100	20	80	-	-	-	100	C	404
6	Industrial Engineering	ME-86	2	2	-	-	4	1	3	100	20	80	25	-	-	125	A	224
	TOTAL		16	10	06	01	33	-	-	-	120	480	225	75	100	1000		
			Total periods (28/32/34)								Total marks = (1000)							

Course: Mechanical Engineering	Semester: III
	Duration: 16 Weeks
3.1 Engineering Drawing - III (ME-37)	
Group : Core (C*)	Compulsory

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term Work	Prac-tical/ Oral	Total
			Hrs	No. of Paper	Marks					
2	6	8	4	1	100	80	20	50	50	200

(3) RATIONALE

Drawing is a graphical language of engineers. Technician works in industries as supervisior of production, maintenance of machines, inspection, etc. In whatever capacity he/she may be working, he/she has to read, interpret and prepare drawing of various types of machine components, dies, assemblies etc. He is required to understand, assimilate and analyze the drawings completely which eventually leads to efficient performance of manufacturing. Hence the basic skills of reading and interpreting the drawing is atmost important and involves preparation of parts using symbols of fit, tolerance, surface finish, etc.

(4) OBJECTIVES

Engineering drawing – III includes study of solid geometry as sections of solids, development of surfaces of solids and intersection of surfaces of two solids. It also includes study of various assemblies (sub-assemblies) and detailed drawings of machine parts of assembly, such as joints, bearing, jigs and fixtures, machine vice, screw jack, tool post, etc. It also includes symbols of welding, tolerances, limits, fits, surface finish and their applications. After learning this subject, the detail and assembly drawing of various machine parts with conventional representation and various symbols is understood for drawing and interpretation.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours Theory	Practical

SECTION-I

(01) **Section of Solids**   20   04   -

1.1 Auxiliary inclined and auxiliary vertical sections of prism, pyramid, cylinder and cone

1.2 Projection of true shape of the sections (Axis of solid/plane inclined to one reference plane)

Practice Sheet/s

(i) A drawing sheet on four problems of sections of   -   -   (12)
solids

(ii) **Home Assignment:** A drawing sheet on four problems of sections of solids.

(02) **Auxiliary Projection**   20   04   -

2.1 Auxiliary projections of machine parts

2.2 Use of auxiliary projections for solid geometry

Practice Sheet/s

(i) A drawing sheet on four problems of auxiliary   -   -   (12)
projections.

(ii) **Home Assignment:** A drawing sheet on four problems of auxiliary projections.

(03) **Details and Assembly of Machine Parts**   24   04   -

3.1 Screw jack, vices, tool post, simple tailstock, jigs and fixtures (with about 8 parts excluding standard parts like nuts, studs, bolts, pins, washers, etc.)

Practice Sheet/s   -   -   (12)

(i) A drawing sheet on two problems of assembly/ details drawing of machine parts.

(ii) **Home Assignment-** A drawing sheet on two

	problems of assembly/ details drawing of machine parts.			
(04)	**Working Drawing** 4.1 Weld symbols 4.2 Machining and surface finish symbols 4.3 Limits, fits and tolerances 4.4 Geometrical tolerances 4.5 Representation of the above symbols and tolerances on part drawing	18	04	-
	Practice Sheet/s (i) A drawing sheet on two problems of working drawing of detail/ assembly.	-	-	(12)
	Total	(82)	(16)	(48)

SECTION-II

(05)	**Interpenetration of Surfaces of Solids** 5.1 Intersections of surfaces of the solids with axis perpendicular or parallel to reference planes 5.2 Intersection of two prisms 5.3 Intersection of two cylinders 5.4 Intersection of prism and cylinder 5.5 Intersection of pyramid and prism 5.6 Intersection of cone and cylinder	24	04	-
	Practice Sheet/s (i) A drawing sheet on four problems of intersection of surfaces of solids. (ii) **Home Assignment:** A drawing sheet on four problems of Intersection of surfaces of solids	-	-	(12)
(06)	**Development of Lateral Surfaces of Solids** 6.1 Development of lateral surfaces of prisms, pyramids, cone and cylinder	24	04	-

6.2 Antidevelopment

Practice Sheet/s

(i) Drawing sheets on eight problems of development and sections of solids.	-	-	(12)

(ii) **Home Assignments:** A drawing sheet on six problems of development and sections of solids

(07)	**Joints**	18	04	-

7.1 Cotter, cotter joints and knuckle joints
7.2 Assembly and details of joints

Practice Sheet/s

(i) A drawing sheet on assembly/details of joints	-	-	(06)

(08)	**Frictional (Bush) Bearing**	16	04	-

8.1 Solid bearing
8.2 Bush bearing
8.3 Plummer block
8.4 Pivot (Foot Step) bearing
8.5 Assembly and details of bearings.

Practice Sheet/s

(i) A drawing sheet on assembly/details of bearings	-	-	(12)

(ii) **Project-** Chart and model making on above

topics by individual or group.	-	-	(06)

Total	(82)	(16)	(48)

(6) IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by the following strategy

    (i)   Lesson plan
    (ii)   Use of charts, models, transparencies
    (iii)   Use of a devices

(7) REFERENCE BOOKS

Sr No	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	N.D.Bhatt and Panchal	Geometrical and Machine drawing	14th	2000	Rupalee Pub.Opp. Amul Dairy, Court Rd, Anand-388 001
(ii)	R.K. Dhawan	Engineering drawing	2nd	2001	S.Chand & Co. Ltd, Ram Nagar, New Delhi-110 055
(iii)	R.K. Dhawan	Machine drawing	2nd	2001	S.Chand & Co. Ltd., Ram Nagar, New Delhi-110 055
(iv)	M.L. Dabhade	Engineering Graphics	4th	1995	Mrs.VA.Velhankar 1030, Model Colony, B-12,Akash Ganga, Pune-411 016

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: III**
	Duration: 16 Weeks
3.3 Power Engineering – I (ME-38)	
Group : Core (C*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Lecture (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term Work	Prac-tical/ Oral	Total
			Hrs	No. of Paper	Marks					
3	2	5	3	1	100	80	20	50	50	200

(3) RATIONALE

I.C. engines, steam engines, steam turbines, gas turbines are widely used for power generation, etc. I.C. engines are widely used for transportation purpose in all means of transportations i.e. road, railways, air and water. Therefore the principle of construction and working of such prime movers and machines, the analysis of their performance are highly relevant to mechanical engineers. A air compressors are used in almost all industries including operation of pneumatic tools.

(4) OBJECTIVES

Students will be able to :
(i) Understand the construction and working of different types of I.C. engines and their subsystems.
(ii) Design and conduct test on I.C. engines.
(iii) Understand the working and application of different types of air compressor's.
(iv) Understand thermodynamics.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours	
			Theory	Practical
	SECTION – I			
(01)	**General thermodynamics**	12	04	-
	1.1 Principles such as first and second law of thermodynamics & limitations			
	1.2 Perfect gases and vapours			
	1.3 Laws of perfect gases			
	1.4 Specific heats and their relation with gas constant.			
	1.5 General gas equation and characteristic gas equation of perfect gases.			
	1.6 Thermodynamic properties of gases, Internal			

energy, enthalpy, entropy, work done
1.7   Compression and expansion processes
1.8   Heating and cooling processes

| (02) | **Different Thermodynamic Processes** | 15 | 05 | - |

2.1 Representation of processes on P-V and T-S
   diagrams
2.2 Calculations of work done, heat transfer, change
   in internal energy, change in enthalpy and
   change in entropy, etc.
2.3 Different processes
   (a) Constant volume process
   (b) Constant pressure process
   (c) Constant temperature process
   (d) Constant entropy process (Isentropic process)
   (e) Polytropic process

| (03) | **Air Standard Cycles** | 25 | 05 | - |

3.1 Assumptions of air standard cycles
3.2 Representation of different cycles on P-V and
   T-S diagrams
3.3 Calculations of efficiencies and mean effective
   pressure of the following Air cycles
   (a) Carnot Cycle
   (b) Otto Cycle
   (c) Diesel Cycle
   (d) Dual Cycle

| (04) | **Air Compressors** | 30 | 10 | |

4.1 Introduction
4.2 Application of compressed air
4.3 Classification of compressor
   (a) Reciprocating & rotary   -   -
   (b) Single acting & double acting
   (c) Single stage & multi stage

4.4 Terminology of reciprocating air compressor
4.5 Multi staging of reciprocating air compressor
4.6 Advantages of inter cooling
4.7 Types of inter cooling
4.8 Derivation of workdone with &without clearance
4.9 Derivation of workdone for multi staging
reciprocating air compressor
4.10 Efficiencies of reciprocating air compressor
4.11 Calculation of workdone ,power & efficiencies
4.12 Introduction of rotary air compressor types,
vane blower, centrifugal & axial flow.
4.13 Difference between reciprocating & rotary air
compressor
4.14 Air motors, introduction & applications

Practical/s
    (i) Study of reciprocating air Compressors.   02
    (ii) Study of rotary air Compressors

	Total	(82)	(24)	(02)

SECTION – II

(05)	**Internal Combustion Engines**	16	05

5.1 Applications of I.C. engines
5.2 Classifications of I.C. engines
5.3 Merits v/s other prime movers
5.4 Principles of working
5.5 Constructional details of petrol, diesel and gas
    engines.
5.6 Working of petrol, diesel and gas engines
5.7 Working cycles
5.8 Two stroke and four stroke engines
Practical/s

(i) General study of I.C. Engines		03	
(ii) Study of S.I. and C.I. Engines			
(iii) Study of Two and Four Strokes Engines			

(06) Different Systems 24 07 -

6.1 Ignition systems of I.C Engines
6.2 Fuel supply system of I.C Engines
6.3 Cooling systems
6.4 Lubrication systems
6.5 Governings of I.C.Engines

Practical/s

(i) Study of Petrol Engines and its special features   04
 like carburetor and spark plug
(ii) Study of diesel engines and its special features
 like fuel pump, fuel injectors and nozzles
(iii) Study of cooling and lubrication of I.C. engines
(iv) Study of ignition systems used in S.I. Engines

(07) Performance and Testing of I.C. Engines 20 07 -

7.1 Calculation of mean effective pressure
7.2 Calculation of indicated power
7.3 Calculation of brake power
7.4 Calculation of mechanical efficiency
7.5 Calculation of thermal efficiencies
7.6 Calculation of fuel consumption
7.7 Calculation of specific fuel consumptions
7.8 Methods of finding indicated and brake
      power
7.9 Morse test for finding I.P. of multi-cylinder
      engines
7.10 Study of dynamometers
7.11 Speed-torque and load – Torque characteristics
       of I.C. Engines

	Practical/s			02
	(i) Conduct the trial on single cylinder four strokes C.I. Engine			
	(ii) Conduct the trial on 3 cylinders engine to calculate indicated power (MORSE TEST)			
(08)	**Study of Wankel Engine**	08	02	-
	8.1 Principle, construction and working			
	Practical Sheets:			
	(i) Study of Wankel Engine	-	-	01
(09)	**Supercharging and Turbo Charging of I.C. Engines**	08	01	-
	9.1 Advantages, applications and working of super charged and turbo charge engines.			
(10)	**Maintenance of I.C. Engines**	06	02	-
	10.1 Starting of I.C. engines			
	10.2 Stopping of I.C. engines			
	10.3 Common faults, causes and remedies of I.C. engines			
	Practical/s			03
	(i) Dismantling and assembling of I.C. Engines			
	(ii) Starting, stopping and governing of I.C. Engines			
	(iii) Common faults detected, causes and remedies of I.C. Engines			
	Total	(82)	(24)	(13)

(6) IMPLEMENTATION & STRATEGY (PLANNING)
(i)   Teaching Plan
(ii)   Lesson Plan
(iii) Visits, use of charts, and models.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	Patel Karamchandani	Heat Engines	17	2000	Acharya Publication, Vadodara
(ii)	P.L. Ballaney	Thermal Engineering	24	2003	Khanna Publication, New Delhi
(iv)	R.S.Khurmi	Thermal Engineering	12	2000	S.Chand New Delhi
(iv)	S. Dombkundwar	Thermal Engineering	5th Revised	2001	DhanpatRai and Co. Pvt. Ltd. New Delhi-06
(v)	Mathur Sharma	Internal Combustion Engines	8th	1999	DhanpatRai & Sons New Delhi

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: III**
	Duration: 16 Weeks
3.3 Manufacturing Processes (ME-39)	
Group : Core (C*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term Work	Oral	Total
			Hrs	No. of Paper	Marks					
2	4	6	3	1	100	80	20	50	50	200

(3) RATIONALE

A product industry comprises of machines. Number of processes being carried out on different machines. They have different principles of working. To go to an industry it is essential to know how these machines work and help in producing different products.

(4) OBJECTIVES

(i)   The students will be able to understand how a machine works and what operations can be carried out on it.

(ii)   They will be able to handle the machine and work on it efficiently.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours
	SECTION – I		
(01)	**Lathe Machine**	24	06
	1.1 Introduction and working principle		
	1.2 Classification specification and alignment test		
	1.3 Study of various operations done on lathe with use of various accessories, methods of taper turning, screw cutting, lathe tool geometry, tool materials, speed & feeds & factor affecting them.		
	Practical Sheets:		
	(i) One job of eccentric turning		
	(ii) One job of external V and square threading, taper turning knurling, shoulder cutting, chamfering and centering		
(02)	**Capstan and Turret Lathe**	16	04
	2.1 Classification, specification, working comparison with other lathe.		

2.2 Work holding, tool holding devices like
  (a) Straight cutter holder
  (b) Adjustable/ Plain angle cutter holder
  (c) Multiple cutter holder
  (d) Offset Cutter holder
  (e) Combination tool holder
  (f) Knee tool holder
  (g) V steady box tool holder

(03)	**Shaper & Planer**	26	04
	3.1 Constructional details, specifications & alignment tests, operation performed		
	3.2 Different methods of work holding		
(04)	**Slotting Machines**	16	02
	4.1 Constructional details specifications & alignments		
	4.2 Operations performed		
	4.3 Work holding devices		
	Total	**(82)**	**(16)**

SECTION – II

(05)	**Milling Machine**	32	06
	5.1 Introduction and classification of milling machines		
	5.2 Constructional details		
	5.3 Milling methods & different milling operations		
	5.4 Study of different types of cutters, elements of milling cutter		
	5.5 Use of dividing head		
	5.6 Different methods of indexing		
(06)	**Drilling and Boring Machines**	30	06
	6.1 Classification and construction of various operations performed on them		
	6.2 Twist drill nomenclature, its material and methods of holding on machine		
(07)	**Broaching and sawing Machines**	20	04

7.1 Introduction, type of broaching and sawing m/cs
7.2 Constructional details of broach
7.3 Advantages and limitations of broaching
7.4 Specification and selection of saw blades

| | Total | (82) | (16) |

(6) PRACTICALS

Sr. No.	Title	Hours
(i)	Turning jobs with	
	(i) 'V' threading tapering Internal 'V' threading and straight turning, step turning	24 Hrs.
	(ii) square threading, Tapering Straight turnings	28 Hrs.
	(iii) eccentric turnings	28 Hrs.
		80 Hrs.

Total

(7) IMPLEMENTATION STRATEGY (PLANNING)

(i)   Lectures and practical jobs
(ii)   Charts and handouts
(iii)   Slide showing for milling
(iv)   Showing of different types of broaches

(8) REFERENCE BOOKS

Sr No	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	S.K.Hajara Chaudhary A.K.Hajra Chaudhary	Workshop Technology Vol-II	9th	1997	Media promoters and publishers Ltd, New Delhi

(ii)	B.S.Raghuvanshi	Workshop Technology Vol-II	9th	1997	Dhanpatrai & Co. New Delhi
(iii)	W.A.J.Chapman S. J. Martin	Workshop Technology Vol-1,2,3	5th (Indian)	1998	Viva Books Pvt. Ltd., NewDelhi

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: III**
	Duration:16 Weeks
3.4 Basic Electrical & Electronic (EE-34)	
Group : Core (C*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term Work	Prac-tical/ Oral	Total
			Hrs	No. of Paper	Marks					
4	2	6	3	1	100	80	20	50	25	175

(3) RATIONALE

 To teach the student facts, concepts, principles and procedure of operation and control of electric M/c. and applications of electrical energy in manufacturing industry which enables him to work as supervisor in a shop and as an assistant in research and development department.

(4) OBJECTIVES

 Students will be able to:

(i) Understand the concept and principle of A.C fundamentals, which can be applied to rectify electrical faults and acquire supervisory role

(ii) Understand the working and construction of different types of machines which will help them to discharge role as a supervisor in all technology areas and assist

in carrying out investigation work

(iii) Select the drive for a given application.

(iv) Understand the working of electronic devices, circuits and their industrial application.
(v) Understand the fundamentals of microprocessor & microcontrollers and their application.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours
	SECTION-I		
(01)	**Basic Concept & Principle Of Electrical Engineering**	04	04
	1.1 Ohm's law, Law of electromagnetic induction		
	1.2 A.C.Fundamentals		
	Concept of 1φ & 3φ AC Supply, P.F Active & reactive power		
(02)	**DC Motors**	06	04
	2.1 D.C.Motor working princlple		
	2.2 Types of D.C. Motor		
	2.3 Characterises & application		
(03)	**Transformer**	04	06
	3.1 Working principle		
	3.2 Construction		
	3.3 Core type & Shell type transformer		
	3.4 EMF Equation		
	3.5 Turn ratio, Current ratio & Voltage ratio		
	3.6 Concept of auto transformer & 3φ transformer		
(04)	**A.C. Motors**	30	04
	4.1 Classification		
	4.2 3φ Induction motor – principle, construction, type		

       & application

    4.3 1φ Induction motor types & application

    4.4 Synchronous motor principle of operation,
         application

(05) **Electrical Drives**	04	06

    5.1 Advantage of electrical device

    5.2 Classification

    5.3 Selection of drive

    5.4 Different enclosure & method of mounting

(06) **Electrical Heating**	04	08

    6.1 Principle of electrical heating

    6.2 Resistance heating, Induction heating &
         Di-electric heating principles

    6.3 Procedure to select furnace for heating

(07) **Awareness About Electropower Generation**	04	04

    7.1 Different types of Power plants

    7.2 Lay out diagram

Total	**(32)**	**(40)**

SECTION-II

	20	04
(08) **Introduction To Electronic Devices**		

    8.1 Semiconductor intrinsic & extrinsic

    8.2 Diode: P-N Junction diode, symbol, working &
         characteristics

    8.3 Zener diode : Symbol, working, characteristics,
         transistor Bipolar junction transistor (BJT), Field
         effect transistor (FET), Unijunction transistor
         (UJT), symbol, working & characteristics

8.4 Power device : Silicon control rectifier (SCR),
      DIAC & TRIAC, symbol, working &
      characteristics
8.5 Photo devices : Photo diode photo transistor :
      symbol, working & characteristics

Practicals
(i)   Identification of different active components used
      in electronics laboratory.
(ii) To plot V-I characteristics of P-N Junction diode
      & Zener diode, interpret the results.
(iii) To plot the V-I characteristics of UJT & interpret
      the result
(iv) Determine the V-I characteristics of SCR &
      interpret the result

(09) **Rectifiers & Filter Circuits**   10   02
      9.1 Rectifier : Half Wave, Full Wave & Bridge Type
           (single & three phase)
      9.2 Filters
      Practicals
      (i) Study of half wave & Full wave Bridge rectifier
      (ii) Study of zener voltage regulator

(10) **Amplifier**   08   02
      10.1 Single stage transistor in CE configuration,
            frequency response
      10.2 Two stage transistor amplifier, RC coupled
      10.3 Introduction of power amplifier, classification,
            single ended class A amplifier
      Practicals
      (i) To plot frequency response of single phase RC
           coupled amplifier & find out off frequency

(11)	**Oscillator**	05	01

1.11   Concept & working

(12)	**Power Control Circuits**	22	04

12.1   Transducer : Temperature, Pressure,
        Displacement
12.2   Electronic timers
12.3   Level & Temperature control circuits
12.4   Speed control circuit
Practicals
(i)   Study of electronic timers
(ii)
(iii)

(13)	**Digital Circuits**	10	02

13.1   Study of logic gates (AND, OR, NOT, NOR,
        NAND, EXOR, EX-NOR, symbol & truth table
13.2   Study of flip-flops (S-R & J-K) Symbol of
        working principle, truth table
13.3   Study of working principle of the following with
        the help of block diagram - Encoder, Decoder,
        Multiplexer, De-Multiplexer, Shift register &
        Counter
13.4   Study of display – LCD, LOD, Seven segment
        display
Practicals
(i) Verification of truth table of logic gates – And,
NOT, OR.
(ii) Study of Multiplexer
(iii) Study of Ripple counter

(14)	**Introduction To Microprocessor & Microcontroller**	07	01

	Total	(82)	(16)

(6)   IMPLEMENTATION STRATEGY (PLANNING)
   (i) The syllabus is taught as per the lesson plans using charts & demonstration of machine in the electrical laboratory.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publishing	Publisher & address
(i)	B.L Thereja (volume I & II	Electrical Technology:	3rd	2002	S. Chand & Company
(ii)	V.N.Mittal	Basic Elect.Engg.	9th	1997	Tata Megraw-hill
(iii)	Samarjit Ghosh	Fundamental of Electrical and Electronics Engineering	1st	2003	Practice Hall India
(iv)	U. A. Bakshi & A. P. Godse	Basic Electrical and Electronics Engineering	1st	2001	Technical Publication, Pune.
(v)		Basic Electronics & liner Circuit	35th	2001/2002	T.T.T.I Chandigarh THM
(vi)		Electronic device & Circuit	26th	2002	FHI
(vii)		Digital Electronics	8th	2003	Tata Megraw-hill

(1) SUBJECTCT DETAILS

Course: Mechanical Engineering	**Semester: III**
	Duration: 16 Weeks
3.5 Mathematics – III (MA-35)	
Group : C	**Optional**

(2) TEACHINGAND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Tutorial (Hrs Per Week)		Paper			Theory	Sessional Marks	Term Work	Prac-tical/ Oral	Total
			Hrs	No. of Paper	Marks					
3	1	4	3	1	100	80	20	-	-	100

(3) RATIONALE

1. Creating aptitude for Mathematics of Higher Semesters
2. Focusing attention of problem solving in liberal sense. This aspect should take care of
   (a) Intelligent combination of techniques.
   (b) Mathematization or mathematical modeling of problems involved in various branches of knowledge.
3. Nurturing the higher order mental process of logical reasoning with rigor and precision.
4. Developing conceptual clarity & habit of abstracting a given concrete situation and to put it in precise language with the ingredients of the problems on hand.

(4) OBJECTIVES

Differential calculus is introduced as
1. Prerequisite for many topics such as integral calculus, differential equations, Fourier series etc. to be studied later.

2. To introduce the applications commonly required.

(5) DETAIL CONTENTS

Chapter	Content	<u>Marks</u>	Hours

SECTION I

(01.) **Differentiation**   57   16
1.1 Definition
1.2 Derivative by first principle
1.3 List of derivative of standard function

1.4 Methods of differentiation

1.5 Derivative of explicit & implicit

1.6 Derivative of parametric function
1.7 Derivative of Inverse function
1.8 Derivative of function with respect to another function
1.9 Successive Differentiation
1.10 n^{th} derivative of function   25   08
1.11 Leibnitz theorem
1.12 Application of Derivative
1.13 (i) Geometric meaning of derivative
    (ii) Equation of tangent, normal to given curve
    (iii) Derivative as a rate measure-velocity,
        Acceleration, Related Rate
    (iv) Maxima/Minima of Function
    (v) Radius of Curvature

                               Total   (82)   (24)

<u>SECTION-II</u>

(02)   **Integral Calculus**   82   24

2.1 Integration as inverse of differentiation

2.2 Methods of Integration, substitution by parts, partial fraction.

2.3 Definite integral & their properties, Reduction formulae (No proof)

2.4 Application: Mean Value & R.M.S. Value

Total   (82)   (24)

(7) REFERENCE BOOKS

Sr. No	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	S. P. Deshpande	Mathematics for Polytechnic Students –II	1st	1998	Pune Vidyarthi Griha Prakashan, Pune
(ii)	Dr. B. S. Grewal	Higher Engineering Mathematics	35th	2000	Khanna Publishers 2B, New Delhi
(iii)	J. N. Wartikar P. N. Wartikar	Applied Mathematics	7th	1989	Pune Vidyarthi Griha Prakashan, Pune
(iv)	B. M. Patel J. M. Rawal P. B. Bahatkar K. R. Ansari D. M. Hadke A. S. Singh	Applied Mathematics	7th	2002	Nirali Prakashan, Mumbai

(1) SUBJECT DETAILS

Course: Mechanical Engineering **3.6 Industrial Engineering (ME-86)** **Group : Application (A)**	**Semester: III** **Duration: 16 Weeks** **Optional**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term Work	Prac-tical/	Total
			Hrs	No. of Paper	Marks					
2	2	4	3	1	100	80	20	25	-	125

(3) RATIONALE

Industrial engineering plays a vital role in increasing the productivity. Various Ind. Engg. Techniques are used to analyze and improve the work methods to eliminate waste, proper allocation & utilization of resources. Ind. Engg. is a profession in which a knowledge of mathematical & natural science gained by study, experience & practice is applied with judgment to develop the ways to utilize economically the materials, other natural resources and forces of nature for the benefit of mankind.

(4) OBJECTIVES

    (iii)   To make them understand the concept of Industrial engineering.
    (iv)   To make them understand the relationship between production and productivity.
    (v)   To make them understand how work study technique helps to improve production and productivity.
    (vi)   To make them understand the basic wages and incentive schemes.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours
	SECTION – I		
(01)	**Introduction** 1.4 History and contribution of Ind. Engg., activities objectives of Industrial Engineering. 1.5 Techniques of Ind. Engg.	08	02
(02)	**Production and Productivity** 2.1 Introduction, concept, benefit 2.2 Relationship between production and productivity 2.3 Productivity measures. **Practical /s** (i) Assignment on production and productivity	08	02
(03)	**Work Study** 3.1 Introduction, work study procedure 3.2 Work study and management, supervisor, worker 3.3 Concept of work content 3.4 Techniques to reduce excess work content **Practical /s** (i) Assignment on total work content	16	03
(04)	**Method Study** 4.1 Introduction, objective, steps involved in method study 4.2 Selection of job 4.3 Recording technique 4.4 Critical examination 4.5 Development & selection of new method 4.6 Micro-motion study 4.7 Cyclegraph, chrono-cyclegraph 4.8 Principles of motion economy **Practical /s**	45	08

      (i) Assignment on procedure of method study
      (ii) Assignment on recording technique
      (iii) Assignment on micro-motion study

(05)   **Introduction to Ergonomics**   05   01
      5.1 Objectives, applications

                                     Total   (82)   (16)

SECTION – II

(06)   **Work Measurement**   40   08
      6.1 Introduction
      6.2 Techniques of work measurement
      6.3 Elements of time study
      6.4 Performance rating
      6.5 Allowances
      6.6 Computation of standard time
      6.7 Work sampling
      6.8 P.M.T.S.
      Practical /s
        (i)   Assignment on techniques of work measurement
        (ii) Assignment on calculation of standard time

(07)   **Job Evaluation & Merit Rating**   16   03
      7.1 Introduction, objectives, procedure
      7.2 Job evaluation system - Ranking method, factor
      comparison method, merit rating
      Practical /s
        (i)   Assignment on job evaluation and merit rating

(08)   **Wages and Incentives**   16   03
      8.1 Introduction
      8.2 Types of wage payments
      8.3 Incentive schemes
      Practical /s
        (i)   Assignment on wages and incentives

| (09) | **Process Mapping** | 10 | 02 |

9.1 Concept of BPR
9.2 Flexible manufacturing system
Practical /s
   (i)   Assignment on BPR and FMS

| | **Total** | (82) | (16) |

(6) IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by using
  (v)   Teaching Plan
  (vi)   Use of Charts, models and transparencies
  (vii)   Use of other teaching methods such as case study , group discussion, etc

(7) REFERENCE BOOKS

Sr No	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	I.L.O.	Work - Study	4th	1994	Universal Pub. Corpn., 534, Kalbadevi Rd, Mumbai-400 002
(ii)	Ralph M. Barnes	Motion & Time Study Design and Measurement of works	7th	1981	Dhanpatrai & Co. New Delhi
(iii)	Marvin E. Mundel	Motion & Time Study	6th	1998	Prentice Hall of India, New Delhi
(iv)	Martand Telsang	Industrial Engg. & Production Management	2nd	2002	S. Chand & co. 7361, Ram Nagar New Delhi-55

SHRI VILEPARLE KELVANI MANDAL`S
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

FULL TIME

DISCIPLINE: MECHANICAL ENGINEERING.　　　　　　　　**w.e.f. batch admitted june 2008 (progressive)**

SEMESTER: FOURTH　　　　　　　　**Effective from the academic term: DEC-09/JAN- MAY 10**

TECHNICAL & EXAMINATION SCHEMES

Sr no	SUBJECT	SUBJECT CODE	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION &MARKS			SCHEME OF EXAMINATION						Group Compulsory/ Optional	Scheme L/Pr/Cr.
			L	P	D	T	Cr	NP	HRS	Mks	SSL	Theory paper	T/W	Pract.	Oral	TOTAL		
1	Mechanism	ME-47	3	2	-	-	5	1	3	100	20	80	50	-	50	200	C*	325
2	#Fluid mechanics & hyd. machines	ME-48	3	2	-	-	5	1	3	100	20	80	50	50	-	200	C*	325
3	Strength of materials & structures	AM-38	3	2	-	-	5	1	3	100	20	80	25	50	-	175	C*	325
4	Advanced Mathematics	MA-45	3	-	-	1	4	1	3	100	20	80	-	-	-	100	A	404
5	Power Engg.-II	ME-49	3	2	-	-	5	1	3	100	20	80	50	-	50	200	A	325
6	Industrial Management-I	ME-01	3	0	-	-	3	1	3	100	20	80	-	-	-	100	M*	303
7	Computer Aided Graphics	CA-03	2	4	-	-	6	1	3	100	20	80	50	50	-	200	C	246
	TOTAL		12/20	06/12	-	01	33	-	-		140	560	225	150	100	1275		
			Total periods (18/33)								Total marks = (675/1175)							

(1) SUBJECT DETAILS

Course: Mechanical Engineering	Semester: IV
	Duration: 16 Weeks
4.1 Mechanisms (ME-47)	
Group : Core (C*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Prac-tical/ Oral**	Total
			Hrs	No of paper	Marks					
3	2	5	3	1	100	80	20	50	50	200

(3) RATIONALE

The student has to work for design, production, maintenance of machines, assemblies, sub-assemblies, etc. He should be aware of working considering motion/power for various drives and other machine components. This subject is continuation of physics, engineering drawing, mechanics & base for machine design. It also forms part of mechanical technology, manufacturing engineering, production engineering, etc.

(4) OBJECTIVES

The objectives include study of various mechanical drives commonly used. It includes use of friction in belt drive, clutch & brake. Losses due to friction in bearing. The study of special purpose drive likes cam drive and frictional clutches. The use of vector diagram to calculate velocity & acceleration of links in simple mechanisms. Basics, classification & application of gears and basic study of flywheel and governor.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours Theory	Practical

SECTION – I

(01)	**Kinematics**	10	04	-

1.1 Basic of kinematics
1.2 Types of kinematics pairs
1.3 Various simple mechanisms, its inversions for working and application

	Practical/s	-	-	02

(i) Terminology for kinematics

(02)	**Velocity and Acceleration Diagrams**	20	10	-

2.1 Basics, types of velocity and acceleration – Angular, linear motion and co-relation

2.2 Absolute, relative velocity and acceleration for Simple mechanisms – single and double crank mechanism uniform & changing angular velocity of crank
2.3 Use of velocity and acceleration diagrams to find velocity & acceleration of various elements/points on simple mechanisms
2.4 Use of Klein's and Bannett's construction for single crank mechanism with uniform angular velocity (Coriolis acceleration component to be excluded)

	Practical/s	-	-	04

(i) Simple mechanisms and inversions
(ii) Velocity and acceleration (Vector diagram)

(03)	**Gear**	16	06	-

3.1 Gear terminology

3.2 Types of gears and applications
3.3 Law of gearing and sliding velocity
3.4 Profiles of gear tooth and comparison,
    interference in involutes profile.

-	-	04

Practical/s

(i) Gear Terminology
(ii) Types of gears

(04)	**Gear Trains**	16	06	-

4.1 Classification of gear trains
4.2 Designing of simple spur gear train for number
    of teeth and exact center to center distance for
    given velocity ratio, module and approximate
    center to center distance
4.3 To find speed of different gears and arm for
    epi-cyclic gear train (Simple & Compound)

-	-	06

Practical/s

(i) Types of gear trains
(ii) Differential gear system
(iii) Four speed gear box (Sliding mesh)

(05)	**Cam**	20	06	-

5.1 Type of cams & followers
5.2 Cam terminology
5.3 Design of radial (disc) cam profile for
    knife/roller/flat faced follower having uniform
    velocity/S.H.M./uniform acceleration and
    retardation

-	-	04

Practical/s

(i) Cam terminology and classification of cams
    and followers
(ii) Cam profile drawings

	(82)	(32)	(20)
Total	(82)	(32)	(20)

SECTION – II

(06) **Mechanical Drives**	10	04	-

6.1 Drives & classification
6.2 Types of mechanical drives
6.3 Positive & non-positive drives, comparison

	-	-	02

Practical/s

(i) Types of mechanical drives

(07) **Belt, Rope and Chain Drive**	20	08	-

7.1 Types of belt drives, open/cross, flat/V/rope, simple/compound, etc; types of pulleys
7.2 Velocity ratio for belt drive, consideration of slip & belt thickness, creep & its effect
7.3 Calculation of length of belt for open/cross belt drive, approximation of it, angle of contact
7.4 Working tension, initial tension, centrifugal tension, safe tension and their relation for belt & rope drive consideration of co-efficient of friction, contact angle & groove angle of grooved pulley
7.5 Power transmission calculation for belt drive, to find dimension of belt/pulley for given power & max. power
7.6 Comparison between various belt drives
7.7 Chain drives & its comparisons with other mechanical drives
7.8 Types of chains & applications, consideration of velocity ratio of chain drive

	-	-	04

Practical/s

(i) Belt drives
(ii) Chain drives

(08)	**Brakes**	16	06	-

8.1 Introduction, operating systems, brake material characteristics

8.2 Types of mechanical brakes

8.3 Simple problem for single, double, band and band & block brake for torque/power/force applied   -   -   02

Practical/s

(i) Different types of brakes and its classification

(09)	**Bearing**	10	04	-

9.1 Friction in bearing

9.2 Types & co-relation with clutch

9.3 Uniform intensity of pressure & uniform wear conditions

9.4 Power loss & designing of frictional bearings

9.5 Antifriction bearings and types

          -    -   02

Practical/s

(i) Different type of bearings

(10)	**Clutches**	16	06	-

10.1 Working of frictional clutches

10.2 Types of frictional clutches

10.3 Friction torque/power calculation to find dimensions of clutch

10.4 Centrifugal clutch, construction & working, Its comparison with other clutches

Practical/s   -   -   02

(i) Different type of clutches

| (11) | **Flywheel & Governors** | 10 | 04 | - |

11.1 Introduction to flywheel
11.2 Function of flywheel
11.3 Introduction to governor
11.4 Function & types of governor
11.5 Comparison between flywheel & governors

| | Total | (82) | (32) | (12) |

(6) IMPLEMENTATION STRATEGY (PLANNING)

(i) Teaching Plan
(ii) Models
(iii) Charts.

(7) REFERENCE BOOKS

Sr No	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	Khurmi & Gupta	Theory of machines	5th	1995	Eurasia Pub.House Pvt Ltd New Delhi-110055
(ii)	Rattan S.S.	Theory of machines	1st	1993	Tata Mcgra Hill Pub Co.Ltd
(iii)	Ballaney P.L.	Theory of machines	5th	1987	Khanna Publication New Delhi-110006
(iv)	H.M.Shah and H.M.Nadkarni	Theory of machines	2nd	1982	Dhanpatrai & Sons New Delhi110 006
(v)	Ghosh & Mallick	Design of machine elements & mechanisms	1st	2002	East West Pub. New Delhi
(vi)	Bevan	Theory of machines	1st	1984	CBC Pub New Delhi

1) SUBJET DETAILS:

    COURSE: MECHANICAL ENGINEERING   **SEMESTER: IV**

4.2   FLUID MECHANICS & HYDRAULICS MACHINERY

CODE: ME-48

GROUP: CORE (C*)   **COMPULSARY**

2) TEACHING AND EXAMINATION SCHEME:

Teaching scheme		Credits	Examination scheme and maximum marks								
Theory (Hrs per week)	Practical (Hrs per week)		Paper			Theory	Sessional	Term work	pract-cal	Total	
			Hrs	No. of paper	Marks	Marks	Marks	Marks	Marks	Marks	
3	2										
		5	3	1	100	80	20	50	50	200	

3) RATIONALE:

Fluid Mechanics and Hydraulics Machinery is a subject in engineering which deals with transformation of energy stored in a fluid to produce useful work output. The machines in industries are required to perform number of functions such as moving, holding, pressing and lifting etc.which requires motion and force. The analysis of forces and friction for static and moving fluid is considered in continuation with force analysis studied under physics and applied mechanics.

The machines in industries are required to perform number of functions such as moving; holding, pressing and lifting etc.which requires motion and force. This subject helps to understand, operate, maintain and design of various hydraulics and pneumatic circuits used in the industry. It makes them understand various parts of machines like pumps, actuators, valves etc.

4) OBJECTIVE:

It develops understanding of properties of steady and moving fluids. This helps to understand construction, working, installation, applications and performance of equipments such as pumps, turbines etc.

Student will be able to identify various components of hydraulic and pneumatic systems, know the working principle of various components used for hydraulic and pneumatic systems. They will be able to select appropriate components required for simple hydraulic and pneumatic systems, list probable causes of faults or defects in the components. This helps to develop the similar circuits for job holding and tool operation in machine tools. It also helps in mass production, low cost automation which will increase productivity.

5) DETAILED CONTENTS

SECTION-I

Chapter	Contents	Marks	Hours Th	Pract.
01	**Properties of Fluids** 1.1 Mass density, specific weight, specific gravity, specific volume. 1.2 Viscosity, cohesion and adhesion, surface tension, capillarity. 1.3 Vapour pressure, compressibility.	10	03	
02	**Fluid pressure and pressure measurements** 2.1 Fluid pressure, pressure head, intensity of pressure. 2.2 Concept of atmospheric, gauge pressure, vacuum and absolute pressure. 2.3 Peizometer tube, simple and differential manometers. 2.4 Bourdon's pressure gauge, diaphragm pressure gauge, dead weight pressure gauge.	10	03	
03	**Static pressure** 3.1 Pascal's law and its applications. 3.2 Total pressure and centre of pressure for immersed plane surfaces such as rectangular,triangular,circular etc.	10	03	
04	**Flow of fluids** 4.1 Types of flows 4.2 Law of continuity 4.3 Bernoulli's theorem 4.4 Applications of Bernoulli's theorem such as Venturimeter,orifice plate (construction, working and derivation of discharge) 4.5 Pitot tube. **Practical/s** i) Verification of Bernoulli's theorem. ii) Determination of co-efficient of discharge for venturimeter	16	04	 02 02

	and orifice plate.			

05	**Flow through simple pipes**
	5.1 Laws of fluid friction for laminar and turbulent flow.
	5.2 Darcy's and Chezy'sequation for frictional loss
	5.3 Loss of head due to sudden enlargement, contraction,
	  Obstruction, bends, loss at inlet and exit.
	5.4 Total energy line and total gradient line
	Practical/s
	i) Determination of loss of head due to friction in pipes.
	ii) Determination of loss of head due to bends, sudden
	  enlargement, sudden contraction.
		16	04
			
			02
			02	

06	**Hydraulic systems**
	6.1 Introduction to oil hydraulic systems
	  Practical layout of hydraulic systems, General layout of
	  hydraulic systems, Merits and demerits of oil hydraulic
	  systems.
	6.2 Pumps for hydraulic systems -.(Fixed displacement pumps
	  only)
	  Classification, Construction and working of gear, gerotor,
	  vane, axial Piston, radial piston, balanced vane, and bent
	  axis piston pump
	6.3 Valves for hydraulic systems
	  Construction, working and symbols of pressure relief
	  valve, pressure reducing valve, and pressure override
	  valve.
	  Construction, working and symbols of check valve, flow
	  control valve, sequence valve.
	  Construction, working and symbols of poppet valve, spool
	  valve, 3/2, 4/2 direction control valve.
	6.4 Actuators and accessories for hydraulic systems
	  Construction, working and symbols of linear actuators-
	  single acting, double acting; rotary actuators-hydraulic
	  motors.
	6.5 Hydraulic circuits
	  Construction and working of basic hydraulic circuits such
		20	07	

	as meter-in, meter-out, bleed off, sequential, regenerative circuits. Symbols and their labels of components. **Practical/s** (i) Study of rotary pumps. (ii) Study of meter-in, meter-out, bleed off circuits. (iii) Study of sequencing circuit.			02 03 03
	Total	82	24	16

SECTION-II

07	**Centrifugal pumps** 7.1 Construction and working of centrifugal pump 7.2 Types of casings and impellers 7.3 Calculation of manometric efficiency, overall efficiency, velocity diagram 7.4 Multistage of centrifugal pump 7.5 Net positive suction head, cavitations. 7.6 Testing of centrifugal pump 7.7 Troubleshooting 7.8 Characteristics curves 7.9 Specification and selection of centrifugal pump. **Practical/s** Trial on centrifugal pump.-To determine total head, pump. efficiency, Overall efficiency and volumetric efficiency.	35	10	04
08	**Reciprocating pumps** 8.1 Construction and working of single and double acting Reciprocating pumps. 8.2 Concept of slip, negative slip,Cavitation and separation 8.3 Indicator diagram with effect of acceleration and friction head. 8.4 Air vessel. **Practical/s** Trial on reciprocating pump.-To determine total head, pump efficiency, Overall efficiency and volumetric	10	03	02

	efficiency.			
09	**Hydraulic Turbines** 9.1 Layout of hydroelectric power plant. 9.2 Classification and selection of hydraulic turbines. 9.3 Construction and working of Pelton wheel, Francis turbine, Kaplan turbine 9.4 Comparison of turbines. 9.5 Functions, types of draft tube.cavitation in turbines. (No numerical on hydraulic turbine) **Practical/s** i) Trial on Pelton wheel-To study operation of turbine to determine power Output and efficiency ii) Study and demonstration of Francis turbine.	16	04	 04 02
10	**Pneumatic systems** 10.1 Introduction of pneumatic systems- Applications of pneumatic systems, General layout of pneumatic systems, Merits and limitations of pneumatic systems. 10.2 Valves for pneumatic systems- Construction, working and symbols of spool type, poppet type valves. Construction, working and symbols of flow control valve, shuttle valve, and quick exhaust valve. 10.3 FRL unit. 10.4 Pneumatic Circuits Control of single acting cylinder using pilot operated valve, flow control valve, exhaust throttling, Control of double acting cylinder, sequencing circuit. **Practical/s** (i) Study of pneumatic circuit for speed control of single and double acting cylinders. (ii) Study of pneumatic circuit for speed control of Pneumatic . motor.	21	07	 02 02
	Total	82	24	16

6) IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by adopting the following strategy.(Teaching plan)

i) Lesson plan.
ii) Use of charts, models and transparencies.
iii) Use of actual devices.

7) REFERANCE BOOKS

Sr.No.	Author	Title	Edition	Year of publication	Publishers and address
1	R.S.Khurmi	Fluid Mechanics & Hydraulics machinery	First	2001	S Chand and co. ,New Delhi
2	Jagdish lal	Fluid Mechanics & Hydraulics machinery	Second	1986	Metropolitan book co. pvt.ltd.
3	Modi P.N. and Seth S. M.	Hydraulics and Fluid Mechanics including Hydraulics machines	Eleventh	1973	Standard book house , New Delhi
4	Sperry Vickers	Hydraulics manual	XII	2002	Vickers Sperry international, Mumbai
5	S.R.Majumdar	Oil Hydraulic system Principle and Maintenance	VI Reprint	2004	Tata McGraw hill publishing company limited, New Delhi-110063

6	S.R.Majumdar	Pneumatic system Principle and Maintenance	XI Reprint	2004	Tata McGraw hill publishing company limited, New Delhi-110063
7	H.L.Stewart	Hydraulics and Pneumatics power for production	-	2001	Industrial Press inc.New York,U.S.A.
8	J.J.Pipenger	Industrial Hydraulics	-	1981	McGraw Hill, New York,U.S.A.

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: IV**
	Duration: 16 Weeks
4.3Strength of Materials & Structures (AM-38)	
Group : Core (C*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Prac-tical/** Oral	Total
			Hrs	No of paper	Marks					
3	2	5	3	1	100	80	20	25	50	175

(3) RATIONALE

Strength of materials is fundamental structural engineering subject which gives idea about stresses and strains in various materials, their properties and behaviour under different conditions. Also this subject is a pre-requisite subject to higher semester subjects like design of machines, theory of machines.

(4) OBJECTIVES

The students will be able to:

(i) Define and distinguishes different types of stresses
(ii) Work out the stresses under different conditions of loadings/forces
(iii) Predict the mode of failure
(iv) Predict the state of a body subjected to system of forces

(5) DETAILED CONTENTS

Chapter	Contents	Period	Marks
	SECTION – I		
(01)	**Stress and Strain**	10	26
	1.1 Definition of rigid body, plastic body and elaslicity		
	1.2 Definition of strain, stress, modulus of elasticity		
	1.3 Classification of sree, strain		
	1.4 Deformation of body due to axial load		
	1.5 Deformation of body of varying c/s due to axial load, max stres and min stress induced		
	1.6 Stresses in bars of composite section		
	1.7 temperatue stress and strain, coefficient of thermal expansion		
	1.8 temperature stress in bars of composite section		
	1.9 Shear stress, complememtary shear stress, state of simple shear, modulus of rigidity		
	1.10 punching shear		
	Practical		
	1.1 Study of unversal testing machine		
	1.2 Tension test on mild steel bar		
	1.3 Shear test on mild steel bar		
(02)	**Elastic Constants**	04	10
	2.1 Definition of lateral srain, poisson,s ratio		
	2.2 change in lateral dimensions		
	2.3 Volumeteric strain due to axial force and change in volume		

2.4 Bi-axial and tri-axial stresses and volumetric strain
2.5 Definition of bulk modulus, change in volume
2.6 Relation between modulus of elasticity, modulus of rigidity and bulk modulus.

(03)	**Strain Energy**	04	10

3.1 Types of loading-gradual, sudden and impact load
3.2 Definition of stran energy, modulus of resilience and proof resilience
3.3 Comparision of stresses due to gradual load, sudden load and impact load. Instantenuous stress inducd in the body
3.4 Strain energy stored due to gradual, sudden and impact load in the body.

Practical
3.1 Izod impact tst on mid steel, brass, copper and cast iron

(04)	**Principle Planes And Stresses**	04	10

4.1 Stresses on oblique plane i.e. normal stress and tangential stress
4.2 definition of principle planes and principle stresses
4.3 Principal planes and principal stresses due to bi-axial stress system (Analyical and Graphical method)
4.4 Principal plne and principal stresses due to complex stress system (Analytical and graphical method)

(05)	**Moment of inertia**	04	10

5.1 concept of moment of inertia M.I. of planes areas such as rectangle ,triangle ,circle ,semicircle and quarter circle;.
5.2 Parallel axis and perpendicular axis theorem M.I. of composite sections, built up sections, symetrical and unseymetrical sections, radius of gyration ,polar moment of inertia.

(06)	**Columns & struts**	06	16

6.1 Defination ,types of end conditions for column, classification of column.

6.2 Buckling of axially loaded compression member, effective length, radius of gyration, slenderness ratio.Moment of resistance of beam section

6.3 Euler's theory and rankine's theory assumptions, buckling loads ,factor of safety , safe load

6.4 Application of Rankine's and euler's theory, designing solid circular or hollow circular sections

	Total	**(32)**	**(82)**

SECTION-II

(07)	**Shear force & bending moment diagram**	06	06

7.1 Defination of shear force and bending moment, relation between SF & BM and load.

7.2 SF & BM diagram for simply supported ,cantilever and ver hang beams subjected to combination of point load, uniformly distributed load.

(08)	**Bending & shearing stresses in beams**	08	20

8.1 concept of pure bending, theory of simple bending, assumption in theoy of bending, neutral axis, bending stresses and their nature, bending stress distribution diagram

8.2 Application of theory of bending to symmetrical & unsymmetrical beam sections.

8.3 Shear stress equation , meaning of terms in equation, shear stress distribution for for rectangular, angle section, channel section, circular sections and T-sections. Euler`s theory of long column (formula only)

8.4 Relation between max. shear stress & average shear stress.

Practical:-

1. Transverse test on beam

(09)	**Deflection of beams**	04	10

9.1 concept of slope deflection & radius of curvature

9.2 Simple problems on cantilever & simply supported beams subjected to various loads using standard formulae.

Practical/s

(i) Deflection test

(10)	**Torsion**	10	04

10.1 Defination of torsion, theory of pure torsion, assumption, equation of torsion, angle of twist, torsional rigidity, polar section modulus.

10.2 Torque transmitted by shaft

10.3 Strength of shaft & stiffness of shaft

10.4 Power transmitted by shaft, design of shaft

Practical:-

Spring test

(11)	**Direct & bending stresses**	04	10

11.1 Concept of direct & eccentric load

11.2 Unaxial and biaxial bending of short compression member

11.3 Stress distribution across the section ,resultant stress, condition for no tension, middle third rule, core of the section.

(12)	**Stresses in shells**	04	10

12.1 Defination of thin cylindrical & spherical shells

12.2 Stresses in the walls of thin cylindrical & spherical shells due to internal pressure ,circumferencial & longitudinal stresses

12.3 Change in dimensions, change in volume due to internal pressure

	Total	(64)	(164)

Term work shall consist of practical on following (minimum 10)
1) Types of beams.(moment of inertia)
2) Tension test on standard mild steel specimen
3) Shear test on standard mild steel specimen
4) Izod impact test
5) Brinell's hardness test
6) Bend test in bars & flats
7) Transverse test on beam.
8) Deflection test
9) Columns & struts
10) Spring test
11) Tension test on welded joints
12) Graphics (SF & BM diagrams,minimum 4 problems covering all types of loading)
13) Graphics (mohr's stress circles

6. IMPLEMENTING STRATEGY (PLANNING):

1. Teaching plan
2. Models

7. REFERENCE BOOKS:

Sr. no.	Authors	Title	Edition	Year of Publication	Publisher & address
1	Khurmi R.S.	Strength of materials	9th	2004	S.Chand Co.Mumbai
2	Ramamurtham R.Narayanan	Strength of materials	14th	2003	Dhanapatri Pub.3917, New Delhi
3	S.S.Bhavikatti	Strength of materials	2nd	2005	Vikas Publishing House pvt ltd. New Delhi-14
4	Sunil M. Deo	Strength of materials	7th	2002	Nirali Publication Mumbai

(1) SUBJECT DETAILS

| Course: Mechanical Engineering | Semester: IV |
| | Duration: 16 Weeks |

Course: Mechanical Engineering · **Semester: IV** / **Duration: 16 Weeks**

4.4 Advanced Mathematics (MA-45)

Group : A · **Optional**

(2) TEACHING AND EXAMINATION SCHEME

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Tutorial (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Prac-tical/ Oral**	Total
			Hrs	No of paper	Marks					
03	-	4	3	1	100	80	20	-	-	100

(3) RATIONAL

Advance Mathematics is classified as basic science subject which comprises the facts, concept and principles of mathematics. These can be applied to solve problems in civil, mechanical and plastic engineering courses.

(4) OBJECTIVES

(i) The student will be able to evaluate integrals with the help of definition, formulae, methods and theorems.
(ii) Student will evaluate problems with the help of definition and properties of definite integral and redution formulae.
(iii) The student will be able to represent complex no. as Argands Diagram. Using algebra of vectors student will be able to find work done by a force, moment of a force about a point. Area of triangle. Volume of parrallelopiped.
(iv) The student will solve simultaneous equation by using matrices.

(5) DETAILED CONTENTS

| Chapter | Marks | Hours |

Content

SECTION I

(01)	**Application of Definite Integrals**	42	16
	1.1 Length of the arc		
	1.2 Area		
	1.3 Volume		
	1.4 Centre of gravity		
	1.5 Moment of inertia		

(02)	**2.0 Complex Numbers**	42	16
	2.1 De Morives Theorem		
	2.2 Roots of a complex number		
	2.3 Circular and hyperbolic functions of complex numbers		
	relation between them.		
	2.4 Separation of real & imaginary part of a complex no.		

SECTION – II

(03)	**3.0 Laplace Transformation**	24	12
	3.1 Introduction, Definition		
	3.2 Laplace transforms of elementary functions $1, t^n, e^{at}, \sin(at), \cos(at)$		
	3.3 Properties of laplace transforms		
	3.4 Inverse laplace transforms		
	3.5 Transform of derivatives and integrals		

(04)	**4.0 Differential Equation**	60	20
	4.1 Formation of differential equation		
	4.2 Differential Equation of first order and first degree		
	4.3 Differential equation of higher order with constant equation coefficients such as $f(D)y = X$ where $X = e^{ax}, \sin(ax + b), \cos(ax + b), x^m, e^{ax}V$, where, V is a function x.		
	4.4 Applications of differential equation		

(6) IMPLEMENTATION STRATEGY (PLANNING)

Lectures are conducted as per teaching plan and conducting tutorials.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	Dr.B.S. Grewal	Higher Engineering Mathematics	35th	2000	Khanna Publisher, 2/B Delhi 110006
(ii)	S.P. Deshpande	Mathematics for Polytechnic Students –II	1st	1998	Vidyarthi Graha Prakashan, Pune
(iii)	B.M. Patel J.M. Patel	Applied Mathematics	7th	2002	Nirali Prakashan, Mumbai

SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: IV**
	Duration: 16 Weeks
4.5 Power Engineering – II (ME-49)	
Group : Application (A)	**Optional**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Prac-tical/** Oral	Total
			Hrs	No of paper	Marks					
3	2	5	3	1	100	80	20	50	50	200

(3) RATIONALE

Steam (Thermal) power plants are widely used for power generation (Electrical Power). Study of thermal power plants is essential for the mechanical engineers.

Gas turbines and jet propulsions are important for power generation, aeronautics and for use in defence. Use of refrigeration and air conditioning is finding wider application both in industrial and domestic fields.

(4) OBJECTIVES

Students will be able to :
(i)   understand the working of steam turbine which is widely used for the generation of electricity and also understand the important components of thermal power plant.

(ii) understand the working of gas turbine cycle.

(iii) understand the principles of various jet propulsion systems.

(iv) understand the principles of various refrigeration & air conditioning system.
(v) understand the facts ,concepts and modes of heat transfer.

(5) DETAILED CONTENTS

Contents	Marks	Hours	
		Theory	Practical
SECTION – I			
(01) **Steam** 1.1 Generation of steam 1.2 Types of steam	08	03	-

1.3 Properties of steam like dryness fraction,
internal energy, specific enthalpy, specific
volume, specific entropy of dry ,wet and
superheated steam

(02)	**Steam Boilers**	15	04	-

2.1 Principle of steam generation
2.2 Requirement of steam
2.3 General description & principles of working
2.4 Classifications of steam boilers
2.5 Applications of steam boilers
2.6 Principles parts of steam boilers
2.7 Water tube and fire tube boilers
2.8 Boiler mountings like water level indicator,
pressure gauges, safety valves, steam stop
valve, fusible plug, blow off cock valve, high
pressure and low level valve etc.
2.9 Boiler accessories like economiser, air
preheater & superheater etc

Practical/s

(i) Study of boilers-Water tube and fire tube boilers	-	-	02
(ii) Study of boiler mountings and accessories	-	-	02

(03)	**High Pressure Boilers**	07	03	-

3.1 La-mont boiler
3.2 Loeffler boiler
3.3 Benson boiler
3.4 Velox boiler

Practical/s

(i) Study of high pressure boilers	-	-	01

(04)	**Performance of Boiler**	06	01	-

4.1Boiler efficiency
4.2 Load performance

4.3 Inspection of boilers
4.4 Starting & stopping of boilers

(05) **Steam Engine**   08   03   -
5.1 General description
5.2 Principles and working of a simple steam
    engine
5.3 P-V and T-S diagram of thermodynamic cycle
    of steam engines
5.4 Calculation of indicated power, break power
    and efficiencies of steam engines
Practical/s
(i) Study of steam engines

(06) **Steam Power Plant**   10   02   -
6.1 General description
6.2 Cycles
    (a) Rankine cycle
    (b) Modified rankine cycle
6.3 P-V, T-S and h-s diagrams of above cycles
6.4 Calculation of efficiencies and specific steam
    consumption
6.5 Applications of above cycles.

(07) **Steam Nozzles**   08   03   -
7.1 Types of steam nozzles
7.2 Flow of steam through nozzles
7.3 Construction and working of convergent and
    divergent nozzles
7.4 Calculation of area and velocity at throat and
    exit
7.5 Condition for maximum discharge
7.6 Effect of friction
7.7 Nozzle efficiency

(08)	**Steam Condensers** 8.1 Types of steam condensers 8.2 Applications of steam condenser 8.3 Construction and working of jet and surface condenser 8.4 Air pumps	12	03	-
	Practical/s (i) Study of steam condensers	--	--	01

(09)	**Steam Turbines**
	9.1 Classification of steam turbines
	9.2 Principles of working of impulse and reaction
	  turbines
	9.3 Compounding and governing of steam turbine
	9.4 Velocity diagrams of impulse and reaction
	  turbine
	9.5 Performance of steam turbines
	9.6 Efficiencies of turbines
	Practicals
	(i) Study of steam turbines
	(ii)Study of compoundings and governings of
	  steam turbine
		08	02	

(82)	(24)	(07)

SECTION II

(10)	**Heat transfer** 10.1Modes of heat transfer	20	09	-

e.g.-conduction ,convection & radiation
10.2 Conduction-introduction
10.3 Fourier law of heat conduction
10.4 Thermal conductivity ,thermal resistance
10.5 The material-conductors & insulators
10.6 Heat transfer by conduction through
    Flat surfaces
    Cylindrical surfaces
    Spherical surfaces
    Simple numericals on steady state

(11) **Heat transfer by convection**   08   02   -
11.1 Introduction and applications
11.2 Types-free convection
    Forced convection
11.3 Overall heat transfer co-efficient

(12) **Heat transfer by radiation**   08   02   -
12.1 introduction
12.2 Stefan boltzman law
12.3 Kirchoff's law
12.4 Black body ,grey body ,white body
,etc…

(13) **Heat exchangers**   16   05   -
13.1 Introduction & applications
    Classification
13.2 Counter flow & parallel flow in
    Heat exchangers
13.3 Derivation & simple numerical

On log mean temperature
13.4 Heat transfer in condenser and
Evaporator
13.5 Simple numerical

(14)	**Plants for generation of power**	15	04	-

14.1 Thermal power plant
14.2 Hydroelectric power plant
14.3 Nuclear power plant

Practicals
Study of power plants(industrial visit)

(15)	**Gas turbine**	06	02	-

15.1 Classification of gas turbine
15.2 Principle of working of constant
Pressure close & open cycle gas
Turbine ,constant volume gas turbine

Practicals

(i) Study of gas turbine	--	--	01

(16)	**Aircraft engines**	06	01	-

16.1 Principles of working of turbo-jet and turbo-
prop engines
16.2 Applications of air craft engines
Practical/s

(i) Study of air craft engines	--	--	01

(17)	**Refrigeration & air conditioning**	08	01	-

17.1 Introduction Refrigeration and airconditioning
17.2 Importance of refrigeration and air

conditioning

17.3 Applications for example refrigerator and air
   conditioners

Practical/s

(i) Study of refrigeration and air conditioning
   (Introduction)   -   -   01

                                             82   24   04

6) IMPLEMENTATION STRATEGY (PLANNING)

    (i)   Teaching Plan
    (ii)   Visits, Use of charts, models

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	Patel Karamchandani	Heat engines	17th	2000	Acharya Publication, Vadodara
(ii)	P.L. Ballaney	Thermal Engineering	24th	2003	Khanna Publication, New Delhi
(iii)	R.S.Khurmi	Thermal Engineering	12th	2000	S.Chand, New Delhi

(iv)	Dombkundwar S.	Thermal Engineering	5th Revised	2001	Dhanpat Rai and Co. Pvt. Ltd. New Delhi-06

1. SUBJECT DETAILS :

Course : mechanical	**Semester : IV** **Duration :16 Weeks**
4.6Subject : Industrial Management - I	**Code : ME-01**
Group : Compulsory M*	**Compulsory**

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	Sessional	T/W	Pract.	Total
			Hrs.	Np	Mks					
03	-	03	03	01	100	80	20	-	-	100

3. RATIONALE :

Management is the process of getting work done through work force to achieve the objectives of the organization. This subject "Industrial Management-I" covers the fundamentals principles, objectives, process and various processes and activities of management.

Along with attaining the necessary technical knowledge, the technical students also require some inputs in management areas so as to enable them to carry out their work effectively and efficiently.

This subject will enable the students to understand various processes and activities in an industrial organization.

4. OBJECTIVES :

6. To understand the process of formation and promotion of Industry/Organization.
7. To understand the necessary Management/ Supervisory skills required by the technical students.
8. To know the basic principles of Supervision.
9. To understand the Basics of Quality Management, Maintenance & Industrial Safety.
10. To understand the principles and practices in Human Resources Management.

5. DETAILED CONTENTS :

SECTION-I

Chapter   Content   Marks   Hours

1.	**Introduction to Indian Industry**	15	06

1. **Introduction to Indian Industry**   15   06
   1.10   Meaning - Definition
   1.11   Classification of Industry
   1.12   Location of Industry
   1.13   Importance of Industry
   1.14   Resources for Industry

2. **Types of Ownership of Industry**   17   04
   2.1 Proprietorship
   2.2 Partnership
   2.3 Private Ltd Company
   2.4 Public Ltd Company
   2.5 Co-operative Enterprises
   2.6 Public Sector Enterprises

3. **Supervisor & Supervision**   20   06
   3.1 Introduction
   3.2 Role of Supervisor in an organization
   3.3 Responsibilities of supervisor
   3.4 Quality of Supervisor
   3.5 Skills of Supervisor
   3.6 Functions of Supervisor

4. **Leadership**   15   04
   4.1 Meaning and Nature
   4.2 Qualities of good leaders
   4.3 Types of leadership
   4.4 Supervisors role as leader

5. **Motivation**   15   04
   5.1 Meaning
   5.2 Needs and expectations Workmen
   5.3 Types of Motives: Primary & Secondary Motives
   5.4 Affiliation motive, power motive and achievement
      motive.
   5.5 Role of supervisor in motivating the workmen

                                                82   **24**

SECTION – II

6. **Industrial Training**   16   04
   14.1 Need and Importance of training.
   14.2 Methods and Techniques of training.
   14.3 Training and Development of manpower.
   14.4 Supervisor as a Trainer.

7. **Maintenance**   16   04
   7.1 Need for Maintenance of Machinery.
   7.2 Types of Maintenance.
   7.3 Maintenance and Productivity.
   7.4 Role of Supervisor in shopfloor maintenance.

8. **Quality Management**   16   04
   8.1 Meaning, Purpose.
   8.2 Areas of application and scope.
   8.3 T.Q.M.
   8.4 ISO and its application.

9. **Industrial Safety**   16   06
   9.1 Meaning and Importance.
   9.2 Accidents – Causes of Accidents.
   9.3 Effects of Accidents.
   9.4 Prevention of Accidents.
   9.5 Safety devices and system.

10. **Industrial Relations**   18   06
    10.1 Meaning and Importance.
    10.2 Types of Industrial Relations.
    10.3 Industrial disputes – Causes.
    10.4 Methods and machinery for resolving industrial disputes.
    10.5 Trade union – Its role in maintaining industrial peace.

                                                                         82   **24**

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	T.R.Banga and S.C. Sharma	Industrial Organization & Engineering Economics	10th	2001	Khanna Publication
(ii)	O.P.Khanna	Industrial Management	5th	1988	Ganpat Rai

(iii)	T.R. Banga & S.C. Sharma	Industrial Organization & Management	19th	2003	Khanna Publication	
(iv)	K.C.Jain L.N.Agarwal	Production Planning Control & Industrial Management	7th	1989	Khanna Publication	
(v)	Giridhar Gyani	Training Manual on ISO 9000 and TQM	7th	1997	Raj Publishing House, Jaipure.	

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: IV**
	Duration: 16 Weeks
4.7 Computer Aided Graphics (CA-03)	
Group : Core C	**Optional**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term Work	Prac-tical/ Oral	Total
			Hrs	No. of Paper	Marks					
2	4	6	3	1	100	80	20	50	50	200

(3) RATIONALE

This subject is introduced to make the student aware of computer aided graphics. A fair knowledge of this subject is essential for the mechanical engineers. Since there are new emerging areas of Computer Aided Manufacturing Computer Integrated Manufacturing. To work in this environment every one should be familiar with the methods of drawing & design using softwares. Also area of automated production requires drawing with AutoCAD, IDEAs, UNIGRAPHICS, etc. It consumes less time to put an ideas in the form of drawing.

(4) OBJECTIVES

It develops understanding of basics for study of primitive drawing. This helps to understand the complex assembly which can be divided into a smaller primitives. They will get an overall idea about implementing it in actual mechanical engineering. They will be able to implement the concept of Layer, Bill of Materials, Tolerance, etc. They will get an idea how data in one form can be converted into another to be used in a similar software.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours Theory	Practical
	SECTION – I			
(01)	**Introduction to Computer Peripherals**	10	04	-
	1.1 General ideas, study of printers plotters, digitisers, mouse, joystick, etc.			
	1.2 Introduction to AutoCAD			
	1.3 Concept and terminology, introducing different features, program operation, features, advance drafting.			
	Practical	-	-	04
	(i) To study the operation of different peripherals			
(02)	**Installation and File Management**	06	03	-
	2.1 Loading AutoCAD, different library files			
	2.2 Familiarization with editing plotting, configuring			
	2.3 Converting of graphics with computer aided instruction. Understanding the mathematical	-	-	04

terms.

Practical

(i) To install Autocad, study of main execution file, configuration file and supporting file with main menu.

(03)	**Drawing commands**	18	03	-
	3.1 Basics drawing commands to draw primitives like line, point, arc, circle, etc.			
	3.2 Drawing commands like pline, donut, hatch, etc.			
(04)	**Utility commands**	18	02	-
	4.1 Utility commands like end, save, status etc.			
	4.2 Edit & inquiry commands - Commands like copy, move, erase, area etc.			
	Practical	-	-	16
	(i) To study of basic drawing, utility, edit and enquiry commands.			
(05)	**Display and setting commands**	12	02	-
	5.1 Display commands like zoom, pan, view, regeneration, etc.			
	5.2 Setting commands like grid, ortho, axis, etc.			
	Practical	-	-	04
	(i)To study display commands and drawing aid feature.			
(06)	**Layer and shape files**	18	02	
	6.1 Concept and use of layer command			
	6.2 Creation of shape file.			
	6.3 Creating line type, creating font style etc.			
	Total	(82)	(16)	(28)

SECTION – II

(07)	**Complex Object Drawing**	12	02	

7.1 Using block, wblock, insert, etc.

7.2 Setting commands with prototype drawing file.

(08)   12   02   -

Attribute for Bill of Material

8.1 Attribute commands like ATTDEF, ATTDISP,
    ATTEDIT, ATTEXT (cdf, sdf, dxf), ASCTEXT.   -   -   04

Practical

(i) To study of attributes and bill of material

(09)   18   02   -

Dimensioning of Special Features

9.1 Different dimensions type, dimensioning adding
    tolerances, center, redius, leader, status,dim
    variable

9.2 Study of hatch pattern   -   -   12

9.3 Study of script and slide show.

Practical/s

(i) To study hatch pattern, line type, sketch, layer,
    dimension commands

(ii)To study customization of menu using macros.

(10)   20   05   -

Three Dimensional Drawing

10.1 Commands, V point, hide, view, 3D-view,
    elevation 3D-polyline, 3D-face, 3D mesh.

10.2 **UCS**, **UCSICON,** change property

10.3 TABSURF, REVSURF, EDGESURF,
    3DARRAY   -   -   12

10.4 3D Operation like ADD,SUBTRACT, etc

Practical/s

   1. (a) To study 3D Command

        (b) To draw an actually drafted design.

(11) **Introduction to Customization and Application**	20	05	-

11.1 Customization of menu, different types of available menu

11.2 Application in the areas of mechanical engineering like drawing of CAM profile

-	-	08

11.3 Slide show for slider crank mechanism

Practical/s

(i) Drawing application using AUTOCAD

(82)	(16)	(36)

Total

(6) IMPLEMENTATION STRATEGY (PLANNING)

(i)   Use of Auto Cad Drawing Files in practicals

(ii)   Lecture Plan

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	George Omura	Mastering Autocad 14	1st	1997	BPB Publication, New Delhi
(ii)	-	Autocad Reference Manual 2004	-	2004	Autodesk

FULL TIME

DISCIPLINE   :   **MECHANICAL ENGINEERING.**   **w.e.f. batch admitted june 2008**
(progressivly)

SEMESTER :   V   **Effective from the academic term:**
JULY-NOV.2010

Sr.No.	Subject Duration	Credit		Weekly Report	Quiz Test Marks	Dissertation (Report)	Oral/ Viva	Total
1.	26 Weeks	15	Maximum Marks	50	50	50	50	200
			Minimum Marks	20	20	20	20	80

FULL TIME

DISCIPLINE: MECHANICAL ENGINEERING.   **w.e.f. batch admitted june 2008 (progressive)**

 SEMESTER: SIXTH   **fective from the academic term: DEC-09/JAN-MAY 10**

TECHNICAL & EXAMINATION SCHEMES

Sr no	SUBJECT	SUBJECT CODE	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION &MARKS			SCHEME OF EXAMINATION						Group Compulsory/ Optional	Scheme L/Pr/Cr.
			L	P	D	T	Cr	NP	HRS	Mks	SSL	Theory paper	T/W	Pract.	Oral	TOTAL		
1	# Automation & CAD-CAM	ME-06	3	2	-	-	5	1	3	100	20	80	25	-	25	150	A*	325
2	Industrial Management -II	ME-02	3	-	-	-	3	1	3	100	20	80	-	-	-	100	M*	303
3	Modern Production Processes	ME-87	2	4	-	-	6	1	3	100	20	80	25	-	25	150	A*	246
4	Foundry Tech. & Mat. Science	ME-66	2	3	-	-	5	1	3	100	20	80	50	-	50	200	C*	235
5	Elective (Any One)																	
	(i) Automobile Engg. OR	ME-68	3	2	-	-	5	1	3	100	20	80	25	-	25	150	A*	325
	(ii)Mechatronics	ME-88	3	2	-	-	5	1	3	100	20	80	25	-	25	150	A*	325
6	Mechanical Measurements & Control	ME-69	3	2	-	-	5	1	3	100	20	80	25	-	25	150	A	325
7	World class Manufacturing System	ME-89	3	2	-	-	5	1	3	100	20	80	25	-	25	150	A	325
	TOTAL		13/19	11/15	-	-	33	-	-	-	140	560	175	-	175	1050		

			Total periods (24/33)		Total marks = (750/1050)			

- Diploma Award Subject.

AUTOMATION & CAD CAM

1) SUBJECT DETAILS

COURSE: MECHANICAL ENGINEERING   SEM: VI

CODE: ME-06   DURATION: 16 WEEKS

GROUP: APPLICATION (A*)   compulsory

2) TEACHING &EXMINATION SCHEME

Teaching Scheme		Credits	Examination Scheme & Maximum Marks			Theory	Sessional Marks	Term Work	Practical/ Oral	Total
Theory (Hrs/Week)	Practical (Hrs/Week)		Paper							
			Hrs	No. of paper	Marks					
3	2	5	3	1	100	80	20	25	25	150

3) RATIONAL:

The need of today's manufacturing industrial world is based on best quality & precision Oriented shorter manufacturing cycle time. To satisfy this need the use of CAD/CAM & automation Is inevitable. To satisfy industrial need ,diploma engineer should be able to cope with CAD/CAM technology. With this intention this subject Is introduced in the curriculum. The prerequisites of this subject have been introduced in earlier subject such as engineering graphics, engineering drawing & mechanical engineering drawing.

4) OBJECTIVES:

Student should be able to:

1. Understand the fundamentals & use of CAD,
2. Conceptualize drafting and modeling in CAD,
3. Prepare APT part programming.
4. Conceptualize automation and FMS
5. Knowledge of advanced pneumatic circuits.

5) CONCEPT   THEORY

Section-1   marks hours

1-introduction   Th   Pr

1.1 Definition of automation   08 02   03 -

1.2 Types of automation

1.3 Reason for automation

1.4 Arguments for and against automation

2-Production operations   10 03 02

2.1 Manufacturing industries
2.2 Types of production
2.3 Functioning in manufacturing
2.4Orgnization and information processes in manufactory
2.5 Automation strategies
Practical: 1 to study the production operation.

3-Progrmmable logic control (PLC)   24 07 04 -
3.1 plc hardware
3.2PLC compared with other control system
3.3 basics of plc programming
3.4 data controls
3.5 plc   sequencer and shift registers
3.6 timers   and counters
Practical : plc programming
4-Types of automated production systems   16 05 04
4.1 Automated flow lines
4.2 Methods of work part transport
4.3 Automation for machinery operations.
4.4Genral terminology and analysis.
4.5 analysis of transfer lines

Practical: 1-Assignment on production system.

5-Automated assembly system
  Material handling & storage system.   24 07 04

5.1Types of automated assembly systems
5.2Parts feeding devices.
5.3 automated guided vehicle systems
5.4 quantative analysis of agv systems
5.5 automated storage /retrieval systems
5.6 quantitive analysis of AS/RS systems
Practical: Assignment on automated assembly line.

Section 2
6-Indutrial robotics   16 05 04
6.1 Introductions
6.2Phyical configuration
6.3Basic robot motion
6.4 Technical features such as –work, volume, preciation
     And speed of movement, weight carrying capacity
6.5End effectors
6.6Robot sensors
6.7Application of robotics

-material transfer, machine loading, welding, spray coating,
Processing operation, assembly, inspection
Practical: 1Report writing on visit to industry having robot &
            Its inspection
        2 practical on pick place robot

7-Flexible manufacturing systems,   16 04 02
7.1What Is FMS
7.2FMS workstations
7.3Computer control systems
7.4Planning FMS
Practical: Assignment on FMS

8-Qulity control & automated inspection   16 05 02
8.1Inpection and testing
8.2Sensors technologies for automated inspection
8.3Machine vision
8.4Optical inspection methods
8.5Noncontacted inspection methods
Practical: Assignment on quality control & automated inspection

9- Computer aided design   18   05   04
9.1 the design process
9.2 applications of computer in design process
9.3 cad hardware
9.4 geometrical modeling techniques
 A   wire frame modeling
B surface modeling
C so;id modeling
9.5 software modules

Practical: Assignment on CAD

10 Computer integrated   manufacturing   18   05 04
10 .1 computer aided manufacturing
A   manufacturing planning
B   Manufacturing control
C   computerized elements of CIM system
10.2 computerized manufacturing planning systems
     A   computer aided process planning
     B computer integrated productin planning systems
     C   material requirements planning
     D capacity Planning
10.3 Shop floor control and automatic identification techniques
     A shop floor control

B Factory data collection systems
C Automatic identification techniques
D bar code technology
E automated data collection systems

10.4   Computer networks for manufacturing

10.5 future automated factory

Practical: assignment on CIM

6) IMPLEMENTATION STRATEGY (PLANNING)

1. Writing teaching plan

2. Demontration of models,

3. Fcilitating industrial visit.

7) BOOKS FOR REFERENCE

Sr.no.	Name & year of publication	Title	Name of author	Edition
1	Prentice Hall of India Pvt Ltd, 1998	Automation , production systems , and CIM	Mikell groover	1998
2	PHI Learning Private Limited New delhi	Programmable Logic Control	NIIT	2008
3	Prentice Hall of India Pvt Ltd, 1996	Programmable logic controll	John W Webb	2008
4	Prentice Hall of India Pvt Ltd, 2003	Cad/cam	Mikell groover	2003
5	New age International ltd	CAD/CAM/CIM	P radhakrishnan	12003
6	Prentice Hall of India Pvt Ltd, 1998	CAD/ CIM Principles & Application	N. Nageshwara Rao	2007

1. SUBJECT DETAIL'S:

COURSE: ALL DECIPLINES   **SEMESTER: VII**
SUBJECT: INDUSTRIAL MANAGEMENT – II   **CODE:ME-02**
COUMPULSORY:-M*

2. TEACHING & EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme & Maximum Mark's							
Theory Hrs Per Wk	Practical Hrs. Per Wk		Paper			TH	Sessional Marks	T/W	Pract	Total
			Hrs	N/P	Mks					
03	-	03	03	01	100	80	20	-	-	100

3. RATIONALE:

Management is the process of getting work done through work force to achieve the objectives of the organization. This subject "Industrial Management" covers the fundamentals principles, objectives, process and the various activities of the management. Along with attaining the necessary technical knowledge, the technical students also require some inputs in management areas so as to enable them to carry out their work effectively and efficiently. This subject will enable us to understand various process and activities in an industrial organization.

4. OBJECTIVES: 1. To know the process of management

2. To understand the organizational structure and its importance

3. To know the various functional areas of an organization

4. To understand the basics of costing and finance

5. To understand the various functions of marketing

6. To enable the students applying basic principles of management in their work life

5. DETAILED CONTENT:

SECTION-I

CHAPTER	CONTENT	MARKS	HOURS
01	**MANAGEMENT** 1.0 Introduction to management 1.1 Meaning, definition & importance 1.2 Relevance of management to engineers 1.3 Principles of management	12	05
02	**FUNCTIONS OF MANAGEMENT** 2.0 Functions of management 2.1 Planning organizing 2.2 Directing, communicating 2.3 Motivating & co-ordinating 2.4 Controlling	15	04
03	**ORGANIZATIONAL STRUCTURE** 3.0 Meaning, types & factors determining structure 3.1 Line organization 3.2 Functional organization 3.3 Line & staff organization 3.4 Project based organization	15	05
04	**PROCUREMENT** 4.0 Purchase procedures 4.1 Types of purchase 4.2 Principles of purchase	15	04

CHAPTER	CONTENT	MARKS	HOURS
	4.3 inventory & inventory control 4.4 Duties of store keeper		
05	**HUMAN RESOURSE MANAGEMENT** 5.0 Importance of human resource to industry 5.1 Recruitment, selection & placement of man power 5.2 Employee welfare measures in industry 5.3 Training & development 5.4 Self management 5.5 Time management	25	06

SECTION-II

CHAPTER	CONTENT	MARKS	HOURS
06	**MARKETING** 6.0 Importance of marketing 6.1 Sales & marketing – Difference 6.2 Product life cycles & marketing strategies 6.3 Channels of distribution 6.4 Packaging & advertising 6.5 Export marketing	15	05
07	**FINANCE** 7.0 Sources of finance 7.1 Working capital & fixed capital 7.2 Financial statements of the company 7.3 Financial ratios 7.4 Budgets & budgetary control	20	06
08	**COST & COST CALCULATION** 8.0 Objectives of cost calculation 8.1 Classification of costs – bases 8.2 variable & fixed cost 8.3 Direct & indirect cost 8.4 Functional costs 8.5 Cost control & cost reduction 8.6 Overheads & types of overheads 8.7Cost calculation of a product 8.8 Break even analysis	25	06
09	**DEPRECIATION** 9.0 Meaning & importance 9.1 Causes of depreciation 9.2 Methods of calculation of depreciation 9.3 Machine replacement – factors to be considered	10	03
10	**TIME VALUE OF MONEY** 10.0 Equivalence 10.1 Simple & compound interest 10.2 Present worth method 10.3 Future worth method 10.4 Sinking fund method	12	04

	10.5 Capital recovery method		

BOOKS RECOMMENDED:

AUTHOR	TITLE	PUBLISHER
1. T.R.Banga & S.C.sharma	Industrial organization & engineering economics	Khanna publication
2. O.P.Khanna	Industrial management	Ganpat rai
3. K.C.Jain & Agarwal	Production planning & Industrial management	Khanna publiction

SUBJECT DETAILS

Course: Mechanical Engineering	Semester:VI
Modern Production Processes (ME-87)	Duration : 16 Weeks
Group: Application A*	Compulsory

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme & Maximum Marks							
Theory (Hrs/Week)	Practical (Hrs/Week)		Paper			Theory	Sessional Marks	Term Work	Practical/ Oral	Total
			Hrs	No. of paper	Marks					
2	4	6	3	1	100	80	20	25	25	150

(3) RATIONALE:

From last few decades engineering industries have witnessed a rapid growth in the development of harder & difficult to machine materials such as carbides, stainless steel, nimonics , heat resisting steels etc. For such material conventional machine is uneconomical and degree of accuracy and surface finish attainable are poor. So it is the need for the development of process concepts in metal machining.

(4) OBJECTIVE:

(1) Students will be able to understand the different metal finishing process.
(2) Student will be able to understand the grinding process, sheet metal process, gear manufacturing & thread manufacturing process.
(3) Student will be able to operate grinding machine, milling machine, press tool.
(4) Student will be able to understand the principle of unconventional machining process.
(5) Student will be able to write part program using G – code.

SECTION –I

CHAPTER	CONTENTS	MARKS	HOURS
(1)	**Metal finishing process**	**10**	**02**
(1.1)	Metal spraying , Oxidizing ,Tumbling		
(1.2)	Honing, Lapping, Burnishing, Polishing		
(2)	**Griding**	**25**	**05**
(2.1)	Introduction to Grinding Process		
(2.2)	Types of Grinding Machines		
(2.3)	Grinding Wheel		
(2.4)	Bonds & Bonding Process		
(2.5)	Grit, Grade & structure of Grinding Wheel		
(2.6)	Wheel shape & sizes		
(2.7)	Selection of Grinding Wheel		
(2.8)	Standard marking system of Grinding Wheel		
(2.9)	Mounting of Grinding Wheel		

(2.10)	Balancing of Grinding Wheel		
(2.11)	Truing & Dressing of Grinding Wheel		

(3)	**Sheet Metal Work**	**17**	**04**
(3.1)	Introduction to Press Tool		
(3.2)	Shearing action & operations		
(3.3)	Classification of Dies & its various elements		
(3.4)	Drawing & Draw Die design		
(3.5)	Bending, Types of Bending Dies, Bending length & force calculation		

(4)	**Numerical Control/ Computerized Numerical Control**	**30**	**05**
(4.1)	Introduction		
(4.2)	NC & its components		
(4.3)	Position & Motion control in NC machines		
(4.4)	NC system		
(4.5)	Tool positioning modes		
(4.6)	NC part programming		
(4.7)	N- code, G- code, M- code		
(4.8)	Elementary exercise on part programming		

SECTION –II

(5)	**Gear manufacturing**	**30**	**04**
(5.1)	Introduction		
(5.2)	Gear cutting on milling machine		
(5.3)	Dividing head & Indexing methods		
(5.4)	Simple Indexing		
(5.5)	Compound Indexing		
(5.6)	Gear Hobbing		
(5.7)	Gear shaping		
(5.8)	Gear finishing process		

(6)	**Thread Manufacturing**	**15**	**03**
(6.1)	Introduction		
(6.2)	Tread chasing		
(6.3)	Thread milling		
(6.4)	Thread rolling		

(7)	**Modern Machining Methods**	**20**	**05**
(7.1)	Introduction		
(7.2)	Principle ,Advantages, Limitations & Application of Electro chemical machining / Grinding Electro discharged machining / wire cut EDM Ultrasonic machining Leaser beam machining Electro beam machining Plasma arc machining Abrasive jet machining		

(8)	**Plastic Moulding**	**17**	**04**
(8.1)	Introduction		
(8.2)	Types of plastics		

(8.3)   Compression Moulding
(8.4)   Injection Moulding
(8.5)   Blow Moulding
(8.6)   Extrusion

(7) PRACTICALS:
 (i) A job on tool grinding
 (ii) A composite job comprising different machining operation.
 (iii) A job on thread cutting.

(8) REFERENCE BOOKS:

Sr.No	Author	Title	Edition	Year Of publication	Publishers & Address
(i)	S.K. Hajara Choudhary A.K. Hajara Choudhary	Workshop technology Vol-II	14th	2007	Media promoters & publisher ltd. New Delhi
(ii)	B.S. Raghuvanshi	Workshop technology Vol-II	9th	1997	Dhanpatrai & Co. New Delhi
(iii)	W.A.J.Chapman	Workshop technology Vol-I, II, III	3rd	1998	Viva Books Pvt.Ltd. New Delhi Mumbai
(iv)	B.S.Pabla M.Adithan	CNC Machines	1st	1994	New Age International Pvt.Ltd Daryaganj New Delhi.

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(1) SUBJECT DETAILS

Course: Mechanical Engineering   Semester: VIth
                                                     Duration: 16 weeks
6.4 Subject – Foundry Technology & Material Science   Code –ME 66
Group: C*   Compulsory

(2) TEACHING AND EXAMINATION SCHEME

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs. Per Week)	Practicals (Hrs. Per Week)		Paper			Theory	Sessional Marks	Term Work	Practical/Oral	Total
			Hrs	No.Of Paper	Marks					
02	03	05	03	01	100	80	20	50	50	200

(3) RATIONALE

Mechanical engineering branch is related with industries where raw material is extracted in the form of ore, is purified and converted into pure metal form with the help of furnaces. The syllabus comprises of casting, Forging and the subject will also help the students to understand common metallic materials used in industries and also the familiarity of metal treatments.

(4) OBJECTIVE

a) The student may be able to do patterns.
b) The students may be able to prepare core box.
c) They will be able to understand casting process and defects in casting.
d) The student will understand properties of material.
e) The will know about metallurgy and heat treatment process.

(5) DETAILED CONTENTS

SECTION -I

Sr.No.	Contents	Hours	Marks
01	**Pattern Making** 1.1 Definition and its use. 1.2 Materials used 1.3 Types of patterns 1.4 Code used in practice. 1.5 Definition- Core, Core print, Core types and types of core boxes.	**05**	**20**
	Practical		
	1) Two different types of patterns preparation 2) Preparation of one core box.	**18**	-
02	**Moulding**		
	2.1 Different methods of Moulding and core making. 2.2 Sand moulding, Machine moulding, CO2 moulding and Shell moulding. 2.3 Moulding and core making materials and their properties.	**04**	**17**

Sr.No.	Contents	Hours	Marks
	Practical Visit to foundry – To study different types of Moulding processes and preparation of moulding sand.	**02**	-
03	**Foundry Furnaces**		
	3.1 Types of Furnaces – Construction, working and application of Cupola Furnace, Arc furnace- Indirect and Direct arc furnace.	**02**	**15**
	Practical Visit to Foundry - To observe working of different types of furnaces.	**02**	
04	**Casting**		
	4.1 Types of casting- Gravity die, Pressure die, Centrifugal casting. 4.2 Application, Limitation and accuracy of each process. 4.3 Defects in casting – causes and remedies.	**03**	**20**
	Practical Visit to factory – To study different casting processes and inspection of castings.	**02**	-
05	**Forging**		
	5.1 Forging process – Introduction to -Drop forging, Upset forging, Die forging 5.2 Types of dies – Open die, Close die (Single impression) Close die forging operation – Fullering, Edging, and Bending.	**02**	**10**

Section II

Sr.No.	Contents	Hours	Marks
06	**Engineering materials and their properties**		
	6.1 Introduction, Classification and Application of Engineering materials. 6.2 Properties of metals –Density, Melting point, Strength, Elasticity, Ductility, Malleability, Plasticity, Toughness, Hardness, Harden ability, Brittleness, Thermal conductivity, Electrical conductivity, Thermal coefficient of expansion 6.4 Factors considered in selection of materials 6.5 Material selection process.	**04**	**18**
	Practical i) Material identification of typical components. ii) Selecting Metals for mechanical working.	**06**	-
07	**Ferrous metals and alloys**		
	7.1 Classification, Application and composition of low carbon steel, Medium Carbon steel, High carbon steel. 7.2 Alloy steels – Tool steel, Stainless steel, Cutting tool material – High speed steel 7.3 Effect of alloying elements – Carbon, Silicon, Nickel, Manganese, Phosphorus, chromium, Molybdenum, Vanadium,	**03**	**15**

Sr.No.	Contents	Hours	Marks
08	**Non ferrous metals and alloys**		
	8.1 Classification, Application and composition of - Copper alloys - Naval brass, Muntz metal, Gun metal and bronzes. Aluminium alloys – Duraluminium and bearing materials like white metal and leaded bronzes.	02	15
09	**Heat treatment of steels**		
	9.1 Heat treatment process – Principle, Advantages, limitations and application Of - Annealing, Normalizing, Hardening and Tempering.	03	18
	Practical iii) Study of surface Hardening methods – i) Case hardening ii) Flame Hardening. iv) Visit to Industry -To study Heat treatment process, Melting process, effect of alloying elements and Microstructure	09	-
10	**Non metallic Materials**		
	10.1 Properties and applications of Ceramics and Abrasive materials 10.2 Introduction to Thermoplastic - ABS, Acrylic. 10.3 Introduction Thermosetting plastic – Bakelites.	02	08
11	**Powder metallurgy**		
	11.1 Introduction to Powder metallurgy process 11.2 Advantages, limitation and Applications of Powder metallurgy process for Tungsten carbide tip tools.	02	08
	Practical i) Study of cooling curves. ii) Study of iron – iron carbide equilibrium diagram.	09	--

(6) IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by adopting the following strategy. (Teaching plan)

i) Lesson plan.
ii) Use of charts, models and transparencies.
iii) Use of actual devices.
iv) Visit to manufacturing unit

(7) REFERENCE BOOKS –

Sr.No.	Author	Title	Publication
01	O.P. Khanna	Material Science and Metallurgy	Dhanpat Rai and Sons.
02	Dr. V.D. Kodgire	Material Science and Metallurgy	Everest Publishing House
03	R.K.Rajput	Material Science and Engineering	S.K.Katari and Sons
04	Lakhtin	Engineering Physical Metallurgy	Peace Publication
05	Higgins	Engineering Metallurgy process Vol. I & II	Tata Mc Graw Hill
06	ASM Vol. I	Properties and selection Iron and steel.	ASM America
07	ASM Vol. V	Heat Treatment	ASM America

| 08 | O.P. Khanna, S.M. Lal | Foundry Technology | Dhanpatrai and Sons |
| 09 | Hajra Choudhary | Workshop Technology Vol. I | Media Promoters. |

(1) SUBJECT DETAILS

COURSE: MECHANICAL ENGINEERING   **SEMESTER: VIth**

Duration: 16 weeks

AUTOMOBILE ENGINEERING
Code – ME - 88

Group: APPLICATION (A*)　　　　　　　　　　**compulsory(elective)**

(2) TEACHING AND EXAMINATION SCHEME

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs. Per Week)	Practical's (Hrs. Per Week)		Paper			Theory	Sessional Marks	Term Work	Practical	Total
			Hrs	No. Of Paper	Marks					
03	02	05	03	01	100	80	20	25	25	150

(3) RATIONALE

Automobile engineering. A technology subject has applications of various subjects taught earlier. All the major global players in automobile sector have launched their product in India. Automotive sector has major employment potential for diploma holders. Automobile servicing in particular offers good job opportunities as village, town &city level. This course in Automobile Engineering will make student understand & apply the knowledge about various system, subsystems & their inter-relationships.

(4) OBJECTIVE

Student will learn about automotive market in India. They will be able to identify and explain construction and working of various automotive systems and subsystems. Students will learn to carry out maintenance and performance testing of vehicle.

(5) DETAILED CONTENTS

SECTION -I

Sr.No.	Contents	Marks	Th (hrs)	
01	**Introduction To Automobiles** 1.1 constructional features of different types of engines used in automobiles Their characteristics. 1.2 Study of various engine components and their materials. 1.3 Classification of automobiles. 1.4 Vehicle layout and types. 1.5 Body construction-types and nomenclature of car body, Introduction to aerodynamic body shapes. 1.6Automobile market in India of "on road vehicles", major manufacturers, their products and their collaboration.	20	06	
02	**Automobile transmission** 2.1 Clutch-necessity, construction and working of coil spring and diaphragm	35	10	

Sr.No.	Contents	Marks	Th (hrs)	Practical (hrs)
	spring type clutch. 2.2 Gear Box-Tractive effort and Tractive resistance, types of G.B., Construction and working of constant mesh G.B. and synchromesh G.B., epicyclic G.B., Torque converter, over drive, transfer case. 2.3 Final drive-Necessity, construction and working of propeller shaft and differential. 2.4 Axle-type of rear axles, front axles and their applications **Practical/s** (i)Study and demonstration of single plate coil clutch and diaphragm spring type clutch. (ii)Study and demonstration of Synchromesh gearbox. (iii)Study and demonstration of differential.			
03	**Control system** 3.1 Steering system- Requirement of steering system, Construction and working of steering linkage, Steering gear box- Construction and working of rack and pinion and re-circulating ball type gearbox. Introduction to power steering,Steerring geometry-camber, caster, toe-in, toe-out, kingpin inclination and their effects. 3.2Break system-construction and working of hydraulic and pneumatic brakes, Comparison of discs and drum brake. **Practical/s** (i) Study and demonstration of Rack and pinion steering gearbox. (ii) Study and demonstration of hydraulic brake system.	27	08	
	TOTAL	82	24	

Section II

Sr.No.	Contents	Marks	Th (hrs)	Practical (hr
04	**Suspension System, Wheels and tyres** 4.1 Necessity and classification of suspension system. 4.2 Working and construction of leaf spring, rigid axle suspension. 4.3 Introduction to air suspension. 4.4 Construction and working of McPherson and Wishbone trailing link suspensions. 4.5Construction and working of telescopic shock absorbers. 4.6Construction and working of spoked wheel, disc wheel and light alloy cast wheel. 4.7Types of rims, their construction and working. 4.8Construction, working and comparison of radial, cross-ply and tubed, tubeless tyre and tyre specifications. 4.9Factors effecting tyre life. 4.10Wheel alignment and balancing. **Practical/s** (i) Study and demonstration of rigid axle suspension.	27	08	02

05	**Automobile Electrical System and Body** 5.1 Battery-working, construction and rating of battery. 5.2 Ignition-system, construction and working of electronic and CDI ignition system. 5.3 Starting system-construction and working of starting motor. 5.4 Changing system-construction and working of alternator. 5.5 Wiring system-harnessing and colour codes. 5.6 Lighting system-head light, tail light, indicator light and their circuits. 5.7 Gauges, construction and working of fuel level gauge, oil gauge and water temperature gauge. 5.8Use of microprocessor in automobile control system. **Practical/s** (i) Testing of battery and charging system.	35	10	
					02
06	**Vehicle Testing and Maintenance** 6.1 Need of vehicle testing, Vehicle tests standards, Different vehicle tests. 6.2 Maintenance- Trouble shooting and Service procedures, Overhauling-engine tune up. Tools and equipments for overhaul and repair. 6.3 Organization and management of service station, Testing equipments. 6.4 Pollution due to vehicle emissions, exhaust emission control system and regulations. **Practical/s** (i)Carrying out preventing maintenance of four wheeler as per manufacturer's specifications. (ii)Carrying out preventive maintenance of two wheeler as per manufacturer's specifications. (iii)Study of LPG/CNG kit retrofitting. (iv)Visit to four wheeler service station and any automobile manufacturing unit.	20	06	
					04
					04
					02
					08
	Total	82	24	22	

(6) IMPLEMENTATION STRATEGY (PLANNING)
In depth study and understanding of the subject will be implemented by adopting the following strategy. (Teaching plan)
    i) Lesson plan.
    ii) Use of charts, models and transparencies.
    iii) Use of actual devices.
    iv) Visit to automobile manufacturing unit and service station.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of publication	Publisher & Address
01	William Crouse	Automotive Mechanics			McGraw hill publishing company New York, U.S.A.
02	Dr. Kripal Singh	Automobile Engineering Vol .I And II			Standard publications.
03	Joseph Heitner	Automotive Mechanics..	II	1967	Affiliated Eastern Law House.
04	K.K.Jain and R,B.Asthana	Automobile Engineering			Tata McGraw hill publishing company limited, New Delhi- 110063
05	G.B.S.Narang	Automobile Engineering			Tata McGraw hill publishing company limited, New Delhi- 110063

(1) SUBJECT DETAILS

Course: Mechanical Engineering   Semester: VIth

                                                                Duration: 16 weeks

 Mechatronics   Code – ME - 88

Group: Aplication A*   compulsory(Elective)

(2) TEACHING AND EXAMINATION SCHEME

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs. Per Week)	Practicals (Hrs. Per Week)		Paper			Theory	Sessional Marks	Term Work	Practical	Total
			Hrs	No.Of Paper	Marks					
03	02	05	03	01	100	80	20	25	25	150

(3) RATIONALE

Mechatronics is an exciting interdisciplinary field of engineering based on Mechanical Engineering, Electronics Engineering, Controls Engineering & Computer Engineering, which deals with advanced hybrid systems, Electro-Pnumatic systems, Electro-Hydraulic systems, Softerwares, Microprocessors, Programmable Times to create useful products & to improve productivity.

(4) OBJECTIVE

It develops understanding of the study of automat from an engineering perspective & serves the purpose of controlling the advanced hybrid system. This helps to understand mechatronics system in industries business & home automation.

(5) DETAILED CONTENTS

SECTION -I

Sr.No.	Contents	Hours	Marks
01	Introduction to mechatronics, Definition, Mechatronics systems in factory, business & home automation. Overview of Microprocessor, Microcontroller & Microcomputer system.	06	25
02	Introduction to Sensors, Transducers & Actuators Principle, working and application of – Limit switches, proximity switches like inductive, capative and optical (deflection and tough beam type), Thumb wheel switches magnetic reed switches, optical encoders-displacement, measurement, rotary, incremental, opto-couplers. Actuators – Solenoids – ON-OFF applications, latching, triggering Types of relays – Solid state Types of motors – DC motors, DC brushless motors, AC motors, Stepper motors, Servo motors	06	27
03	8085 & 8086 Microprocessor Architecture, Pin configuration, working of microprocessor, and applications. Introduction to ICs used for interfacing such as – Programmable peripheral devices, USART, memory, keyboard, display-	08	20

Sr.No.	Contents	Hours	Marks
	LCD,LBD,I/O device, ADC,DAC etc.		
04	**8051** Microcontroller- Architecture, Pin configuration, working of microcontroller and applications. Applications Comparison of microprocessor and microcontroller, advantages and disadvantages.	04	10

Section II

Sr.No.	Contents	Hours	Marks
05	Selection of a PLC programming equipment, Programming formats Ladder diagrams and sequence listing, large process ladder diagram construction, flowcharting as a programming method, Basic PLC functions. Register basics timer functions, counter functions. Intermediate functions – Arithmetic functions, number comparison and number conversion functions. Data handling functions- SKIP, Master control relay, Jump, Move, Block move, Table to register and register to table move functions, FIFO and LIFO functions, File Arithmetic and logic function.	15	30
06	Introduction to Automatic control systems – Open loop and Close loop systems. Servo mechanism, process control system. Positive and Negative feedback.	03	20
07	ONS and CLR functions and their applications PLC digital bit functions and applications. Sequencer functions and cascading of sequencers. PLC matrix functions Discrete and analog operation of PLC, Networking of PLCs. PLC auxiliary commands and functions.	03	20
08	Online, Offline, Stop/run modes of operations. Uploading/ Downloading between PLC and PC, Introduction to SCADA and DCS	03	12

05) List of Practical –

1) Identification and demonstration of different sensors and actuaters.
2) Demonstration of the working of various digital to analog and analog to digital converters.
3) Development of ladder diagram, programming using PLC for
   a) Measurement of speed of a motor
   b) Motor start and stop by using two different sensors.
   c) Simulation of a pedestrian traffic controller.
   d) Simulation of four road junction traffic controller.
   e) Lift / Elevator control.
   f) Washing machine control.
   g) Tank level control.
   h) Soft drink vending machine control.
4) Trace, interpret and demonstrate working of at least two electro pneumatic systems.

5) Trace, interpret and demonstrate working of at least two electro hydraulic systems.

(6) IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by adopting the following strategy. (Teaching plan)

    i)   Lesson plan.
    ii) Use of charts, models and transparencies.
    iii) Use of actual devices.
    iv) Visit to manufacturing unit .

(7) **REFERENCE BOOKS**

Sr. No.	Author	Title	Publisher & Address
01	Bolton W.	Mechatronics – Electronic control system in Mechanical and Electrical Engineering	Pearson Education Ltd.
02	Histand B.H. and Alciatore D.G.	Introduction to Mechatronics and Measurement system.	Tata McGraw Hill
03	John W. Wrbb and Ronald Reis	Programmable Logic controllers..	Prentice Hall of India.
04	NIIT	Programmable Logic control- Principles and Applications.	Prentice Hall of India
05	Mahalik N.P.	Mechatronics principles, concepts and applications.	Tata McGraw Hill
06	Fawceett J.R.	Pneumatic circuits and low cost automation	---------
07	Gaonkar R.S.,	Microprocessor Architecture, programming and applications with 8085	Wiley Eastern Ltd.

(1) SUBJECT DETAILS

Course: Diploma in Mechanical Engineering   Semester: VIth

 Subject: Mechanical Measurement & Control   Code – ME - 69

Group: Application A   Optional

(2) TEACHING AND EXAMINATION SCHEME

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs. Per Week)	Practicals (Hrs. Per Week)		Paper			Theory	Sessional Marks	Term Work	Pract/oral	Total
			Hrs	No.Of Paper	Marks					
03	02	05	03	01	100	80	20	25	25	150

(3) RATIONALE

          The art of measurement plays an important role in all branches of engineering. With advances in technology, measurement techniques have also taken rapid strides, with many types of instrument devices, innovations, refinements. The course aims at making mechanical engineering student familiar with the principles of instrumentation, transducers & measurement of non electrical parameters like temperature, pressure flow speed, force and stress.

(4) OBJECTIVE

Student will be able to:

1. Understand he principle of operation of an instrument.
2. Appreciate the concept of an instrument.
3. Select suitable measuring device for a particular application.
4. Distinguish between various types of errors.

(5) DETAILED CONTENTS

SECTION -I

Sr.No.	Contents	Hours	Marks
01	Significance of measurement, classification of instruments, static terms and characteristics –range and span, accuracy and precision, reliability, calibration, hysteresis and dead zone, drift, sensitivity, threshold and resolution, repeatability, and reproducibility, linearity. Dynamic error, overshoot. Measurement of error- classification of errors, environmental errors, signal transducers: Classification of transducers-active and passive, resistive, inductive, capacitive, piezo, resistive, thermo resistive specification, selection and application for pressure, temperature, flow ,humidity displacement, velocity, force, strain sound. **Practice :** A report of the following experiments performed in the laboratory. 1. Displacement measurement dy inductive transducer.	12	36

Sr.No.	Contents	Hours	Marks
02	**Control systems** Block diagram of automatic control system, closed loop system, open loop system, feed back control system, feed forward control system, servomotor mechanism, comparison of hydraulic, pneumatic, electronic control system proportion control action. **Practice:** A report of the following experiments performed in the laboratory. 1. Speed measurement by using stroboscope/magnetic/inductive pick up.	06	30
03	**Displacement measurement** Potentiometer, LVDT, eddy current Generation type, speed measurement- Mechanical tachometer, revolution counter & timer, slipping clutch tachometer, electrical tachometer, and contactless electrical tachometer. **Practice:** A report of the following experiments performed in the laboratory. 1. Displacement measurement by inductive transducer.	06	16

Section II

Sr.No.	Contents	Hours	Marks
04	Temperature measurements- Non-electrical methods-bimetal and liquid in glass thermometer, pressure thermometer electrical methods-RTD, platinum resistance thermometer, thermistor. Themoelectrical methods-elements of thermocouple, law of intermediate temperature, law of intermediate metals, thermo emf measurmnt. **Practice:** A report of the following experiments performed in the laboratory. 1. Temperature control using thermal reed switch & bimetal switch.	06	20
05	Flow measurements- Variablehead flow meters, variable area meter-rota meter, Strain Measurement- Stress-relation, types of strain gauges, strain gauge materials, resistance strain gauge-bonded and unbounded, types (foil, semiconductor, wire wound gauges). **Practice:** A report of the following experiments performed in the laboratory. 1. Measurement of flow by using rotameter.	10	36
06	Miscellaneous Measurement Humidity measurement –hair hygrometer, humisor hygrometer Liquid level measurement –direct and indirect methods Force measurement-Tool Dynamometer (Mechanical type)	8	26

| | Shaft Power Measurement –Eddy Current Dynamometer, Strain Gauge Transmission dynamometer.
Practice:
A report of the following experiments performe in the laboratory.
　　1.　Measurement of force & weight by using a load cell.
　　2.　Liquid Level Measurement by using Capacitive Transducer system. | | |

(6) IMPLEMENTATION STRATEGY (PLANNING)

1. **Teaching Plan**
2. **Lesson Plan**
3. **Use Of Models, Charts.**

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Publisher & Address
01	A.K.Sawney	Mechanical Measurements & Instrumentation	Dhanpat Rai & Sons, New Delhi.
02	R.V.Jalgaonkar	Mechanical Measurements & Control	Everest Publishing House, Pune.
03	D.S.Kumar	Mechanical Measurements & Control	Metropolitan Publications, New Delhi.
04	C S.Narang.	Instrumentation Devices & systems	Tata McGraw hill publications.
05	R.K.Jain	Mechanical & Industrial Measurements	Khanna Publications, New Delhi.
06	B.C Nakra and K.KChaudhary	Instrumentation, Measurement and Analysis.	Tata McGraw hill publications.

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: VI**
	Duration: 16 Weeks
Subject : World class manufacturing system	**Code-ME-89**
Group : Application A	**Optional**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Practical/** Oral	Total
			Hrs	No of paper	Marks					
3	2	5	3	1	100	80	20	25	25	150

3) RATIONALE

The term word class manufacturing is popularly used to denote a standard of excellence. World class manufacturing is   a production practice that considers the expenditure of resources for any goal other than the creation of value for the end customer to be wasteful and thus target for elimination. World class manufactures are the one that posses the knowledge and technology to produce the product and services of continually improving quality.

(4) OBJECTIVES

The students will able to :
-Explain the importance of lean manufacturing.
Describe 5 's' and its implementation steps.
Describe value added and non-value added work.
Describe T.P maintenance implementation.
Explain how kanban reduce waste.
Describe and compute takt time.

(5) DETAILED CONTENTS

Chapter	Content	Marks	Hours
	SECTION-I		
		05	04
1	Lean manufacturing		
1.1	Introduction to lean		
1.2	Need principles		
1.3	Implementation	20	07
2	5 –'S'		
2.1	Introduction		

2.2   Need for 5 'S'
2.3   Implementation

PRACTICAL\S
1)study of 5 'S'

		16	04
3	Value stream mapping (material and information flow mapping)		

3.1   Introduction
3.2   Implementation
3.3   Value stream mapping tools like
      a)   process activity mapping
      b)product variety funnel mapping
      c)quality filter mapping
      d) forrester effect mapping
      e)decision point analysis

PRACTICALS
1)study of value steam mapping tools

4	Total productive maintenance	16	04

4.1   Introduction
4.2   Implementation
4.3   Types of maintenance

PRACTICALS
study of total productive maintenance

Manufacturing /Office cells OR Group Technology	15	05

5.1   **Introduction**

5.2   **Design**
      a)   process design b)Product design
      practicals-
      1)Study of group technology

6	**Kanban**	12	03

    Introduction
    Implementation
6.1   **Types**
    a)production kanban b) Withdrawal kanban
    Practicals
6.2   **1)Study of kanban**

6.3

07	18	05

Setup reduction

7.1 **Introduction to SMED**

7.2 **Implementation**

7.3 **Tools**

a)Visual control b) checklist

c)Quick fastners d) standaridize Die hight

e) locating pins f) Stoppers etc

Practicals –
Study of SMED

08	16	04

Kaizan

8.1 introduction
8.2 implementation
Practicals
1)Study of kaizen

09	20	05

Six sigma

9.1
9.2
9.3 Introduction
Sigma levels
Methods-
9.4 1)dmaic
2)dmadv
Implementation
Practicals
1)Study of six sigma

10	10	03

. Lean simulation

10.1 Introduction
10.2 Benefits
Practicals

1)Study of Lean simulation

| 11 | | | 22 | 08 |

Lean Techniques

11.1 West indentification
11.2 Mistake proffing/POKA –YOKE
11.3 Takt time
11.4 Visual workplace
Practicals
1)study of lean techniques

(6) IMPLEMENTATION STRATEGY (PLANNING)

(i) **Use of charts,models& transparencies**
(ii) **Teaching Plan**
(iii) **Industrial visits**

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Publishers & Address
(i)	Katsundo hitomi	Manufacturing system engg	Viva book pvt ltd pune
(ii)	Jeffery K.Liker David Meier	The Toyota Way field book	Tata Mc Grew Hill Publishing Comp Ltd
(iii)	R C Mishra& k pathak	Maintenance Engineering Management	Prentice Hall of India Private Limited New Delhi 110 001

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

FULL TIME

DISCIPLINE: MECHANICAL ENGINEERING.   i.e. batch admitted June 2008 (progressive)

SEMESTER: SEVENTH   **Effective from the academic term: 2008**

TECHNICAL & EXAMINATION SCHEMES

Sr no	SUBJECT	SUBJECT CODE	SCEME OF INSTRUCTIONS & PERIODS PER WEEK					NO. OF PAPERS, DURATION &MARKS			SCHEME OF EXAMINATION						Group Compulsory/ Optional	Scheme L/Pr/Cr.
			L	P	D	T	Cr	NP	HRS	Mks	SSL	Theory paper	T/W	Pract.	Oral	TOTAL		
1	# Metrology & quality control	ME-05	3	2	-	-	5	1	3	100	20	80	25	50	-	175	A*	325
2	# Design of machine element	ME-97	3	3	-	-	6	1	4	100	20	80	50	-	25	175	A*	336
3	# Refrigeration & air conditioning	ME-98	3	2	-	-	5	1	3	100	20	80	25	50		175	A*	325
4	# Production management	ME-78	3	2	-	-	5	1	3	100	20	80	25	-	25	150	M*	325
5	# Tool design & process planning	ME-77	2	3	-	-	5	1	3	100	20	80	50	-	25	175	A*	235
6	# Project	ME-79	-	4	-	-	4	-	-	-	-	-	50	-	50	100	A*	044
	TOTAL		14	16	-	-	30	-	-	-	100	400	225	100	125	950		
			Total periods (30)								Total marks = (950)							

(1) SUBJECT DETAILS

Course: Mechanical Engineering	Semester: VII
	Duration: 16 Weeks
7.1 Metrology & Quality Control (ME- 05)	
Group : Application (A*)	Compulsory

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Pract cal/** Oral	Total
			Hrs	No of paper	Marks					
3	2	5	3	1	100	80	20	25	50	175

(3) RATIONALE

The mechanical engineering technician often comes across measuring various parameters of machined components and the appropriate fitment of interchangeable components in assemblies. For the above purpose he/she is also required to analyze the quantitative determination of physical magnitude and ensure the control of quality.

The different methods and instruments which can be used for linear and angular measurements, geometrical parameters (like surface finish, square ness, parallelism, roundness, etc.) and the use of gauges and system of limits, fits, tolerances, etc. are often required to be dealt in detail by diploma technician on the shop floor. He/she is also required to analyze, interpret and present the data collected graphically & statistically for ensuring the quality.

The knowledge of the subject also forms the basis of the design of mechanical measurements systems, design & drawing of mechanical components.

(4) OBJECTIVES

It develops understanding of construction, working and use of different measuring instruments. It develops understanding of selection of appropriate instruments for specific measurements. It also develops understanding of different statistical quality control tools used to improve quality of product.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours	
			Theory	Practical
	SECTION – I			
(01)	**Introduction To Metrology**	06	02	-
	1.1 Definition of metrology, Categories of metrology, Scientific metrology, Industrial metrology, Legal metrology			
	1.2 Need of inspection			

1.3 Concepts of Precision Accuracy, Sensitivity, Readability, Traceability, Reproducibility.

1.4 Sources of errors, Factors affecting accuracy, Selection of instruments, Precaution while using instruments for getting higher precision and accuracy

Practical/s

i.	Study and use of Vernier Caliper	02
ii.	Study and use of Screw Micrometer	02
iii.	Study and use of Vernier Depth Gauge	02
iv.	Study and use of Depth Micrometer	02
v.	Study and use of Inside Micrometer	01

(02) Standard of measurements   06   02   -

2.1 Definition and introduction and comparison - line standard, End standard and wavelength standard comparison

2.2 Slip gauge and its accessories, Length bars.

(03) Comparators   14   04

3.1 Definition, requirement of good comparator.

3.2 Working principles of comparators, Use of comparators, Dial indicator , Johansson Mikrokator ,Sigma Comparator, Pneumatic comparator, Electrical, Electronic comparators.

3.3 Advantages and Disadvantages

Practical/s

(i)	Study and use of Mechanical Comparator	02
(ii)	Study and use of Dial Micrometer	02
(iii)	Study and use of Dial Bore Gauge	01

(04) Angle Measuring Instruments   10   03

4.1 Concept of angle measurement, instruments for angle measurement

4.2 Working and use of Bevel Protractor, Sine Bar, Spirit Level, Sine Centre, Clinometrer, Angle

Gauges, Autocollimator

Practical/s

(i) Study and use of Bevel Protractor   02

(ii) Use of Sine Bar   02

(05) **Limits, Fits, Tolerances and Limit Gauges**   08   02

5.1 Concept of Limits, Fits, Tolerances.

5.2 Interchangeability and Selective Assembly.

5.3 Hole and Shaft basis system

5.4 Taylor's Principle of gauge design

5.5 Design of plug and ring gauges

(06) **Metrology of Screw Threads**   10   03

6.1 Errors in threads, pitch errors

6.2 Measurement of elements such as major dia.
Minor dia. Effective dia. Pitch and angle for
external threads. (Two wire method, three wire
method, thread micrometer, floating carriage
micrometer)

Practical/s

i   To find the major diameter, minor diameter,   02
    pitch and angle of thread on tool maker's
    microscope.

ii Study of Screw Pitch Micrometer   01

(07) **Gear Measurement**   10   03

7.1 Analytical and functional inspection, Rolling
    Test, Measurement of tooth thickness, gear
    tooth vernier.

7.2 Errors in gears such as backlash run out,
    Composite

Practical/s   01

(i) Study of gear tooth vernier

(08)	**Measurement and Surface Finish**	08	02	

(08)   **Measurement and Surface Finish**   08   02

8.1 primary and secondary texture, sampling length, Lay, ClA, Ra, RMS, Rz, values and their interpretation

8.2 Various techniques of qualitative analysis, working principle of stylus probe instruments such as Tomlinson surface meter

(09)   **Measurement and Testing**   10   03

9.1 testing straightness- Wedge method, use of spirit level and autocollimator.

9.2 Testing flatness - use of spirit level/ Autocollimator, use of optical flat

9.3 Square ness testing – Indicator Method, Use of Optical Square

9.4 Tool Maker's microscope

9.5 Profile projector

Practical/s

i use optical flat to inspect flatness of slip gauges   01

              Total   82   24   23

SECTION II

(10)   **Quality Control**   14   04

10.1 Measuring of Quality, Quality Control.

10.2 Inspection stages, comparison between inspection and quality control

10.3 Meaning of quality of design, quality of conformance, quality of performance, factors affecting them

10.4 Cost of quality, value of quality, optimum Quality of design.

10.5 Concept of reliability/

10.6 Quality assureance

10.7 Vendor Ratings, Vendor quality ratings

(11)   **Total Quality Management**   14   04

11.1 Principles of TQM – customer focus, commitment by top management, continuous improvement- PDCA, quality circles, employ empowerment (JIDOKA)

11.2 Quality audit – concept of audit practices, lead
     Assessor certification.
11.3 Six Sigma – statistical meaning, methodology
     Of system improvement, DMAIC cycle,
     Yellow belt, green belt, black belt certification.

(12)_ ISO 9000 Series and other standards	06	02

12.1 Concept, ISO 9000 series quality standards.
12.2 QS 14000, standards in general its evaluation
     and implications, necessity of ISO certification
12.3 Other quality systems.

(13) Statistical Quality Control	38	11

13.1 Meaning and importance of SQC
13.2 Variable and attribute measurement, chance
     and assignable causes of variation.
13.3 Frequency Histogram, Polygon, Bar Chart.
13.4 Normal distribution curve – characteristics,
     uses, process capability, capable and incapable
     process, possible relations of process in
     control with USL and LSL, Cp, Cpk.
13.5 Control chart for variables – X and R chart
     (calculations of trial control limits, revised
     control limits, interpretation and conclusion
13.6 Control Chart for attributes – P chart, np Chart
     c chart (calculations of trial control limits,
     revised control limits, interpretation and
     conclusion.)
13.7 Pareto analysis, cause and effect diagram,
     Scatter diagram.

Practical/s

i Quality control by statistical methods. Plotting		01
the charts from given data.		02
(a) Frequency Histogram.		02
(b) Normal distribution curve		02
(c) Control Chart for average and range		02
(d) Control chart for fraction defectives		02
(e) Control chart for no. of defectives		02

(14)	**Acceptance sampling**	10	03
	14.1 Concept, comparison with 100% inspection		
	14.2 Type of sampling plans, merits and demerits		
	14.3 Operating characteristic curve- importance, Significance, producers risk, consumers risk, AQL, IQL, LTPD, AOQL.		

| | **TOTAL** | 82 | 24 | 09 |

(6) IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the the subject will be implemented by adopting the following strategy. (teaching plan)

(i) Lesson Plan
(ii) Use of charts, models and transparencies.
(iii) Use of actual devices

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	R.K. Jain	Engineering Metrology	12th	2005	Khanna Publishers, 2B-Nath Market, Delhi-06
(ii)	I.C. Gupta	Engineering Metrology	13th	2002	Dhanpatrai & Sons
(iii)	M.S. Mahajan	Statistical Quality Control	16th	2002	Dhanpatrai & Sons 1682, Nai Sarak, Delhi
(iv)	Grant Leavenworth	Statistical Quality Control	2nd	1988	Tata McGraw Hill Book Co. Singapore
(v)	J.M. Juran	Quality Planning & Analysis	3rd	1995	Tata McGraw Hill 4/12 Asat Ali Road New Delhi-02
(vi)	Besterfield, Dale H.	Total Quality Management	3rd		Prentice Hall, New Delhi

(1) SUBJECT DETAILS

Course: Mechanical Engineering	Semester: VII
	Duration: 16 Weeks
7.2 Machine Design Practice (ME- 95)	
Group : Application (A*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Prac-tical/** Oral	Total
			Hrs	No of paper	Marks					
3	3	6	4	1	100	80	20	50	25	175

(3) RATIONALE

 The product produced will be used under different conditions such as overload, cold climate, excessive heat, exposed to moisture from atmospheres. The product has to sustain these conditions and work efficiently. Different types of stresses are developed during production. The product has to withstand different type of stresses. The failure of the product will lead to loss of life of the users. The subject deals with designing of the product to withstand these variations.

(4) OBJECTIVES

The students will able :
(i)   to identify different types of stresses.
(ii) to identify different types of load acting.
(iii) to select proper raw material.
(iv) to suggest ideal manufacturing process.

(5) DETAILED CONTENTS

 Chapter   **Content**   **Marks**   **Hours**
                                                                 SECTION-I

No.	Topic		
(01)	**Introduction** 1.1 Introduction to design 1.2 Types of loads and stresses acting on machine components & examples 1.3 Material specifications and selection 1.4 Elastic stress, yield stress, ultimate stress and design stress & factor of safety, consideration in deciding safety factor 1.5 Simple problems	12	04
(02)	**Design of Joints** 2.1 Design of cotter joint 2.2 Design of knuckle joint **Practical/s** (i) Design of rod joints	16	04
(03)	**Design of Shafts** 3.1 Shafts, axle and spindles 3.2 Design of shafts subjected to torsion alone 3.3 Design of shafts subjected to torsion and bending 3.4 Line shafts	16	04
(04)	**Design of Coupling** 4.1 Classification and application 4.2 Design of single and split muff couplings 4.3 Design of flange couplings 4.4 Selection of flexible coupling **Practical/s** (i) Design of shaft coupling	16	06
(05)	**Design of Bearing** 5.1 Selection of bearings from handbook	10	02
(06)	**Design of Springs** 6.1 Types of springs, classification and application 6.2 Design of helical compression and tension springs, torque and deflection equations, Wahl's stress factor, end connections	12	04
	Total	**(82)**	**(24)**

SECTION – II

No.	Topic		
(07)		16	04
	Design of Power Screws 7.1 Power screw profiles & designation, application and selection 7.2 Design of simple power screws and screw jacks **Practical/s** (i) Design of power screws		

(08)		16	04

Design of Lever

8.1 Design of hand and foot levers
8.2 Design of bell crank levers

(09)		12	04

Design of Machine Parts Subjected to Eccentric Loading

9.1 Direct stresses and bending stresses
9.2 Design of offset links & C-frames

(10)		12	04

Design of Bolted Joints

10.1 Types of bolts and locking arrangements
10.2 Types of gaskets and applications
10.3 Bolted joints subjected to eccentric loading
Practical/s
(i) Design of composite assignment consisting of above topics such as Shafts, Springs, Brackets, Bolts, Levers, etc.

(11)		10	04

Design of Welded Joints

11.1 Types of welded joints, advantages and practical applications
11.2 Size of weld and strength of welded joints
11.3 Welded joints subjected to bending and torsion
11.4 Welded joints subjected to eccentric loading

(12)		16	04

Design of Gears

12.1 Types of gears, terminology and applications
12.2 Design of spur gears & simple gear calculations & Lewi's formula
12.3 Mounting of gears
Practical/s
(i) Design of gear drive

		(82)	(24)

Total

(6) IMPLEMENTATION STRATEGY (PLANNING)

(iv) Students are made conversant with use of design standards and handbooks. Term work consists of designs and preparation of working drawing of simple machines. Practical examination : consists of an oral based on theory and term work.

(v) Teaching Plan

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	R.S. Khurmi & J.K. Gupta	Machine design	7th	2004	Eurasia Publishing House Pvt Ltd., 7361, Ramnagar, New Delhi, Anand 398 001
(ii)	N.C. Pandya & C.S. Shah	Elements of machine design	6th	1983	Charotar Publishing Opp. Amul Dairy, Anand 388 001
(iii)	M.F. Spott	Design of machine elements	5th	1978	Prentice Hall of India Private Limited New Delhi 110 001

SUBJECT DETAILS

Course: Mechanical Engineering	Semester: VII
7.3Subject :- Refrigeration and Air Conditioning	Code :- ME-98
Group : Application (A*)	Compulsory

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Prac-tical/** Oral	Total
			Hrs	No of paper	Marks					
3	2	5	3	1	100	80	20	25	50	175

3) RATIONALE:

        RAC is inflict with the process of cooling and heating by removing and adding heat to and from the space. It is a scope of application lies in railways, theaters, hospitals, domestic application, industries, aircraft and rockets etc. Because of ozone depletion, which is global problem, special attention has been given on this subject.

4) OBJECTIVE:

  In refrigeration 1) Students will learn about old and CFC free refrigerants along
                   with their properties.
          2) Students will well-versed with refrigeration machines- vapour
             compression and vapour absorption.
          3) Students will learn modern refrigeration system and practices
          4) Students will be able to calculate the capacity of RAC machine
          5) Students will understand basics of liquefaction of gases

  In Air conditioning 1) Students will learn about psychometric properties and processes
           2) Students will get acquainted with A/C machines like, window A/C,
            package A/C, central A/C and their application.
           3) Students will learn modern A/C systems.
           4) Students will able to design A/C system for rooms or building.

(5) Detailed Contents:

SECTION- I

Sr No	Topic	Marks	Period
(1)	**Refrigeration Cycle-**	36	10

    (a) Reverse carnot cycle.
    (b) Reverse Brayton or Bell Coleman cycle.
    (c) Vapour compression cycle. Air refrigeration system.
    (d) Vapour absorption cycle.
    (e) COP, TR, sub cooling, superheating
    (f) Refrigeration of these cycles on P-V, T-S & P-H diagrams
    (g) Actual VCR system.
    (h) Refrigeration plants.
    (i) CEC & Star Rating of refrigerator
    (j) Introduction of modern refrigeration system.

Practicals:
(k) Study of vapour compression refrigeration system
(l) Study of vapour absorption refrigeration system
(iii) Performance of refrigeration test rig.

(2)	**Refrigerants**	10	06

    (a) Primary Refrigerants, CFC free refrigerants, Azeotropes, Properties
    (b) Secondary Refrigerants Nacl, $Cacl_2$, chilled water.
    (c) Corrosion inhibitors
    (d) Eco-friendly Refrigerants
    (e) Ozone depletion, green house effect.
    (f) Refrigerant recovery system

(3)	**Component of vapor compression refrigeration system**	20	08

    (a) Compressor hermetically sealed reciprocatory, rotary, screw
       Scroll compressor
    (b) Capacity control of compressor.
    (c) Lubricant oil, oil separator.
    (d) Condenser-types, cooling tower-types
    (e) Evaporator-types.
    (f) Expansion devices-capillary tube, automatic expansion valve
       T.E.V, high and low side float valve.
    (g) Component selection.

(4)	**Low temperature refrigeration (numerical, no derivation)**	16	08

    (a) Cascade refrigeration system
    (b) Manufacture of dry ice.
    (c) Liquefactions of gases, hydrogen, helium.

(d) Lined system, Claude system.

SECTION- II

Sr.No.	Topic	Marks	Period
(5)	**Air conditioning system.**	**36**	**14**

(a) Psychometric properties, process.
(b) Factors affecting human comfort.
(c) Application of split A/C, package A/C, multisplit A/C , year
Round A/C, VRF, chiller system, MAC system, VAV system
(d) Heat pump and heat recovery system.
(e) Cooling load calculation
(f) SHF, BPF.
(g) Problems of load calculations of different field.

Practicals:
(a) Study of window air conditioner
(b) Study of package and split A/C.
(c) Field load calculation.
(d) Study of domestic refrigeration
(e) Study of water cooler.
(f) Study of ice plant/ cold storage.
(g) Performance of heat pump Trainer.

(6)	**Distribution system.**	**20**	**08**

(a) AHU, duct system.
(b) Air distribution system and air circulation.
(c) Pressure in ducts, simple numerical (no derivation)

(7)	**Food preservation**	**08**	**02**

(a) Causes of food spoilage
(b) Methods of food preservation.

(8)	**Controls**	**10**	**04**

(a) Electrical and Electronic & digital
(b) Refrigerant feed control, temperature control.
(c) Defrosting method.
    Scada -working and application.

(9)	**Air conditioning equipments**	**08**	**04**

(a) Air cleaner, air filter, dehumidifier, humidifier.
(b) Fans and Blowers, grills and registers.

6) IMPLEMENTATION STRATEGY

a) Teaching plan
b) Periodical test
c) Charts

d) Continuous assessment of term work

7) Reference books

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
i)	S.C. Arora S. Domkundwar	Refrigeration & A/C	5th	1996	Dhanpatrai & Sons 1682, Nai Sarak, Delhi
ii)	C.P.Arora	Refrigeration & A/C	2nd	2000	Tata McGraw Hill 4/12 Asat Ali Road New Delhi-02
iii)	P.N.Anantnarayanan	Refrigeration & A/C	2nd	1996	Tata McGraw Hill 4/12 Asat Ali Road New Delhi-02
iv)	R.S.Khurmi	Refrigeration & A/C	2nd	2000	Tata McGraw Hill 4/12 Asat Ali Road New Delhi-02
v)	W.F. Stoecker & J.W.Jones	Refrigeration & A/C	-	-	Tata McGraw Hill 4/12 Asat Ali Road New Delhi-02
vi)	Norman.C.Harris	Modern Refrigeration & A/C practice	-	-	Wiley Eastern publications
vii)	R.J.Dossat	Princeple of Refrigeration	-	-	Wiley Eastern publications

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: VII**
	Duration: 16 Weeks
7.4 Production Management (ME- 78	

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Practical/** Oral	Total
			Hrs	No of paper	Marks					
3	2	4	3	1	100	80	20	25	25	150

(3) RATIONALE

Today's organisation has to accommodate new product, volume changes, new technologies and management philosophies due to changing environment. There is a constant pressure to improve all work processes to meet the demands of changing environment.

Production Management plays a pioneering role as a change agent in the organisation as system integrators with strong mathematical, statistical, technical and management background.

(4) OBJECTIVES

(i) To make the student understand concept of production system and production management

(ii) To make the students understand effective utilization of the various resources required for production & service facilities available to produce the product.

(iii) To make them able to work effectively on the shop floor.
(iv) To make them understand the advanced productivity techniques.

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours
	SECTION – I		
(01.)	**General**	16	05
	1.1 Production		
	1.2 Departments and functions		
	1.3 Inter-relationship		
	Practical/s		
	(i) Assignment on working of a company		
(02)	**Design of Production System**	50	14
	2.1 Production system		
	2.2 Types of production		
	2.3 Plant location		

2.4 Plant layout – their types
2.5 Tools & techniques of plant layout
2.6 Product design and development
2.7 Break even analysis
2.8 Standardization, simplification & specialization
2.9 Make buy decision

Practical/s

(i) Assignment on production system
(ii) Assignment on plant layout
(iii) Assignment on Product design and development

(03)	**Material Handling**	16	05
	3.1 Introduction		
	3.2 Principle of material handling.		
	3.3 Material handling equipment		

Practical/s

(i) Assignment on Material Handling System

	Total	(82)	(24)

SECTION – II

(04)	**Planning and Control**	65	19
	4.1 Production, planning & control		
	4.2 Sales forecasting		
	4.3 Scheduling		
	4.5 PERT & CPM		
	4.6 Linear programming		
	4.7 Assignment models		
	4.8 Sequencing models		

Practical/s

(i)   Assignment on production, planning and control
(ii) Assignment on PERT & CPM
(iii) Assignment on linear programming
(iv) Assignment on assignment and sequencing
      models

(05)	**Inventory Control**	17	05
	5.1 Elements of control procedure		
	5.2 Inventory control system, types		
	5.3 EOQ, safety stock		
	5.4 ABC analysis		
	5.5 Just in time		

Practical/s

(i) Assignment on inventory control system

| | **Total** | (82) | (24) |

(6) IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by using
(i) Teaching Plan
(ii) Use of Charts, models and transparencies
(iii) Use of other teaching methods such as case study, group discussion etc.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	Eilon Samuel	Elements of Production Planning & Control	-	1989	Universal Pub. 534, Kalbadevi Rd Mumbai-400 002
(ii)	Elwood S. Buffe Rakesh K.Sarin	Modern Production Operation Management	8th	1987	John Witey & Sons INC., 605,3^{rd} Avenue, New York
(iii)	Hamdy A. Taha	Operation Research	6th	2000	Prentice Hall of India Pvt.Ltd New Delhi-110 001
(iv)	V.K.Kapoor	Operation Research	7th	2001	Sultan Chand & Sons, 23, Daryaganj New Delhi-110 002
(v)	Martand Telsang	Industrial Engineering & Production Management	2nd	2002	S.Chand & Co. 7361, Ram nagar, New Delhi 110055

(1) SUBJECT DETAILS

Course: Mechanical Engineering	**Semester: VII**
	Duration: 16 Weeks

7.5 Tool Design and Process Planning (ME- 77)

Group : Application (A*)   **Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory (Hrs Per Week)	Practical (Hrs Per Week)		Paper			Theory	Sessional Marks	Term-Work	**Prac-tical/** Oral	Total
			Hrs	No of paper	Marks					
2	3	5	3	1	100	80	20	50	25	175

(3) RATIONALE

With an advent of technology there are many advances in manufacturing processes and equipments. Knowledge of conventional tools and working on them with the help of jigs and fixtures for holding the work piece and guiding the tools is very important in production engineering and Process Planning is used for the production of a part or product. So, it is the linkage between product design and product manufacturing which will help to reduce manufacturing time, cost and scope for interchangeability of components.

(4) OBJECTIVES

(i)   The students will be able to design the jigs and fixtures for different components
(ii) The student will be able to design a press tool for a given component
(iii) The student will be able to write a process sheet

(5) DETAILED CONTENTS

Chapter	Contents	Marks	Hours
	SECTION – I		
(01)	Tool Design 1.1 Introduction 1.2 Objective 1.3 Economics 1.4 Analysis of small tool costs	12	03
(02)	**Cutting tool design** **2.1 Metal cutting principles** 2.2 Cutting tools selection 2.3 Chip formation 2.4 Tools wear	15	03
(03)	**Work Holding** **3.1 Principle**	22	04

	3.2 Locating principles		
	3.3 Work Piece Surface		
	3.4 Types of locations		
	3.5 Degree of Freedom		
	3.6 Basic locating Rules		
	3.7 Location Tolerances		
	3.8 Fool Proofing		
	3.9 Types of locator		
	3.9.1 Clamping Principles		
	3.9.2 Types of clamps		
(04)	**Jig Design**	23	04
	4.1 Principles		
	4.2 Developing Preliminary jig design		
	4.3 Drill jigs		
	4.4 Types of drill jigs		
	Practicals		
	1 – Design and drawing of drill jig		
(05)	**Plastic Moulds**	10	02
	5.1 Introduction		
	5.2 Types		
	5.3 Basic Elements		
	Total	82	16

SECTION – II

(06)	**Fixture design**	22	05
	6.1 Principles		
	6.2 Developing Preliminary fixture design		
	6.3 Types of the fixture		
	Practicals		
	Design and drawing of fixture		
(07)	**Press Working**	30	07
	7.1 Power Presses		
	7.2 Cutting Operations		
	7.3 Die & punch design for bending, forming & drawing die		
	7.4 Design for progressive die		
	Practicals		
	1 – Design and drawing of punch & die for bending, forming & Drawing		
	2 – Design and drawing of progressive die		
(08)	**Process planning**	30	04
	8.1 Introduction		
	8.2 Role of process planning engineer		
	8.3 Steps to process planning		

8.4 Time data, equipment & too ling to the sequence
process
8.5 Factors influencing process selection
8.6 Process chart
Practicles
1 –Construction of process planning Sheet for the given
job

	Total	82	16

(6) IMPLEMENTATION STRATEGY (PLANNING)

(i)   Lectures/(Use of OHP)
(ii) Fabrication projects on jig, fixtures and press tools
(iii) Design of jig fixture and press tools
(iv) Hand outs and part prints for the above topics
(v) Teaching Plan

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
(i)	Donald Eary & Gerald Johnson	Process Engineering	-	1962	Prentice Hall Eagle Wood Cliff New Delhi- 110 001
(ii)	Cyril Donaldson Frank Wilson	Tool Design	27th	2000	Prentice Hall Eagle Wood Cliff New Delhi- 110 001
(iii)	P. H. Joshi	Jigs & Fixtures	10th	1984	Tata Mcgraw Hill, New Delhi
(iv)	M. H. Kempster	Introduction to jig & tool design	-	-	Viva Book Pvt. Ltd. Pune
(v)	Vukota Boljanovic	Sheet Metal Forming Processes & Die Design	-	-	Industrial Press Inc. Newyork
(vi)	P. C. Sharma	Production Engineering	-	-	S. Chand

(1) SUBJECT DETAILS

Course: Mechanical Engineering	Semester: VII
	Duration: 16 Weeks
7.6Project (ME -79)	
Group : Application (A*)	**Compulsory**

(2) TEACHING AND EXAMINATION SCHEMES

Teaching scheme		Credits	Examination Scheme and Maximum Marks		
Theory (Hrs Per Week	Practical (Hrs Per Week)		Term-Work (project report)	Presentation &Oral	**Total**
0	4	4	50	50	100

(3) RATIONALE:
      The diploma engineers have to face problems related to drawing / design of assembly/ machine proc installation, testing, etc. To solve such problems, they should develop systematic approach and the same will induced in them.

4) OBJECTIVE:
      Project develops the ability to visualize the problems related to design and drawing, assembly testing They have to develop a prototype or model of a project etc. It can be an advances analysis. The group project develop skills and attitude to work in teams specially when the nature of work is project based.

5) SELECTION PROCESS:
      1) Selection of topic from the group of topics by a group of students(not more than 8)
      2) Detailed discussion with HOD / Sr. staff / other staff members who will guide.
      3) Submitting of synopsis of it along with all details including financial requirements

6) IMPLEMENTATION STATEGY(Planning)
      1) Study of objectives of the project
      2) Data collection and design calculations (as applicable)
      3) Drawings of Sub-assembly/ assembly
      4) Procurement of raw material/s
      5) Machining
      6) Assembly
      7) Testing

7) References covering the following points:
    1) Data Collection
    2) Information from Industries
    3) Use of reference Books

4) Use of Data books like borings / shafts / steels / section, etc.
5) Use of standards.

Shri Vile Parle Kelavani Mandal`s
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

DISCIPLINE: MECHANICAL   ENGINEERING   FULL TIME   w.e.f. batch admitted June,2008 (Progressively)

TEACHING & EXAMINATION SCHEMES   Effective from the Academic Term July/November,2008

CODE : ME08IT

VIII   SEMESTER

Sr No	Subject Duration	Credit		Weekly Report	Quiz Test Marks	Dissertation (Report)	Oral/ Viva	Total
8.1	26 Weeks	15	**Maximum Marks**	50	50	50	50	200
			Minimum Marks	20	20	20	20	80

- **Maximum 100 marks of Inplant Training will be considered for Award of Diploma.**
- **The Examination shall be conducted for 200 marks and same marks will be converted in to 100 by the Examination Section.**