MODEL CURRICULUM

FOR

POST SSC PROGRAMME

IN

DIPLOMA IN MECHANICAL ENGINEERING 2011

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

7TH FLOOR, CHANDRALOK BUILDING, JANPATH

NEW DELHI – 110 001

FOREWORD

It is with great pleasure and honour that I write a forward for the Model scheme of instruction and syllabi for the Post SSC Engineering Diploma programmes prepared by the All India Board of Technician Education with **Prof. Ashok A. Ghatol** as its Chairman and other members. All India Council for Technical Education has the onerous responsibility for uniform development and qualitative growth of the Technical Education system and preparation of syllabi to maintain uniform standards throughout the county. In pursuance to clause 10 (2) of the AICTE Act 1987 AICTE has the objective of bringing about uniformity in the curriculum of Engineering. In that direction, the efforts of the All India Board of Technician Education has been quite commendable and praiseworthy. A painstaking effort was made by the Chairman, members of the Board and various working groups composed of experts from leading institutions in framing of the Instruction and Syllabi. The Board was ably assisted by the official of the Academics Bureau in successfully organizing the meetings making available necessary documents and follow up action on the minutes of the meetings.

Chairman

All India Council for Technical Education

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME: ELECTRONICS/MECHANICAL/CIVIL/COMPUTER/ELECTRICAL/CHEMICAL ENGG. GROUPS

COURSE CODE : EJ/EN/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/CO/CM/IF/EE/EP/CH/CT/PS/ CD/EDEI/ CV/MH/FE/IU/MI

DURATION OF COURSE : 6 SEMESTERS

SEMESTER: FIRST **SCHEME : C**

BRANCH: Common for all branches **YEAR:I** **SEMISTER: I**

SR.NO.	SUBJECT	PERIODS			EVALUATION SCHEME						Credits
	THEORY	L	TU	PR	SESSIONSAL EXAM			ESE	PR #	TW @	
					TA	CT	Total				
1	Basic Physics	2	-	2	10	20	30	70	50	-	3
2	Basic Chemistry	2	-	2	10	20	30	70	50	-	3
3	Basic Mathematics	4	1	-	10	20	30	70	-	-	5
4	English	2	-	2	10	20	30	70	-	25	3
5	Engineering Graphics	2	-	4	-	-	-	-	-	50	4
6	Computer Fundamentals	1	-	4	-	-	-	-	50	25	3
7	Basic Workshop Practice (Group wise)	-	-	3	-	-	-	-	50	25	2
	Total	**13**	**1**	**17**	**40**	**80**	**120**	**280**	**200**	**125**	**23**

STUDENT CONTACT HOURS PER WEEK: **31 HRS**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

- External Assessment @ - Internal Assessment ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, PR - Practical

TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

Total Marks : 725

Minimum passing under any head is 40%, i.e. 40% passing for Sessional, ESE, Oral, and TW Separately.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : ELECTRONICS/MECHANICAL/CIVIL/COMPUTER/ELECTRICAL/ CHEMICAL ENGG. GROUPS		
Course code: EJ/EN/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/ CS/CR/CO/CM/IF/EE/EP/CH/CT/PS/CD/EDEI/ CV/MH/FE/IU/MI	**Semester : FIRST**	
Duration : 6 SEMESTERS	**Maximum Marks :**	
Teaching Scheme C	**Examination Scheme**	
Theory : 13 hrs/week	Mid Semester Exam: Marks	
Tutorial: 1 hrs/week	Assignment & Quiz: Marks	
Practical : 17 hrs/week	End Semester Exam: Marks	
Credit :		
Aim :- Nil		
Objective :- Nil		
Pre-Requisite :-Nil		
Contents:- Nil		Hrs/week
Text Books:- Nil		
Reference books :- Nil		
Suggested List of Laboratory Experiments :- Nil		
Suggested List of Assignments/Tutorial :- Nil		

Name of the Course : All Branches of Diploma in Engineering/ Technology (Basic Physics).	
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ ME/PG/PT/AE/CE/CS/CR/IF/EE/EP/CH/CT/PS/ CD/ED/EI/CV/MH/FE/IU	**Semester : First**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil

Objective :-

S.No	Student will be able to:
1.	• Measure given dimensions by using appropriate instruments accurately. • Select proper measuring instrument on the basis of range, least count & precision required for measurement. • Select proper material for intended purpose by studying properties of materials.
2.	• Identify good & bad conductors of heat. • Analyze relation among pressure, volume and temperature of gas & to interpret the results • Identify the effect of interference between light waves.
3.	• Identify properties of laser light and photo electric effect for engineering applications. • Identify, analyze, discriminate and interpret logical sequence of field problems with the study of physics.

Pre-Requisite :-Nil

Contents (Theory)		Hrs/week	Marks
Unit -1 **UNITS AND MEASUREMENTS**	**1.1** Need of Measurement in engineering and science, unit of a physical quantity, requirements of standard unit, systems of units-CGS,MKS and SI, classification of physical quantities-Fundamental and Derived with their units **1.2** Accuracy, Precision of instruments, Errors in measurement, Estimation of errors-Absolute error, Relative error and percentage error, significant figures. (Simple Problems) **1.3** Basic Measuring instruments-Vernier Caliper, Micrometer screw gauge, inner & outer caliper thermometer, spherometer, ammeter, voltmeter with their least count, range, accuracy and precision. Standard reference surfaces used in engineering measurements-surface plate, angle plate, V- block, Engineer's square.	**03**	**06**
Unit -2 **GENERAL PROPERTIES OF MATTER**	**2.1 Elasticity :** Deforming force, Restoring force, Elastic and plastic body, Stress and strain with their types, Hooke's law, Stress strain diagram, Young's modulus, Bulk modulus, Modulus of rigidity and relation between them(no derivation), (simple problems). (Simple problems) Stress strain diagrams of H.T. Steel, Cast iron, Aluminium and Concrete, Ultimate and breaking stress, Factor of	**03**	**06**

	safety. **2.2 Surface Tension:** Forces—cohesive and adhesive, , angle of contact, shape of liquid surface in a capillary tube, capillary action with examples, relation between surface tension , capillary rise and radius of capillary (no derivation)(simple problem),effect of impurity and temperature on surface tension. **2.3 Viscosity :** Velocity gradient, Newton's law of viscosity, coefficient of viscosity ,streamline and turbulent flow, critical velocity, Reynold's number,(simple problems), Stokes law and terminal velocity(no derivation) ,buoyant (up thrust) force, effect of temperature & adulteration on viscosity of liquid.	**02** **02**	**04** **04**
Unit – 3 **HEAT**	**3.1 Transmission of heat and expansion of solids** Three modes of transmission of heat-conduction, convection and radiation, good and bad conductor of heat with examples, law of thermal conductivity, coefficient of thermal conductivity (simple problems), expansion of solids-linear, aerial and cubical and relation between them. **3.2 Gas laws and specific heats of gases** Boyle's law, Charle's law, Gay Lussac's law, absolute temperature, Kelvin scale of temperature, general gas equation(no derivation)(simple problems),molar or universal gas constant, universal gas equation, standard or normal temperature and pressure (N.T.P.), specific heat of gases, relation between two specific heat (simple problems), thermodynamic variables, first law of thermodynamics (statement & equation only), isothermal, isobaric, isochoric & adiabatic processes (difference among these processes and equations of state) (simple problems).	**02** **04**	**06** **08**
Unit – 4 **LIGHT**	**4.1 Properties of light** Reflection and, refraction, Snell's law, physical significance of refractive index (simple problems), Total internal reflection, dispersion, diffraction and polarization of light (only introduction) **4.2 Wave theory of light & Interference** Newton's corpuscles theory of light, Huygen's wave theory, wave front, Types of wave front-spherical, cylindrical and plane Huygen's principle of propagation of wave front, Principle of superposition of waves, Interference of light, constructive and destructive interference, Young's experiment. Analytical treatment of interference, conditions for stationary interference pattern. **4.3 Laser** Light amplification by stimulated emission of radiation, properties of laser, spontaneous and stimulated emission, population inversion, pumping methods, He-Ne laser-construction & working, recording and reconstructing of hologram by using He-Ne laser.	**03** **04** **04**	**06** **08** **08**
Unit – 5 **MODERN**	**5.1 Photo electricity** Plank's hypothesis, properties of photons, photo electric effect,	**03**	**08**

PHYSICS	laws and characteristics of photoelectric effect, Einstein's photoelectric equation,(simple problems), construction and working of photoelectric cell, applications of photoelectric cell **5.2 X-rays** Production of X-rays, types of X-ray spectra-continuous and characteristics, X-ray wavelength (simple problems), properties of X-rays, applications of X-rays-engineering, medicine and scientific research work.	**03**	**06**
	Total	**33**	**70**

Practical :-

S.No	Skills to be developed
1.	**1) Intellectual skills-** ▪ Proper selection of measuring instruments on the basis of range, least count, precision and accuracy required for measurement. ▪ Analyze properties of matter & their use for the selection of material. ▪ To verify the principles, laws, using given instruments under different conditions. ▪ To read and interpret the graph. ▪ To interpret the results from observations and calculations. ▪ To use these results for parallel problems.
2.	**2) Motor skills-** ▪ Proper handling of instruments. ▪ Measuring physical quantities accurately. ▪ To observe the phenomenon and to list the observations in proper tabular form. ▪ To adopt proper procedure while performing the experiment. ▪ To plot the graphs.

Text Books:- Nil

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
V. Rajendran	Physics-I		Tata McGraw- Hill raw- Hill publication, New Delhi
Arthur Beiser	Applied physics		Tata McGraw- Hill raw- Hill publication, New Delhi
by R.K.Gaur and S.L.Gupta	Engineering Physics		Dhanpat Rai Publication, New Delhi.
Resnick and Halliday.	Physics		--

Suggested List of Laboratory Experiments :

S.No	**Laboratory Experiments(Any ten experiments to be performed)**
1	1. Use of vernier calipers for the measurement of dimensions of given object.
2	2. Use of micrometer screw gauge for the measurement of dimensions of given object
3	3. Determine the Young's modulus of material of wire using Searle's apparatus.
4	4. To observe rise in water level through capillaries of different bores.
5	5. Determine coefficient of viscosity of given oil using Stoke's Method.

6	6. Verification of Boyle's law.
7	7. Measurement of unknown temperature using thermocouple.
8	8. Determine the coefficient of linear expansion of given material of rod using Pullinger's apparatus.
9	9. To observe the divergence of laser light with respect to distance.
10	10. Plot characteristics of photoelectric cell (Photoelectric current verses intensity of light and voltage applied).
Suggested List of Assignments/Tutorial :- Nil	

Name of the Course : All Branches of Diploma in Engineering and Technology (Basic Chemistry).			
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE / ME/PG/PT/AE/ CE/CS/CR/ CO/CM/IF/EE/EP/ CH /CT/PS/CD/ ED/EI/CV/MH/FE/IU		**Semester : First**	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit :			
Aim :-Nil			
Objective :-			
S.No			
1.	• To draw the atomic structure of different elements. • To represent the formation of molecules schematically.		
2.	• To describe the mechanism of electrolysis. • To identify the properties of metals & alloys related to engineering applications.		
3.	• To identify the properties of non metallic materials, related to engineering applications. • To compare the effects of pollutants on environments & to suggest preventive measures & safety.		
Pre-Requisite :-Nil			
Contents		Hrs/week	Marks
Unit -1	**Atomic Structure** Definition of Atom, Fundamental Particles of Atom – their Mass, Charge, Location, Definition of Atomic no, Atomic Mass no., Isotopes & Isobars, & their distinction with suitable examples, Bohr's Theory, Definition, Shape & Distinction between Orbits & Orbitals, Hund's Rule, Filling Up of the Orbitals by Aufbau's Principles (till Atomic no. 30), Pauli's exclusion principle Valency – Definition, types (Electrovalency & Covalency), Distinction, Octet Rule, Duplet Rule, Formation of Electrovalent & Covalent Compounds e.g. Nacl, $CaCl_2$, MgO, $AlCl_3$, CO_2, H_2O, Cl_2, NH_3, C_2H_4, N_2, C_2H_2.	05	12
Unit -2	**Electrochemistry** Atom, Ion, Definition Ionisation & Electrolytic Dissociation, Arrhenius Theory of Ionisation, Significance of the Terms Involved in Electrolysis. Such as Conductors, Insulators or Dielectrics, Electrolyte, Non Electrolyte, Electrolysis, Electrolytic Cell, Electrodes, Current Density, Temperature, Mechanism of Electrolysis – Primary & Secondary Reactions at Cathode & Anode, Electrochemical Series for Cations & Anions, Electrolysis of $CuSO_4$ Solution by using Cu Electrode & Platinum Electrode, Electrolysis of NaOH solution & fused NaCl, Faraday's first & second law of Electrolysis & Numericals, Electrochemical Cells & Batteries, Definition, Types (Primary & Secondary Cells), e.g. Construction, Working & Applications of Dry Cell /	06	14

	Laclanche Cell & Lead – Acid Storage Cell, Applications of Electrolysis such as Electroplating & Electro refining, Electrometallurgy & electrotyping Conductivity of Electrolyte – Ohms Law, Definition & Units of Specific Conductivity, Equivalent Conductivity, specific resistance		
Unit -3	**Metals & Alloys** **Metals** Occurrence of Metals, Definition Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Mechanical Properties, Processing of Ore, Stages of Extraction of Metals from its Ores in Detail i.e. Concentration, Reduction, refining. Physical Properties & Applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W. **Mks:10** **Alloys** Definition of Alloy, Purposes of Making alloy Preparation Methods, Classification of Alloys such as Ferrous & Non Ferrous, examples. Composition, Properties & Applications of Alnico, Duralumin, Dutch Metal, German Silver / Nickel Silver, Gun Metal, Monel metal, Wood's Metal, Babbitt Metal. **Mks: 08**	08	16
Unit -4	**Non Metallic Materials** **Plastics** Definition of Plastic, Formation of Plastic by Addition & Condensation Polymerisation by giving e.g. of Polyethylene & Backelite plastic Respectively, Types of Plastic, Thermosoftening & Thermosetting Plastic, with Definition, Distinction & e.g., Compounding of Plastics – Resins, Fillers, Plasticizers, Accelerators, Pigments, Engineering Applications of Plastic based on their Properties. **Mks: 04** **Rubber** Natural Rubber: Its Processing, Drawbacks of Natural Rubber, Vulcanisation of Rubber with Chemical Reaction. Synthetic Rubber: Definition, & e.g., Distinction Between Natural & Synthetic Rubber. **Mks: 04** **Thermal Insulating Materials** Definition, Characteristics & Applications of Glass Wool, Thermocole, Asbestos, Cork. **Mks: 04**	04	10
Unit – 5	**Environmental Effects (Awareness Level)** Introduction, Definition, Causes of Pollution, Types of Pollution, Such as Air & Water Pollution. **Mks: 04** **Air Pollution** Definition, Types of Air Pollutions their Sources & Effects, Such as Gases, Particulates, Deforestation, Radio Active Gases, Control of Air Pollution, Air	09	18

	Pollution Due to Internal Combustion Engine & Its Control Methods, Causes & Effects of Ozone Depletion & Green House Effects. **Mks: 08** **Water Pollution** Definition, Causes & Methods of Preventing Water Pollution, Types of Waste such as Domestic Waste, Industrial Waste, their Physical & Biological Characteristics, BOD, COD, Biomedical Waste & E – Waste, their Origin, Effects & Control Measures. Preventive Environmental Management (PEM) Activities. **Mks: 08**		
	Total	**32**	**70**

Practical :-

S.No	
1.	**Intellectual Skills:** 1. Analyze given solution 2. Interpret the results
2.	**Motor Skills :** 1. Observe Chemical Reactions 2. Measure the quantities Accurately 3. Handle the apparatus carefully
3.	**List of Experiments:** **01 – 07** Qualitative Analysis of **Seven Solutions,** Containing One Basic & One Acidic Radical Listed below **Basic Radicals:** Pb^{+2}, Cu^{+2}, Al^{+3}, Fe^{+2}, Fe^{+3}, Cr^{+3}, Zn^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Mg^{+2}, K^{+}, NH_4^{+}. **Acidic Radicals:** Cl^{-}, Br^{-}, I^{-}, CO_3^{-2}, SO_4^{-2}, NO_3^{-}. **06** To Determine E.C.E. of Cu by Using $CuSO_4$ Solution & Copper Electrode **07** To Determine the % of Fe in the Given Ferrous Alloy by $KMnO_4$ Method. **08** To Prepare a Chart Showing Application of Metals like Fe, Cu, Al, Cr, Ni, Sn, Pb, Co. **09** To Prepare Phenol Formaldehyde Resin (Bakelite) **10** To Determine Carbon Monoxide Content in Emission from Petrol Vehicle. **11** To Determine Dissolved Oxygen in a Water Sample.

Text Books:- Nil

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher

Jain & Jain	Engineering Chemistry		Dhanpat Rai and Sons
S. S. Dara	Engineering Chemistry		S. Chand Publication
B. K. Sharma	Industrial Chemistry		Goel Publication
S. S. Dara	Environmental Chemistry & Pollution Control		S. Chand Publication
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : All Branches of Diploma in Engineering and Technology (Basic Mathematics)			
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/ PG/PT/AE/ CE/CS/CR/CO/CM/IF/EE/EP/CH/CT/PS/ CD/ED/EI/CV/MH/FE/IU		**Semester : First**	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit :			
Aim :-Nil			
Objective :- This subject helps the students to develop logical thinking, which is useful in comprehending the principles of all other subjects. Analytical and systematic approach towards any problem is developed through learning of this subject. Mathematics being a versatile subject can be used at every stage of human life.			
Pre-Requisite :-Nil			

Contents (Name of Topics)		Hrs/week	
Unit -1 Chapter No.	**ALGEBRA**	**01**	
	1.1 REVISION 1.1.1 Laws of Indices 1.1.2 Formula of factorization and expansion ((a^2-b^2), $(a+b)^2$ etc.) 1.1.3 Laws of logarithm with definition of Natural and Common logarithm.		**--**
	1.2 PARTIAL FRACTION Definition of polynomial fraction proper & improper fractions and definition of partial fractions. 1.2.2 To Resolve proper fraction into partial fraction with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors. 1.2.3 To resolve improper fraction into partial fraction.	**04**	**07**
	1.3DETERMINANT AND MATRICES. **Determinant ---------- 4 Marks** Definition and expansion of determinants of order 2 and 3. 1.3.2 Cramer's rule to solve simultaneous equations in 2 and 3 unknowns. **Matrices---------- 11Marks** Definition of a matrix of order m X n and types of matrices. 1.3.4 Algebra of matrices such as equality, addition,	**12**	**15**

	Subtraction, scalar multiplication and multiplication. Transpose of a matrix. 1.3.6 Minor, cofactor of an element of a matrix, adjoint of matrix and inverse of matrix by adjoint method. Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.		
	1.4 BINOMIAL THEOREM 1.4.1 Definition of factorial notation, definition of permutation and combinations with formula. 1.4.2 Binomial theorem for positive index. 1.4.3 General term. 1.4.4 Binomial theorem for negative index. 1.4.5 Approximate value (only formula)	**04**	**03**
Unit -2	**TRIGONOMETRY.**		
	2.1 REVISION 2.1.1 Measurement of an angle (degree and radian). Relation between degree and radian. 2.1.2 Trig ratios of 0^0, 30^0, 45^0 etc. 2.1.3 Fundamental identities.	**02**	**03**
	2.2 TRIGONOMETRIC RATIOS OF ALLIED, COMPOUND, MULTIPLE & SUBMULTIPLE ANGLES (Questions based on numerical computations, which can also be done by calculators, need not be asked particularly for allied angles).	**08**	**07**
	2.3 FACTORIZATION AND DEFACTORIZATION FORMULAE	**04**	**03**
	2.4 INVERSE TRIGONOMETRIC RATIOS 2.4.1 Definition of inverse trigonometric, ratios, Principal values of inverse trigonometric ratios. 2.4.2 Relation between inverse trigonometric ratios.	**02**	**03**
	2.5 PROPERTIES OF TRIANGLE 2.5.1 Sine, Cosine, Projection and tangent rules (without proof) 2.5.2 Simple problems.	**02**	**03**
Unit -3	**COORDINATE GEOMETRY**		
	3.1 POINT AND DISTANCES 3.1.1 Distance formula, Section formula, midpoint, centriod of triangle. 3.1.2 Area of triangle and condition of collinearity.	**04**	**03**
	3.2 STRAIGHT LINE 3.2.1 Slope and intercept of straight line. 3.2.2 Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. 3.2.3 Angle between two straight lines condition of parallel and perpendicular lines. Intersection of two lines. 3.2.5 Length of perpendicular from a point on the line and perpendicular distance between parallel lines.	**06**	**09**

	3.3 CIRCLE 3.3.1 Equation of circle in standard form, centre – radius form, diameter form, two – intercept form. 3.3.2 General equation of circle, its centre and radius.	**06**	**06**
Unit-4	**VECTORS**		
	4.1 Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) 4.2 Dot (Scalar) product with properties. 4.3 Vector (Cross) product with properties.	**04**	04
	4.4 **Applications** 4.4.1 Workdone and moment of force about a point & line	**04**	04
	Total	64	**70**

Text Books:Nil

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S. P. Deshpande	Mathematics for polytechnic		Pune Vidyarthi Griha
S. L. Loney	Trigonometry		S. Chand Publication
H. S. Hall & S. R. Knight	Higher Algebra		Metric edition, Book Palace, New Delhi
Frc.G. Valles	College Algebra		Charotar Publication
Ayres	Matrices		Schuam series, McGraw hill
B. S. Grewal	Higher Engineering Mathematics		Khanna publications New Dehli
S. S. Sastry	Engineering Mathematics		Prentice Hall of India

Suggested List of Laboratory Experiments : Nil

Suggested List of Assignments/Tutorial :

S.No	Topic on which tutorial is to be conducted
1	Partial fractions
2	Determinants
3	Matrices
4	Solution of simultaneous equation by Matrix inversion method.
5	Binomial theorem
6	Trigonometry- fundamental identities-revision only
7	Trigonometry-allied, compound and multiple angles
8	Trigonometry-factorization and defactorization formulae.

9	Trigonometry-inverse trigonometric ratios.
10	Point and distances
11	Straight line
12	Circle.
13	Vectors
14	Vectors' applications

Note:
Maximum 5 questions are to be given in each tutorial, in which two 2 marks questions (based on basic concept and formulae with one/two step calculations) and three 4 marks questions are expected.

Name of the Course : All Branches of Diploma in Engineering and Technology (English).			
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ ME/PG/PT /AE/ CE/CS/CR/CO/CM/IF/ EE/EP/CH/CT/PS/ CD/ED/EI/CV/MH/FE/I		**Semester : First**	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit :			
Aim :-Nil			
Objective :- 1. Comprehend the given passage 2. Answer correctly the questions on seen and unseen passages 3. Increase the vocabulary 4. Apply rules of grammar for correct writing			
Pre-Requisite :-Nil			
Contents		Hrs/week	
Unit -1	**PART I: TEXT** • Vocabulary - Understanding meaning of new words from text • Comprehension – Responding to the questions from text • Identifying parts of speech	16	30
Unit -2	**PART II -Application of grammar** • Verbs • Tenses Do as directed (active /passive, Direct/indirect, affirmative/negative/assertive, question tag, remove too, use of article, preposition ,conjunctions, interjections, punctuation)	10	20
Unit — 3	**PART III - Paragraph writing** • Definition – Types of paragraphs • How to write a paragraph	02	10
Unit — 4	**PART IV - Vocabulary building** • Word formation • Technical jargon • Use of synonyms /antonyms/Homonyms/paronyms • One word substitute	04	10
	Total	**32**	**70**
Text will consist of 10 articles/Lessons			

The term work will consist of 6 assignments:
The assignments should be written in A4 size note books (100 pages ruled)

Practical :-

S.No	Skills to be developed for practical:
1.	**Intellectual Skills**: **1** Skills of speaking in correct English. **2** Searching information. **3** Reporting skills.
2.	**Motor Skills:** **1** Use of appropriate body language. **2** Use of mouth organs
3.	**List of Assignments:** **1** Building of Vocabulary — (3 Hours) (2 assignments) **a)** 25 words for each assignment from the glossary given in the text book at the end of each chapter **b)** Technical Jargons — (2 Hours) (1 assignment) Identify 10 technical words from the respective branches. Resource — (Encyclopedia/Subject Books) **2** Grammar (4 Hours) 2 assignments. **a)** Insert correct parts of speech in the sentences given by the teachers. (16 sentences—Two each, from the different parts of speech) **b)** Punctuate the sentences given by the teachers. (10 sentences) **3** Conversational skills: Role plays (8 hours) **a)** Students are going to perform the role on any 6 situations, by the teacher. **b)** Dialogue writing for the given situations. (2 assignments) **4** Write Paragraphs on given topics (6 hours) (2 assignments) **a)** Four types of paragraphs to be written in **two assignments** covering two types in one assignment. **5** News paper report writing (4hours) (2 assignments) **a)** Write any two events from the news paper as it is. **b)** Write any two events on the situations given by the teacher. **6** Errors in English (4 hours) (2 assignments) **a)** Find out the errors and rewrite the sentences given by the teacher. (20 sentences)

Text Books:- Nil

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
David Green	Contemporary English		Macmillan

	grammar, structures and composition		
R. C. Jain	English grammar and composition		Macmillan
Rodgers	Thesaurus		Oriental Longman
Oxford	Dictionary		Oxford University
Longman	Dictionary		Oriental Longman
Z. N. Patil et el	English for practical Purposes		Macmillan
Editor – Mukti Sanyal	English at Workplace		Macmillan
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :-Nil			

Name of the Course : All Branches of Diploma in Engineering and Technology (Engineering Graphics)	
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE /ME/PG/PT/AE/ CE/CS/CR/ CO/CM/IF/EE/EP/ CH/CT/PS/CD/ED/EI/CV/MH/FE/IU	**Semester :** First
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil

Objective :- The student should be able to: -

S.No	
1.	• Draw different engineering curves and know their applications.
2.	• Draw orthographic projections of different objects.
3.	• Visualize three dimensional objects and draw Isometric Projections.
4.	• Use the techniques and able to interpret the drawing in Engineering field.
5.	• Use computer aided drafting packages.

Pre-Requisite :-Nil

Contents		Hrs/week
Unit -1	Drawing Instruments and their uses 1.1 Letters and numbers (single stroke vertical) 1.2 Convention of lines and their applications. 1.3 Scale (reduced, enlarged & full size) plain scale and diagonal scale. 1.4 Sheet layout. 1.5 Introduction to CAD (Basic draw and modify Command). 1.6 Geometrical constructions.	05
Unit -2	Engineering curves & Loci of Points. 1.2 To draw an ellipse by 2.1.1 Directrix and focus method 2.1.2 Arcs of circle method. 2.1.3 Concentric circles method. 2.2 To draw a parabola by: 2.2.1 Directrix and focus method 2.2.2 Rectangle method	09

	2.3 To draw a hyperbola by: 2.3.1 Directrix and focus method 2.3.2 passing through given points with reference to asymptotes 2.3.3 Transverse Axis and focus method. 2.4 To draw involutes of circle & polygon (up to hexagon) 2.5 To draw a cycloid, 21picycloids, hypocycloid 2.6 To draw Helix & spiral. 2.7 Loci of Points: 2.7.1 Loci of points with given conditions and examples related to simple mechanisms.	
Unit – 3	Orthographic projections 3.1 Introduction to Orthographic projections. 3.2 Conversion of pictorial view into Orthographic Views (First Angle Projection Method Only) 3.3 Dimensioning technique as per SP-46	06
Unit – 4	Isometric projection 4.1 Isometric scale 4.2 Conversion of orthographic views into isometric View/projection(Simple objects) Projection of Straight Lines and Planes. (First Angle Projection Method only)	05
Unit – 5	5.1 Lines inclined to one reference plane only and limited to both ends in one quadrant. 5.2 Projection of simple planes of circular, square, rectangular, rhombus, pentagonal, and hexagonal, inclined to one reference plane and perpendicular to the other.	07
	Total	**32**

Practical :-

List of Practical	**Skills to be developed**	
	Intellectual skills	**Motor Skills**
1.Introduction to graphics - (1 Sheet) Draw the following using CAD 1.1 Rectangle with given dimensions 1.2 Circle with given dimensions and hatch 1.3 Pentagon with line command 1.4 Hexagon with given dimensions 1. Draw one figure containing circle tangent, arc and dimensioning.	2. To develop ability to solve problems on geometrical constructions.	3. To develop ability to draw the geometrical constructions by computer.
2. Engineering curves & Loci of points - (1 Sheet)	1) To develop ability to differentiate between conic and curves.	1. To develop ability to draw different types of curves.

i) Three different curves are to be draw using any one method. ii) Draw locus of point on any one mechanism	2) To develop ability to identify the type of locus from the nature of surface and the position of generating circle. 3) Able to interpret the given mechanisms and locus of points.	
3. Orthographic projections - (Total 2 Sheets) Two objects by first angle projection method – (1 Sheet) Redraw the same sheet using CAD – (1 Sheet)	1) Develop ability to interpret first angle projection method. 2) To interpret and able to solve problem on orthographic projection of given object.	4. Develop ability to draw orthographic projections by first angle projection method
4. Isometric projection - (Total 2 sheets) Two objects one by true scale and another by isometric scale. (simple objects) - (1 sheet) Redraw the same sheet using CAD - (1 sheet)	1) Develop ability to differentiate between isometric view and isometric projections. 2) To differentiate between Isometric scale and true scale.	1. Develop ability to draw isometric views and isometric projections from given orthographic views of an object using computer.
5. **Projections of line and planes.** – (1 Sheet) Two problems on Projection of lines and two problems on Projection of Planes.	1) To develop ability to differentiate between true length and apparent length. 2) To interpret the position lines and plane with reference plane.	1) Able to draw Orthographic Projections of line and planes.

List of Practice Oriented Projects: -

1) To draw layout of visited Industry, College using CAD
2) To draw orthographic projection of given machine element using CAD

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N. D. Bhatt	Engineering Drawing		Charotar Publishing House
K. Venugopal	Engineering Drawing and Graphics+ AutoCAD		New Age Publication
R. K. Dhawan	Engineering Drawing		S. Chand Co.
P. J. Shah	Engineering Drawing		---
K. R. Mohan	Engineering Graphics		Dhanpat Rai and Publication Co.

B) Video Cassettes / CD's

1. CD's prepared by MSBTE for Engineering Drawing

C) IS Code

SP – 46. Engineering Drawing practice for schools and colleges.

Reference books :- Nil

Suggested List of Laboratory Experiments : - Nil	
Suggested List of Assignments/Tutorial :- Nil	

Name of the Course : All Branches of Diploma in Engineering and Technology (Computer Fundamentals).	
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/ DE/ ME/PG/PT/AE/CE/CS/CR/CO/CM/IF/ EE/EP/CH/ CT /PS/ CD/ED/EI/CV/MH/FE/IU	**Semester : First**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil

Objective :-

S.No	Students will be able to:
1.	Understand a computer system that has hardware and software components, which controls and makes them useful.
2.	Understand the operating system as the interface to the computer system.
3.	Use the basic functions of an operating system.
4.	Set the parameter required for effective use of hardware combined with and application software's
5.	Compare major OS like Linux and MS-Windows
6.	Use file mangers, word processors, spreadsheets, presentation software's and Internet
7.	Have hands on experience on operating system and different application software
8.	Use the Internet to send mail and surf the World Wide Web.

Pre-Requisite :-Nil

Contents		Hrs/week
Unit -1	**Fundamentals Of Computer** Introduction Components of PC The system Unit Front part of system Unit Back part of system Unit CPU Memory of computer Monitor Mouse, Keyboard, Disk, Printer, Scanner, Modem, Video, Sound cards, Speakers	**3**
Unit -2	**Introduction To Windows 2000/Xp** Working with window	**3**

	Desktop Components of window Menu bar option Starting window Getting familiar with desktop Moving from one window to another Reverting windows to its previous size Opening task bar buttons into a windows Creating shortcut of program Quitting windows	
Unit – 3	**GUI Based Editing, Spreadsheets, Tables & Presentation** Application Using MS Office 2000 & Open Office.Org Menus Opening of menus, Toolbars: standard toolbars, formatting toolbars & closing of menus Quitting Document, Editing & designing your document Spreadsheets Working & Manipulating data with Excel Changing the layout Working with simple graphs & Presentation Working With PowerPoint and Presentation	**3**
Unit – 4	**Introduction To Internet** What is Internet Equipment Required for Internet connection Sending &receiving Emails Browsing the WWW Creating own Email Account Internet chatting	**2**
Unit – 5	**Usage of Computer System in various Domains** Computer application in Offices, books publication, data analysis ,accounting , investment, inventory control, graphics, database management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, banks, design and research work, real-time, point of sale terminals, financial transaction terminals.	**2**
Unit – 6	**Information technology for benefits of community** Impact of computer on society Social responsibilities Applications of IT Impact of IT Ethics and information technology Future with information technology	**3**
	Total Hours	**16**

Practical's	
Sr. No	**List of Practical's**
1.	Working with Windows 2000 desktop ,start icon, taskbar, Recycle Bin, My Computer icon ,The Recycle Bin and deleted files Creating shortcuts on the desktop

2.	The Windows 2000 accessories WordPad – editing an existing document Use of Paint – drawing tools The Calculator, Clock
3.	The Windows Explorer window, concept of drives, folders and files? Folder selection techniques, Switching drives, Folder creation Moving or copying files, Renaming, Deleting files ,and folders
4.	Printing Installing a printer driver Setting up a printer Default and installed printers Controlling print queues Viewing installed fonts
	The clipboard and 'drag and drop' Basic clipboard concepts Linking vs. embedding
5.	Moving through a Word document menu bar and drop down menus toolbars
6.	Entering text into a Word 2000 document, selection techniques Deleting text
7.	Font formatting keyboard shortcuts
8.	* Paragraph formatting Bullets and numbering
9.	* Page formatting What is page formatting? Page margins Page size and orientation Page breaks, Headers and footers
10.	Introducing tables and columns
11.	Printing within Word 2000 Print setup Printing options Print preview
12.	* Development of application using mail merge Mail merging addresses for envelopes Printing an addressed envelope and letter
13.	Creating and using macros in a document
14.	* Creating and opening workbooks Entering data
15.	Navigating in the worksheet Selecting items within Excel 2000 Inserting and deleting cells, rows and column Moving between worksheets, saving worksheet, workbook
16.	Formatting and customizing data
17.	Formulas, functions and named ranges
18.	Creating, manipulating & changing the chart type
19.	Printing, Page setup, Margins Sheet printing options, Printing a worksheet
20.	* Preparing presentations with Microsoft Power Point. Slides and presentations, Opening an existing presentation , Saving a presentation
21.	Using the AutoContent wizard ,Starting the AutoContent wizard Selecting a presentation type within the AutoContent wizard Presentation type Presentation titles, footers and slide number

22.	* Creating a simple text slide Selecting a slide layout Manipulating slide information within normal and outline view Formatting and proofing text Pictures and backgrounds drawing toolbar AutoShapes Using clipart Selecting objects Grouping and un-grouping objects The format painter
23.	* Creating and running a slide show Navigating through a slide show Slide show transitions Slide show timings Animation effects
24.	* Microsoft Internet Explorer 5 & the Internet Connecting to the Internet The Internet Explorer program window The on-line web tutorial Using hyper links Responding to an email link on a web page
25.	Searching the Internet Searching the web via Microsoft Internet Explorer Searching the Internet using Web Crawler Searching the Internet using Yahoo Commonly used search engines
26.	Favorites, security & customizing Explorer Organizing Favorite web sites Customizing options – general, security, contents, connection, programs, advanced
27.	* Using the Address Book Adding a new contact Creating a mailing group Addressing a message Finding an e-mail address
28.	Using electronic mail Starting Outlook Express Using the Outlook Express window Changing the window layout Reading file attachment Taking action on message-deleting, forwarding, replying
29.	* Email & newsgroups Creating and sending emails Attached files Receiving emails Locating and subscribing to newsgroups Posting a message to a newsgroup
30.	Chatting on internet Understating Microsoft chat environment Chat toolbar

Note : Term work will include printout of Exercises of practicals marked with asterisks (*)			
Text Books:			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Vikas Gupta	Comdex Computer Course Kit	First	Dreamtech
Henry Lucas	Information Technology for management	7Th	Tata McGraw Hills
B.Ram	Computer Fundamentals Architecture and Organization	Revised 3rd	New Age International Publisher
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Civil Engineering Group (Basic Workshop Practice (Civil)	
Course code: CE/CT/CR	**Semester : First**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil	
Objective :-	
S.No	At the end of this course, the student will able to
1.	• Know basic workshop processes. • Read and interpret job drawings. • Identify, select and use various marking, measuring, and holding, striking and cutting tools & equipments wood working and sheet metal shops.
2.	• Operate, control different machines and equipments. • Select proper welding rods and fluxes. • Inspect the job for specified dimensions
3.	• Produce jobs as per specified dimensions. • Adopt safety practices while working on various machines.
Pre-Requisite :-Nil	

Contents		Hrs/week
	Details of Theory Contents	
Unit -1	**CARPENTRY SHOP** 1. Introduction. 2. Various types of woods. 3. Different types of tools, machines and accessories.	03
Unit -2	**WELDING SHOP** 1. Introduction 2. types of welding, ARC welding, Gas welding, Gas Cutting. 3. welding of dissimilar materials, Selection of welding rod material Size of welding rod and work piece. 4. different types of flame. 5. Elementary symbolic representation, 6. Safety precautions in welding safety equipments and its use in welding processes.	04
Unit – 3	**FITTING SHOP** 1. Introduction 2. Various marking, measuring, cutting, holding and striking tools. 3. Different fitting operation like chipping, filing, right angle, marking,	04

	drilling, tapping etc. 4. Working Principle of Drilling machine, Tapping dies its use. 5. Safety precautions and safety equipments.	
Unit – 4	**PLUMBING SHOP** 1. Introduction. 2. Various marking, measuring, cutting, holding and striking tools. 3. Different G.I. pipes, PVC pipes, flexible pipes used in practice. 4. G. I. pipes and PVC pipes fittings and accessories, Adhesive solvents-chemical action, Piping layout.	03
Unit – 5	**SHEET METAL SHOP** 1. Introduction 2. Various types of tools, equipments and accessories. 3. Different types of operations in sheet metal shop. 4. Soldering and riveting. 5. Safety precautions.	02
	Total	**16**

Skill to be developed:

S.No.	
	Intellectual Skills: 1. Ability to read job drawing 2. Ability to identify and select proper material, tools, equipments and machine. 3. Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.
	Motor Skills: 1. Ability to set tools, work piece, and machines for desired operations. 2. Ability to complete job as per job drawing in allotted time. 3. Ability to use safety equipment and follow safety procedures during operations. 4. Ability to inspect the job for confirming desired dimensions and shape. 5. Ability to acquire hands-on experience

Notes: 1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.
2] The workshop diary shall be maintained by each student duly signed by instructor of respective shop

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
• S.K. Hajara Chaudhary	• Workshop Technology	•	• Media Promotors and Publishers,New Delhi
• B.S. Raghuwanshi	• Workshop Technology	•	• Dhanpat Rai and sons, New Delhi
• R K Jain	• Production Technology	•	• Khanna Publishers, New Delhi
• H.S.Bawa	• Workshop Technology	•	• Tata McGraw Hill Publishers, New

			Delhi
• Kent's	• Mechanical Engineering Hand book	•	• John Wiley and Sons, New York
• Electronics Trade & technology			• Development Corporation.(A Govt. of India undertaking) Akbar Hotel Annex, Chanakyapuri, New Delhi- 110 021

- **Video Cassettes/ CDS**
  Learning Materials Transparencies, CBT Packages developed by N.I.T.T.E.R. Bhopal.

Reference books :- Nil

Suggested List of Laboratory Experiments :

S.No	Details Of Practical Contents
1	**WOOD WORKING SHOP:** • Demonstration of different wood working tools / machines. • Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc. • One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.
2	**WELDING SHOP** : • Demonstration of different welding tools / machines. • Demonstration on Arc Welding, Gas Welding, gas cutting and rebuilding of broken parts with welding. • One simple job involving butt and lap joint.
3	**FITTING SHOP**: • Demonstration of different fitting tools and drilling machines and power tools • Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc. • One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.
4	**PLUMBING SHOP**: • Demonstration of different plumbing tools • Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings. • One job on simple pipe joint with nipple coupling for standard pipe. Pipe threading using standard die sets.
5	**SHEET METAL SHOP:** • Demonstration of different sheet metal tools / machines. • Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing , soldering and riveting. • One simple job involving sheet metal operations and soldering and riveting.

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Electrical Engineering/ Electrical Power System (**Basic Workshop Practice (Electrical))**	
Course code: EE/EP	**Semester : First**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil

Objective :-

S.No	The student will be able to
1.	• Use the knowledge of sheet metal working and welding for preparing panels, switch boxes etc.
2.	• Use various drills for electrical wiring and installation
3.	• Make joints for various types of wirings such as casing capping, Batten wiring and mounting of accessories

Pre-Requisite :-Nil

	Contents	Hrs/week
Unit -1	**WELDING SHOP** : 1. Introduction 2. types of welding, ARC welding, Gas welding, Gas Cutting. 3. welding of dissimilar materials, Selection of welding rod material Size of welding rod and work piece. 4. Different types of flame. 5. Elementary symbolic representation, 6. Safety precautions in welding safety equipments and its use in welding processes.	
Unit -2	**SHEET METAL SHOP.** 1. Introduction 2. Various types of tools, equipments and accessories. 3. Different types of operations in sheet metal shop. 4. Soldering and riveting. 5. Safety precautions.	
Unit - 3	**TURNING SHOP** 1. Introduction 2. Various marking, measuring, cutting, holding and striking tools. 3. Working Principle of Drilling machine, Tapping dies its use. 4. Drilling and Tapping 5. Turning: Plain, taper 6. Threading and Knurling	

	7. Safety precautions and safety equipments.	
Unit – 4	**PLUMBING SHOP** 1. Introduction. 2. Various marking, measuring, cutting, holding and striking tools. 3. Different types of PVC pipes, flexible pipes used in practice. 4. PVC pipes fittings and accessories, Adhesive solvents- chemical action, 5. Piping layout.	
	Total	
Practical:	Skills to be developed	
	1. Intellectual Skills: a) Ability to read job drawings. b) Ability to identify and select proper material, tools and equipments and machines. c) Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.	
	2. Motor Skills : a) Ability to set tools, work piece, and machines for desired operations. b) Ability to complete job as per job drawing in allotted time. c) Ability to use safety equipment and follow safety procedures during operations. d) Ability to inspect the job for confirming desired dimensions and shape. e) Ability to acquire hands-on experience.	
Sr. No	**DETAILS OF PRACTICAL CONTENTS**	
01	**WELDING SHOP** • Any one composite job from involving butt joint lap joint welding process, from the following like Grill, door, window frame, Corner flower stand chair , table frame (square pipe 25 mm) cooler frame (folding type), Kitchan Trolley, Centering Plate, supporting frames **Note:**1] One job of standard size (Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work . 3] Job allotted should comprise of 6-8 hours of actual working operations. 4] Student shall calculate the cost of material and labor required for their job from the drawing.	
02	**PLUMBING SHOP** • Demonstration of PVC pipe joint with various fittings. • Exercise for students on preparing actual pipeline layout for PVC pipe. Preparing actual drawing and bill of material.	
03	**SHEET METAL SHOP** • One composite job of Water-draining Channel, display boards, Panel Board, Switch Box, Glass Paneling items etc. Note:1]One job of standard size(Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work. 3] Job allotted should comprise of 4-6 hours of actual working ions. 4] Student shall calculate the cost of material and labor cost required for their job from the drawing.	
04	**TURNING SHOP** Note:1] One job related to Plane and Taper turning, threading and knurling	

	2] One job related to Drilling and tapping 3] Batch size should be selected depending on volume of work. 4] Job allotted should comprise of 6-8 hours of actual working 5] Student shall calculate the cost of material and labor cost for their job from the drawing.
05	**Demonstration of power tools and practice of utility items.** • Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories. • Tools for Cutting and drilling,

Text Books:- Nil

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.K. Hajara Chaudhary	Workshop Technology		Media Promotors and Publishers,New Delhi
B.S. Raghuwanshi	Workshop Technology		Dhanpat Rai and Sons, New Delhi
R K Jain	Production Technology		Khanna Publishers, New Delhi
H.S.Bawa	Workshop Technology		Tata McGraw Hill Publishers,New Delhi
-	Kent's Mechanical Engineering Hand book		John Wiley and Sons, New York

Video Cassettes / CDS

- Learning Materials Transparencies, CBT Packages developed by NITTER Bhopal.

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering (Basic Workshop Practice (Mechanical & Chemical Group))	
Course code: ME/AE/PG/PT/CH/PS	**Semester :** First
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Rationale: Mechanical and Chemical diploma technician is expected to know basic workshop practice like Wood working, Sheet metal. The students are required to identify, operate and control various machines. The students are required to select and use various tools and equipments related to Wood working and sheet metal processes.

Aim :-Nil

Objective :-

S.No	The student will able to
1.	• Know basic workshop processes. • Read and interpret job drawing. • Identify, select and use various marking, measuring, holding, striking and cutting tools & equipments.
2.	• Operate, control different machines and equipments. • Inspect the job for specified dimensions
3.	• Produce jobs as per specified dimensions. • Adopt safety practices while working on various machines

Pre-Requisite :-Nil

Contents (Details Of Theory Contents)		Hrs/week
Unit -1	**CARPENTRY SHOP** 1. Introduction. 2. Various types of woods. 3. Different types of tools, machines and accessories.	
Unit -2	**WELDING SHOP** : 1. Introduction 2. types of welding, ARC welding, Gas welding, Gas Cutting. 3. welding of dissimilar materials, Selection of welding rod material Size of welding rod and work piece. 4. different types of flame. 5. Elementary symbolic representation, 6. Safety precautions in welding safety equipments and its use in welding processes.	
Unit – 3	**FITTING SHOP**: 1. Introduction	

	2. Various marking, measuring, cutting, holding and striking tools. 3. Different fitting operation like chipping, filing, right angle, marking, drilling, tapping etc. 4. Working Principle of Drilling machine, Tapping dies its use. 5. Safety precautions and safety equipments.	
Unit – 4	**PLUMBING SHOP**: 1. Introduction. 2. Various marking, measuring, cutting, holding and striking tools. 3. Different G.I. pipes, PVC pipes, flexible pipes used in practice. 4. G. I. pipes and PVC pipes fittings and accessories, Adhesive solvents-chemical action, Piping layout.	
Unit – 5	**SHEET METAL SHOP.** 1. Introduction 2. Various types of tools, equipments and accessories. 3. Different types of operations in sheet metal shop. 4. Soldering and riveting. 5. Safety precautions.	
	Total	

Skill to be developed:

	Intellectual Skills: 1. Ability to read job drawing 2. Ability to identify and select proper material, tools, equipments and machine. 3. Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.
	Motor Skills: 1. Ability to set tools, work piece, and machines for desired operations. 2. Ability to complete job as per job drawing in allotted time. 3. Ability to use safety equipment and follow safety procedures during operations. 4. Ability to inspect the job for confirming desired dimensions and shape. 5. Ability to acquire hands-on experience.

Notes: 1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.
2] The workshop diary shall be maintained by each student duly signed by instructor of respective shop

Sr.No.	Details Of Practical Contents
01	**WOOD WORKING SHOP:** • Demonstration of different wood working tools / machines.

	• Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc. • One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.
02	**WELDING SHOP** : • Demonstration of different welding tools / machines. • Demonstration on Arc Welding, Gas Welding, gas cutting and rebuilding of broken parts with welding. • One simple job involving butt and lap joint.
03	**FITTING SHOP**: • Demonstration of different fitting tools and drilling machines and power tools. • Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc. • One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.
04	**PLUMBING SHOP**: • Demonstration of different plumbing tools • Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings. • One job on simple pipe joint with nipple coupling for standard pipe. Pipe threading using standard die sets.
05	**SHEET METAL SHOP:** • Demonstration of different sheet metal tools / machines. • Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering and riveting. • One simple job involving sheet metal operations and soldering and riveting.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.K. Hajara Chaudhary-	Workshop Technology		-Media Promoters and Publishers, New Delhi
B.S. Raghuwanshi-	Workshop Technology-		Dhanpat Rai and sons, New Delhi
R K Jain-	Production Technology-		Khanna Publishers, New Delhi
H.S.Bawa- -	Workshop Technology		Tata McGraw Hill Publishers,New Delhi
Kent's	Mechanical Engineering Hand book-		John Wiley and Sons, New York

Video Cassettes/ CDS

- Electronics Trade & technology Development Corporation.(A Govt. of India undertaking)
  Akbar Hotel Annex, Chanakyapuri, New Delhi- 110 021
- Learning Materials Transparencies, CBT Packages developed by N.I.T.T.E.R. Bhopal.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Electronics Engineering Group (Basic Workshop Practice (Electronics Group))		
Course code: ET/EJ/EN/EX/IE/IS/IC/DE/MU/EV		**Semester : First**
Duration :		**Maximum Marks :**
Teaching Scheme		**Examination Scheme**
Theory : hrs/week		Mid Semester Exam: Marks
Tutorial: hrs/week		Assignment & Quiz: Marks
Practical : hrs/week		End Semester Exam: Marks
Credit :		
Aim :-Nil		
Rational:-		
S.No	Electronics diploma technician is expected to know basic workshop practice like Wood working, Sheet metal and Fitting. The students are required to identify, operate and control various machines. The students are required to select and use various tools and equipments related to Wood working and sheet metal processes	
Objective :-		
S.No		
1.	Read and interpret the drawing.	
2.	Draw sketch for given job.	
3.	Use manufacturers Catalog to prepare estimation of material required.	
4.	Use specification tables.	
5.	Decide Sequence of procedure.	
Pre-Requisite :-Nil		
Contents (Topic)		Hrs/week
Unit -1	**CARPENTRY SHOP** 1. Introduction. 2. Various types of woods. 3. Different types of tools, machines and accessories.	
Unit -2	**FITTING SHOP**: 1. Introduction 2. Various marking, measuring, cutting, holding and striking tools. 3. Different fitting operation like chipping, filing, right angle, marking, drilling, tapping etc. 4. Working Principle of Drilling machine, Tapping dies its use. 5. Safety precautions and safety equipments.	
Unit – 3	**SHEET METAL SHOP.** 1. Introduction 2. Various types of tools, equipments and accessories.	

	3. Different types of operations in sheet metal shop. 4. Soldering and riveting. 5. Safety precautions.	
	Total	

Skills to be developed:

Intellectual Skills:

1. Ability to read job drawing.
2. Ability to identify and select proper material, tools, equipments and machine.

Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.

Motor Skills:

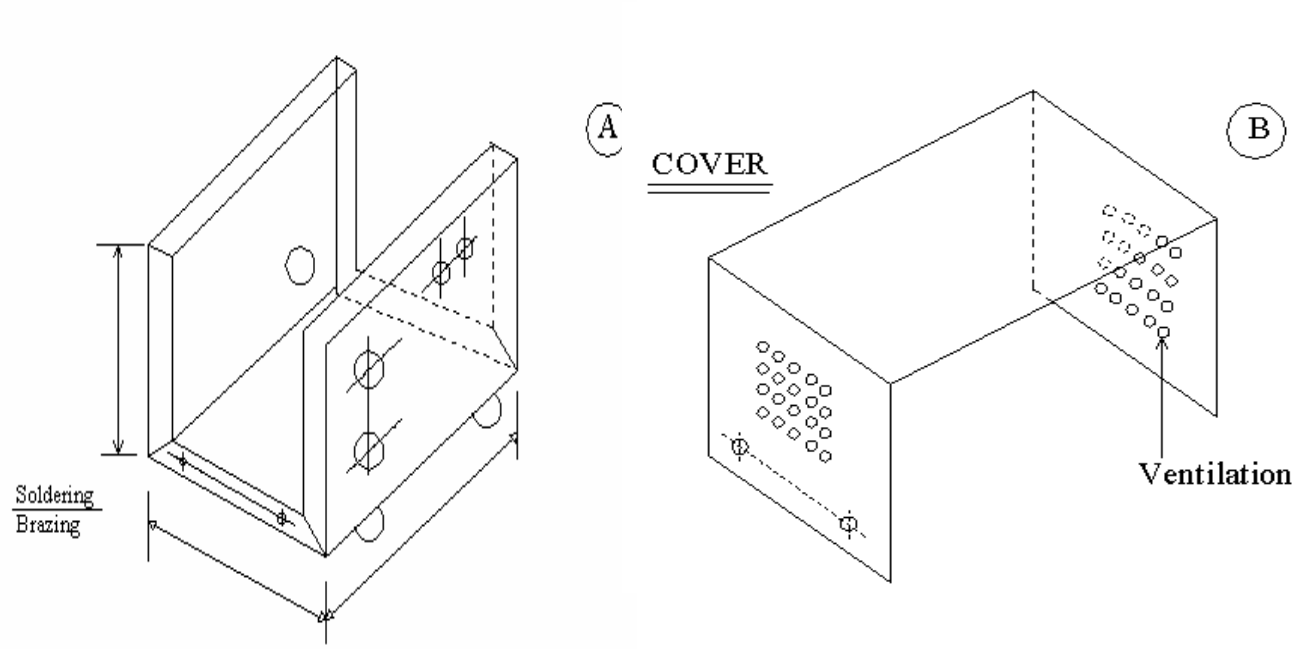
1. Ability to set tools, work piece, and machines for desired operations.
2. Ability to complete job as per job drawing in allotted time.
3. Ability to use safety equipment and follow safety procedures during operations.
4. Ability to inspect the job for confirming desired dimensions and shape.
5. Ability to acquire hands-on experience.

Note: Details of on example job for each shop is given below:

Sr.No.	Details Of Practical Contents
01	**WOOD WORKING SHOP:** • Demonstration of different wood working tools / machines. • Demonstration of different wood working processes, like planning, marking, chiseling, grooving, turning of wood etc. • One simple job of preparing switch board or any other similar job
02	**FITTING SHOP**: • Demonstration of different fitting tools and drilling machines and power tools • Demonstration of different operations like chipping, filing, drilling, tapping, cutting etc. • One simple fitting job involving practice of filing, drilling, tapping, cutting etc. Such as Transistor Heat Sink or any other similar job
03	**SHEET METAL SHOP:** • Demonstration of different sheet metal tools / machines. • Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing , soldering and riveting. • One simple job involving sheet metal operations and soldering and 39iveting. Such as Battery Eliminator Box or any other similar job

S.. SHEET METAL WORK : BATTERY ELIMINATOR BOX

CHASSIS



MATERIAL : C R C A sheet 22/24 SWG

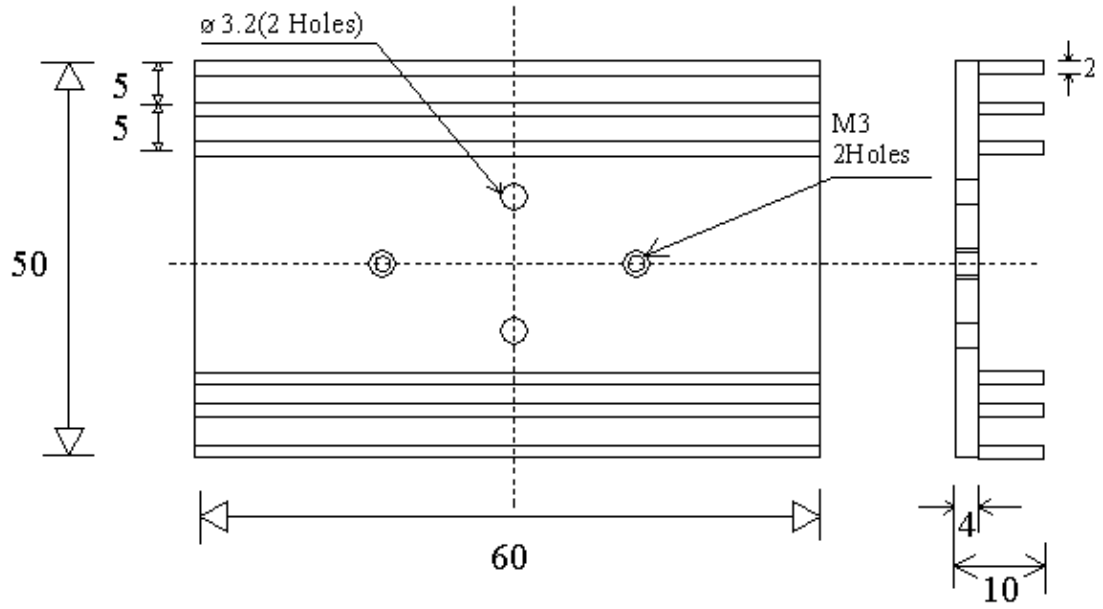
*** TOOLS & EQUIPMENT:**

1) Steel Rule
2) Try square
3) Scriber
4) Spring Divider / Center Punch
5) Files
6) Shearing Machine / ship
7) Drilling Machine
8) Mallet
9) Hammer
10) Chisels
11) Hollow or solid punch
12) Hand Drill M/c
13) Drills in various sizes
14) Taps M3 & tap wrench
15) Bending M/c
16) Bench vice
17) Use various stakes
18) Number Punch
19) Blow lamp

SEQUENCE OF OPERATIONS :

1) Development
2) Marking
3) Checking
4) Cutting
5) Debuting
6) Corner cutting
7) Drilling
8) Punching
9) Bending
10) Topping
11) Numbering
12) Finishing
13) Soldering / Brazing

20) Soldering iron



T.. <u>Fitting Work</u>: Transistor Heat Sink

MAT : ALUMINIUM FLAT SIZE : 50 X 65 X 10 mm

NOTE : ALL DIMENSIONS ARE IN MM
TOLERANCE : ± 0.3 mm

TOOLS & EQUIPMENT

1) Steel Rule / Vernier caliper

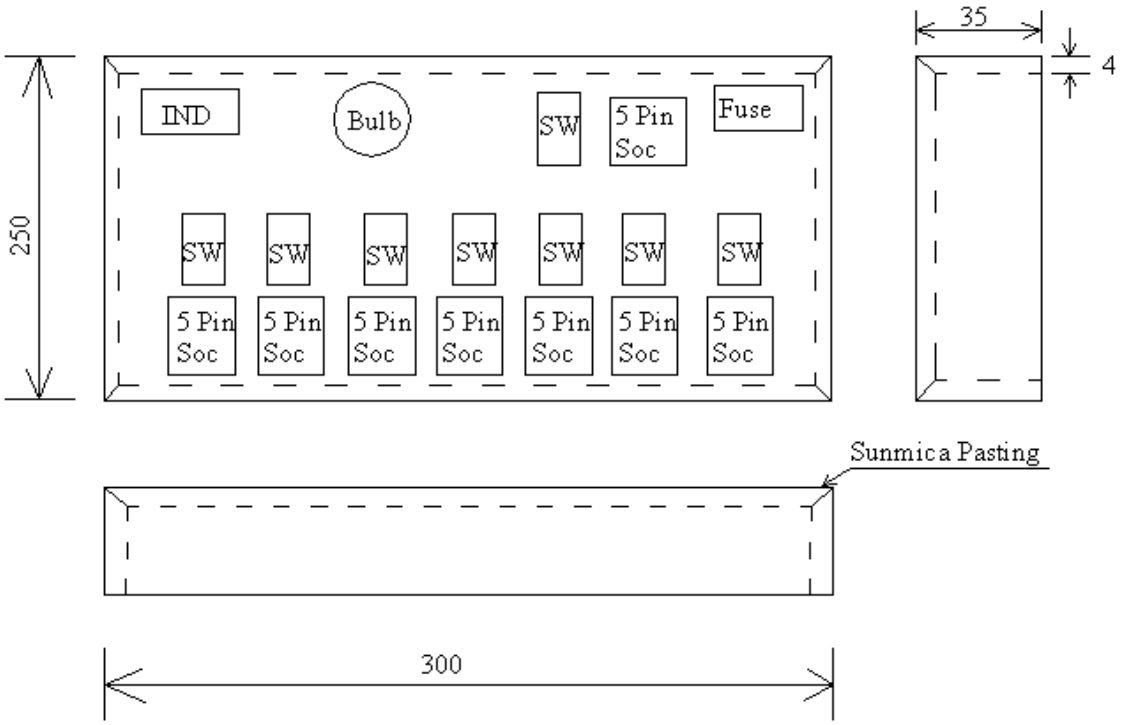
SEQUENCE OF OPERATIONS

1) Marking

2) Try square
3) Scriber
4) Bench Vice
5) Surface plate / with magnet block
6) Files, flat, square, Niddles
7) Marking Gauge
8) Marking Block / Height Gauge
9) Hacksaw frame
10) Center Punch
11) Hammer
12) Chisels Hat
13) Table Drill Machine (Bench)
14) Drills
15) Tap & Tap wrenches
16) Number Punch

2) Checking
3) Cutting
4) Square ness fitting (90')
5) Saw cutting
6) Chiseling / chipping
7) Slot filing
8) Drill Marking
9) Drilling
10) Tapping
11) Finishing
12) Numbering

U.. Carpentry Work: Switch Box



MATERIAL : TEAK WOOD AND SUNMICA, COMMERCIAL PLYWOOD

SIZE : 1) 40 X 260 X 10 mm 02 Nos.
2) 40 X 310 X 10 mm 02 Nos.
3) Sun-mica – 250 X 300 mm X 0.5 mm 01 Nos.
4) Plywood – 250 X 300 mm X 5 mm 01 Nos.
5) Fevicol
6) French Polish

TOOLS & EQUIPMENT

1) Steel Rule
2) Try square
3) Marking Gauge
4) Jack Plane
5) Hand Saw
6) Carpentry Vice
7) Wooden Mallet / Hammer
8) Firmer Chisel
9) Jig Saw Machine
10) Marfa file
11) Numbering

SEQUENCE OF OPERATIONS

1) Measuring
2) Planning
3) Marking
4) Cutting
5) Chiseling
6) Corner joint with nail
7) Sun mica Pasting (Fevicolor similar adhesive)
8) Marking for slot cutting
9) Jig Saw cutting
10) Numbering
11) Polishing

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher

S.K. Hajara Chaudhary	Workshop Technology		Media Promotors and Publishers,New Delhi
B.S. Raghuwanshi	Workshop Technology		Dhanpat Rai and Sons, New Delhi
R K Jain	Production Technology		Khanna Publishers, New Delhi
H.S.Bawa	Workshop Technology		Tata McGraw Hill Publishers,New Delhi
--	Kent's Mechanical Engineering Hand book		John Wiley and Sons, New York
Video Cassettes/ CDS Learning Materials Transparencies, CBT Packages developed by NITTER Bhopal			
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Computer Engineering Group (Basic Workshop Practice (Computer))	
Course code: CO/CM/CD/IF	**Semester : First**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil

Objective :-

S.No	After studying this subject, the student will be able to –
1.	• Understand basic components of computers. • Connect peripheral devices. • Clean various devices like Keyboard, mouse, printers, motherboard.
2.	• Park and eject the papers over the printer. • Write Data on the CD. • Scan documents and images.
3.	• Understand front panel and back panel connections. • Connection of Pen drives and DVD's

Pre-Requisite :-Nil

Contents: Theory (Topic/Subtopic)		Hrs/week
Unit -1	**Introduction to Various External Peripheral Devices** 1.1 Different types of keyboards 1.2 Different types of Mouse 1.3 Different types of Scanners 1.4 Different types of Modems 1.5 Different types of printers 1.6 CD writers, speakers, CD read /write drive 1.7 Microphones, LCD projectors, Pen drives, DVD drive 1.8 Different types of Monitors	
Unit -2	**Introduction to Various Internal Devices** 2.1 Different makes of hard disks 2.2 Different types of network Interface cards 2.3 Different types of cables such as data cables, printer cables ,network cables ,power cables etc. 2.4 Different types of floppy disk 2.5 Motherboard connection 2.6 Graphics Card connection 2.7 Network Interface card connection	
Unit – 3	**Physical Connections of different peripheral Devices** 3.1 Connection of Mouse to different ports	

	3.2 Connection of keyboards to different ports 3.3 Connection of Monitors 3.4 Connection of Printers 3.5 Different switch settings of printers 3.6 Printer's self test 3.7 Jumper settings of hard disks 3.8 Attaching FDD,HDD and CD drives 3.9 Attaching Pen Drives and DVDs 3.10 Attaching Scanners	
	Total	

ASSIGNMENTS:

1. Observe all the peripheral devices available in the lab. Describe them in detail.
2. Demonstration of system configuration using CMOS setup.
3. Study of different ports such as serial, parallel, PS/2,NIC ports.
4. Assignment on how to write data on CDs
5. Observe different printer settings on different types of printers available in your lab. Write down the function of each switch.
6. Demonstration of printer's self test.
7. Assignment on connection of speakers and microphones.
8. Assignment on different types of cables in your lab.
9. Assignment on cleaning procedures of Mouse, Keyboard and motherboard.
10. Assignment on how to connect scanner and scan document and pictures on the scanner available in your lab.
11. Assignment on making jumper settings on hard disk.
12. Assignment on different types of cards such as graphics card, LAN card, multimedia cards etc.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mr. David Stone & Alfred Poor	Troubleshooting Your PC		Prentice Hall India
David Groth	A+ Complete		BPB Publication
Balasubramaniam	Computer Installation and servicing		Tata McGraw Hill
Manuals	Reference Manuals of PC troubleshooting and maintenance		--

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME: MECHANICAL ENGINEERING

COURSE CODE : ME/PG/AE/PS/MH/FE/MI

DURATION OF COURSE : 6 SEMESTERS

SEMESTER: SECOND **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	P	SESSIONSAL EXAM			ESE	PR @	Oral #	TW @	
					TA	CT	Total					
1	Communication Skills	1	1	2	10	20	30	70	-	25	25	3
2	Engineering Mathematics	3	1	-	10	20	30	70	-	-	-	3
3	Applied Science (Mechanical & Plastic)	3	-	4	10	20	30	70	50	-	-	5
4	Engineering Mechanics	3	-	2	10	20	30	70	-	-	25	4
5	Workshop Drawing	1	-	4	10	20	30	70	-	-	50	3
6	Workshop Practice	-	-	4	-	-	-	-	-	-	50	2
7	Development of Life – I	1	-	2	-	-	-	-	-	25	25	3
8	Professional Practices- II	-		2					-		50	1
	Total	**12**	**2**	**20**	**50**	**100**	**150**	**350**	**50**	**50**	**225**	**24**

STUDENT CONTACT HOURS PER WEEK: **34 HRS**

HTEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

, External Assessment @ , Internal Assessment ESE – End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA – Teachers Assessment, L – Lecture, TU – Tutorial, P – Practical

TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

Total Marks : 675

Minimum passing for sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : All Branches of Diploma in Engineering & Technology (**Communication Skills**)			
Course code: CE/CR/CS/ME/EE/EP/EJ/EN/ET/EX/DE/IE/IS/IC/EV/MU/CO/CM/IF/CV/MH/FE/IU/CD/ED /EI		**Semester :** Second	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit :			
Aim :-Nil			
Objective :-			
S.No	The Students will be able to:		
1.	Understand and use the basic concepts of communication and principles of effective communication in an organized set up and social context.		
2.	Give a positive feedback in various situations, to use appropriate body language & to avoid barriers for effective communication.		
3.	Write the various types of letters, reports and office drafting with the appropriate format.		
Pre-Requisite :-Nil			
Contents (Theory)		Hrs/ week	Marks
	Name of the Topic		
Unit -1	**Introduction to communication:** 1.1 Definition , communication cycle/ process, 1.2 The elements of communication : sender- message – channel- Receiver –Feedback & Context. 1.3 Definition of communication process. 1.4 Stages in the process : defining the context, knowing the audience, designing the message, encoding , selecting proper channels, transmitting, receiving, decoding and giving feedback.	**02**	**08**
Unit -2	**Types of communication** Formal- Informal, Verbal- Nonverbal, Vertical- horizontal- diagonal	**02**	**08**
Unit – 3	**Principals of effective communication :** 3.1 Definition of effective communication 3.2 Communication barriers & how to overcome them. 3.3 Developing effective messages: Thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers & facilitating feedback.	**02**	**08**
Unit – 4	**Non verbal- graphic communication**: 4.1 Non- verbal codes: A- Kinesecs , B- Proxemics , C – Haptics	**04**	**18**

	D-Vocalics , E- Physical appearance. F –Chronemics , G –Artifacts **Marks: 08** 4.2 Aspects of body language **Marks: 06** 4.3 Interpreting visuals & illustrating with visuals like tables, charts & graphs. **Marks: 08**		
Unit – 5	**Formal written skills :** 5.1 Office Drafting: Circular, Notice , and Memo. **Marks: 06** 5.2 Job Application with resume. **Marks: 08** 5.3 Business correspondence: Enquiry, Order letter, Complaint letter, and Adjustment letter. **Marks: 06** 5.4 Report writing: Accident report, fall in production, Progress / Investigative. **Marks: 08** 5.5 Defining & describing objects & giving Instructions. **Marks: 04**	**06**	**28**
	Total	**16**	**70**

Assignments:

1. Communication Cycle (With The Help Of Diagram)
2. Communication Situations (List Of 5 Communication situations stating the type of communication
3. Barriers That Hinder A Particular Communication Situation. (State the type of barrier, and how to overcome them).
4. Developing A Story Or A Paragraph For The Given Topic Sentence.(in a group of 5 – 6 students)
5. Describing Various Equipments.
6. Identifying The Various Sentences With Their Type Of Writing. (e.g. Scientific, legal, colloquial etc.)
7. Business Letters
8. Letters Of Suggestion
9. Comparative Time Table Of 2 Students
10. Description Of Two Different Persons.(seeing the picture)
11. Letter To The Librarian, Principal
12. Report Writing.

NOTE: The above assignments are suggested to be completed in the prescribed work-book.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Krushna Mohan, Meera Banerji	Developing Communication Skills		Macmillan
Joyeeta Bhattacharya	Communication Skills		Reliable Series
Jayakaran	Every ones guide to effective writing		Apple publishing

Reference books :- Nil

Name of Authors	Titles of the Book	Edition	Name of the Publisher

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : All Branches of Diploma in Engineering and Technology (Engineering Mathematics)			
Course code: CE/ME/IE/EJ/DE/ET/EX/EE/EP/MU/EV/IS/CO/ CM/IF /PG/PT/AE/CV/MH/FE/CD/ED/EI		**Semester : Second**	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit :			
Aim :-Nil			
Objective :-			
S.No	The student will be able to		
1.	Acquire knowledge of Mathematical terms, concepts, principles and different methods. Develop the ability to apply mathematical methods to solve technical problems, to execute management, plans with precision. Acquire sufficient mathematical techniques necessary for daily and practical problems.		
Pre-Requisite :-Nil			
	Contents (Theory)	Hrs/ week	Marks
Note: 1. Chapters 1 to 3 are common for all branches. 2. Chapter 4-For Civil, Electrical, Mechanical and Electronics groups 3. Chapter 5-For Computer Engineering Group.			
Unit -1	**Function and Limit** **1.1 Function** 1.1.1 Definitions of variable, constant, intervals such as open, closed, semi-open etc. 1.1.2 Definition of Function, value of a function and types of functions, Simple Examples. **1.2 Limits** 1.2.1 Definition of neighborhood, concept and definition limit. 1.2.2 Limits of algebraic, trigonometric, exponential and logarithmic functions with simple examples.	**04** **08**	**06** **12**
Unit -2	**Derivatives** **2.1** Definition of Derivatives, notations. 2.2 Derivatives of Standard Functions 2.3 Rules of Differentiation. (Without proof). Such as Derivatives of Sum or difference, scalar multiplication, Product and quotient. 2.4 Derivatives of composite function (Chain rule)	**12**	**18**

	2.5 Derivatives of inverse and inverse trigonometric functions. 2.6 Derivatives of Implicit Function 2.7 Logarithmic differentiation 2.8 Derivatives of parametric Functions. 2.9 Derivatives of one function w.r.t another function 2.10 Second order Differentiation.		
Unit – 3	**Statistics And Probability** **3.1 Statistics** 3.1.1 Measures of Central tendency (mean, median, mode) for ungrouped and grouped frequency distribution. 3.1.2 Graphical representation (Histogram and Ogive Curves) to find mode and median 3.1.3 Measures of Dispersion such as range, mean deviation, Standard Deviation, Variance and coefficient of variation. Comparison of two sets of observations. **3.2 Probability** 3.2.1 Definition of random experiment, sample space, event, Occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely). 3.2.2 Definition of Probability, addition and multiplication theorems of Probability	**10** **04**	**12** **06**
NOTE: Chapter 4 is for Civil, Electrical, Electronics and Mechanical Groups			
Unit – 4	**4.1 Applications Of Derivative** 4.1.1 Geometrical meaning of Derivative, Equation of tangent and Normal 4.1.2 Rates and Motion 4.1.3 Maxima and minima 4.1.4 Radius of Curvature **4.2 Complex number** 4.2.1 Definition of Complex number. Cartesian, polar, Exponential forms of Complex number. 4.2.2 Algebra of Complex number(Equality, addition, Subtraction, Multiplication and Division) 4.2.3 De-Moivre's theorem (without proof) and simple problems. Euler's form of Circular functions, hyperbolic functions and relations between circular &hyperbolic functions	**06** **04**	**08** **08**
Note: Chapter 5 is for Computer Engineering Group Only			
05	**5.1 Numerical Solution of Algebraic Equations** 5.1.1 Bisection method, Regula-Falsi method and Newton-Raphson method **5.2 Numerical Solution of Simultaneous Equations** 5.2.1 Gauss elimination method 5.2.2 Iterative methods-Gauss Seidal and Jacobi's method	**06** **04**	**08** **08**
	Total	**48**	**70**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.P. Deshpande	Mathematics for		Pune Vidyarthi Griha Prakashan,

	Polytechnic		Pune.
Robert T Smith	Calculus :Single Variable		Tata McGraw Hill
Dass H. K.	Advanced Engineering Mathematics		S. Chand Publication, New Delhi
S.C Gupta and Kapoor	Fundamentals of Mathematical Statistics		S. Chand Publications New Delhi.
B.S Grewal	Higher Engineering Mathematics		Khanna Publication, New Delhi
P. N. Wartikar	Applied mathematics		Pune Vidyarthi Griha Prakashan, Pune.
Reference books :- Nil			

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :

Tutorial
Note:
Tutorials are to be used to get enough practice for solving problems. It is suggested that in each tutorial at least five problems to be solved.

Tutorial No.	Topic on which tutorial is to be conducted
1	Function
2	Limits
3	Derivative
4	Derivative
5	Derivative
6	Statistics
7	Statistics
8	Statistics
9	Probability
10	Probability
11	Application of derivative/numerical Solution of algebraic equations
12	Application of derivative/numerical Solution of algebraic equations
13	Complex Numbers/Numerical Solution of Simultaneous Equations
14	Complex Numbers/Numerical Solution of Simultaneous Equations

Name of the Course : Civil, Mechanical and Electrical Group (Engineering Mechanics)			
Course code: CE/CS/CR/ME/PT/PG/AE/EE/EP/MH/FE/CV		**Semester : Second**	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit :			
Aim :-Nil			
Objective :-			
S.No	The students will able to:		
1.	• Resolve the forces.		
2.	• Find the resultant of given force system.		
3.	• Find the reactions of beam.		
4.	• Find the center of gravity of composite solids.		
5.	• Find M.A., V.R., Efficiency and establish law of machine		
Pre-Requisite :-Nil			
Contents (Theory**)**		Hrs/week	Marks
Unit -1	**Force** a. **Fundamentals: -** Definitions of mechanics, statics, dynamics. Engineering Mechanics, body, rigid body, mass, weight, length, time, scalar and vector, fundamental units, derived units, S.I. units. b. **Force**: - Definition of a force, unit force, Newton, S.I. unit of a force, representation of a force by vector and by Bow's notation method. Characteristics of a force, effects of a force, principle of transmissibility. c. **Resolution of a force:** Definition, Method of resolution, Types of component forces, Perpendicular components and Non-perpendicular components. d. **Moment of a force: -** Definition, measurement of moment of a force, S. I. unit, geometrical meaning of moment of a force, classification of moments according to direction of rotation, sign	**12**	**15**

	convention, law of moments Varignon's theorem of moment and it's use, couple – definition, S.I. unit, measurement of a couple, properties of couple. e. **Force system: -** Definition, classification of force system according to plane and line of action f. **Composition of Forces**: - Definition, Resultant force, methods of composition of forces, I – Analytical method – (i) Trigonometric method (law of parallelogram of forces) (ii) Algebraic method (method of resolution), II – Graphical method: - Introduction, space diagram, vector diagram, polar diagram, and funicular polygon. Resultant of concurrent, non-concurrent and parallel force system by analytical and graphical method.		
Unit -2	**Equilibrium:** 2.1 Definition, conditions of equilibrium, analytical and graphical conditions of equilibrium for concurrent, non-concurrent and parallel force system, free body and free body diagram. 2.2 Lami's Theorem – statement and explanation, Application of Lami's theorem for solving various engineering problems. 2.3 Equilibrant – Definition, relation between resultant and equilibrant, equilibrant of concurrent and non-concurrent force system. 2.4 Beams – Definition, Types of beams (cantilever, simply supported, overhanging, fixed, continuous), Types of end supports (simple support, hinged , roller), classification of loads, point load, uniformly distributed load. Reactions of a simply supported and over hanging beam by analytical and graphical method.	**10**	**15**
Unit – 3	**Friction:** 3.1 Definition of friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction angle of repose and coeff. Of friction. Cone of friction, types of friction, laws of friction, advantages and disadvantages of friction. 3.2 Equilibrium of bodies on level plane –external force applied horizontal and inclined up and down. 3.3 Equilibrium of bodies on inclined plane – external forces is applied parallel to the plane, horizontal and incline to inclined plane. 3.4 Ladder friction, Wedge and block.	**08**	**15**
Unit – 4	**Centroid and Centre Of Gravity:** 4.1 **Centroid:** Definition of centroid. Moment of an area about an axis. Centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite figure.	**08**	**10**

	4.2 **Center of gravity:** Definition, center of gravity. Of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids.		
Unit – 5	**Simple Machines:** 1) Definitions of simple machine, compound machine , load , effort , mechanical advantage , velocity ratio , input on a machine ,output of a machine ,efficiency of a machine , expression for mechanical advantage , velocity ratio and efficiency of a machine. Ideal machine, ideal effort and ideal load, friction in machines, effort lost in friction and frictional load. 5.2 Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, self locking machine. 5.3 Study of simple machines : Simple axle and wheel, differential axle and wheel, Weston's differential pulley block, single purchase crab, double purchase crab, worm and worm wheel, geared pulley block, screw jack, pulleys : First, second and third system of pulleys, gear train, hoist mechanism.	**10**	**15**
	Total	**48**	**70**

Contents (Practical)

Skills to be developed:

1 Intellectual Skill:	A. Calculate the forces on given structure B. Interpret the results
2 Motor Skills:	A. Handle the equipment carefully B. Draw graph

The term work consist of any five experiments from Group A,B and graphical solution in Group C

Group A:

2) Verify law of polygon of forces
3) Verify law of moments
4) Verification of Lami's theorem
5) Forces in members of a jib crane.
6) Comparison of coefficient of friction of various pair of surfaces and
7) determination of angle of repose
8) Equilibrium of parallel forces – simply supported beam reactions.
9) Experimental location of center of gravity of plane plate of uniform thickness.

Group B: To find MA, VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency.

Also check the reversibility of a machine (Any five):

1) Differential axle and wheel
2) Weston's differential pulley block
3) Geared pulley block
4) Single purchase crab
5) Double purchase crab
6) Worm and worm wheel
7) Two sheave and three sheave pulley block

8) Screw jack.

Group C: A 2 Size drawing sheets containing graphical solutions for –

1) Concurrent force system : Two problems
2) Parallel force system : Two problems
3) Reactions of a beam : Two problems

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Beer – Johnson	Engineering Mechanics		Tata McGraw Hill, Delhi
Basu	Engineering Mechanics		Tata McGraw Hill, Delhi
Joseph F. Shelley	Vector Mechanics for Engineers Vol. I & II		Tata McGraw Hill, Delhi

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering Group (Engineering Drawing)			
Course code: ME/PG/PT/AE/MH/FE		**Semester :** Second	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit :			
Aim :-Nil			
Objective :-			
S.No	• The students shall be able to:		
1.	• Understand the basic concepts of engineering drawing.		
2.	• Visualize the objects.		
3.	• Draw different views in different positions of objects.		
4.	• Draw the different views of machine elements.		
Pre-Requisite :-Nil			

Contents (Theory)		Hrs/week	
Note: The teachers should use some of the practical hours for teaching basic Theory during practical's as required.			
Unit -1	**Sectional Views.** 1.1 Types of sections 1.2 Conversion of pictorial view into sectional orthographic views (First Angle Projection Method only)	**03**	**10**
Unit -2	**Missing Views.** 2.1 Draw missing view from the given Orthographic views - simple components (First Angle Projection Method only)	**01**	**05**
Unit – 3	**Isometric Projection** 3.1 Conversion of Orthographic Views into Isometric view/projection (Including rectangular, cylindrical objects, representation of slots on sloping as well as plane surfaces)	**03**	**15**
Unit – 4	**Projections of Solids.** 4.1 Projections of Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube with their axes inclined to one reference plane and parallel to other.	**02**	**10**
Unit – 5	**Sections of Solids.** 5.1 Solids: -Prism, Pyramid, Cone, Cylinder, Tetrahedron, Cube. 5.2 Cone, Pyramid and Tetrahedron resting on their base on Horizontal Plane. 5.3 Prism, Cylinder: -a)Axis parallel to both the reference plane b) Resting on their base on HP.	**03**	**10**

	5.4 Section plane inclined to one reference plane and perpendicular to other.		
Unit – 6	**Developments of Surfaces.** Developments of Lateral surfaces of cube, prisms, cylinder, pyramids, cone and their applications such as tray, funnel, Chimney, pipe bends etc.	**02**	**10**
Unit – 7	**Free Hand Sketches** 7.1 Free hand sketches of nuts, bolts, rivets, threads, split pin, foundation bolts, keys and couplings.	**02**	**10**
	Total	**16**	**70**

Practical

List of Practical	**Skills to be Developed**	
	Intellectual skill	**Motor Skill**
1.Sectional View **-** (Total 2 Sheets) Two objects by First Angle Projection Method – (1 Sheet) Redraw the same sheet using CAD - (1 Sheet)	1)To interpret sectional views of given object.	Develop ability to draw sectional views Using computer.
2. Isometric projection - (Total 2 sheets) Two objects one by true scale and another by isometric scale - (1 sheet) Draw **one** sheet having two problems in each sheet using CAD – (Plot any one)	1) Develop ability to differentiate between isometric view and isometric projections. 2) To differentiate between Isometric scale and true scale.	Develop ability to draw isometric views and isometric projections from given orthographic views of an object using computer.
S. Missing Views Two problems by first angle projection method - (1 Sheet)	1) To interpret the missing view from given orthographic views.	1) To develop ability to draw missing view from given orthographic views.
S. Projection of solids Two problems on two different solids, one by axis of solid inclined to HP and parallel to VP and another problem by axis of solid inclined to VP and parallel to HP. – (1 Sheet)	1) To interpret the different positions of solids with reference planes. 2) To develop ability to differentiate between true length of axis and apparent length of axis. 3) To develop ability to differentiate between true shape and apparent shape of solids.	1) To draw projections of different solids when axis is inclined or perpendicular to one of the reference plane.
S. Section of solids Two problems on different solids. One problem, section plane inclined to HP and perpendicular to VP and in another problem, section plane inclined to VP and Perpendicular to HP. - (1 Sheet)	1) To differentiate between true shape and apparent shape of section. 2) To interpret the positions of section plane with reference planes.	1) To develop ability to draw sectional orthographic views of given solids, when it is cut by section plane in different position with reference planes. 2) Ability to draw true shape of section.

S. Development of surfaces Any two problems on development of surfaces of different objects. - (1 Sheet)	**S.** Able to interpret the development of surfaces of different solids.	**S.** Ability to draw the development of surfaces of different objects in different shapes.
S. Free Hand Sketches Any six figures on different topics. - (1 Sheet)	**S.** To differentiate between scale drawing and free hand drawing. 2) To differentiate between various parts of machine like nuts, bolts, screws, different threads, couplings etc.	1) Develop ability to draw orthographic views of different machine elements.

List of Practice Oriented Projects:

To find out the total sheet metal required for a given object.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N. D. Bhatt	Engineering Drawing		Charotkar Publishing House
R. K. Dhawan	Engineering Drawing		S. Chand Co.
P. J. Shah	Engineering Drawing		--
N. D. Bhatt	Machine Drawing		Charotkar Publishing House
K. Venugopal	Engineering Drawing and Graphics + AutoCAD		New Age Publication
K. R. Mohan	Engineering Graphics		Dhanpat Rai and Publication Co.
R. K. Dhawan	Machine Drawing		S. Chand Co.

Video Cassettes / CD's

IS Codes:

SP – 46. Engineering Drawing practice for schools and colleges.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering Group (Professional Practices-II)	
Course code: ME/PG/PT/AE/ MH/FE	**Semester : Second**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil	
Objective :-	
S.No	The Student will be able to:
1.	• Acquire information from different sources. • Prepare notes for given topic.
2.	• Present given topic in a seminar. • Interact with peers to share thoughts.
3.	• Prepare a report on industrial visit, expert lecture.
Pre-Requisite :-Nil	

Contents:- Nil	Hrs/week
Text Books:- Nil	
Reference books :- Nil	
Suggested List of Laboratory Experiments :- Nil	
Suggested List of Assignments/Tutorial :- Nil	

Sr. No.	**Activities**	**Hours**

01	**Industrial Visits:** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form part of the term work. Visits to **any two** of the following : i) Nearby Petrol Pump.(fuel, oil, product specifications) ii) Automobile Service Station (Observation of Components / aggregates) iii) Engineering Workshop(Layout, Machines) iv) Dairy Plant / Water Treatment Plant	**10**
02	Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any THREE of the following areas : i) Pollution control. ii) Non destructive testing. iii) Acoustics. iv) Illumination / Lighting system. v) Fire Fighting / Safety Precautions and First aids. vi) Computer Networking and Security. vii) Topics related to Social Awareness such as – Traffic Control System, Career opportunities, Communication in Industry, Yoga Meditation, Aids awareness and health awareness.	**06**
03	<u>Group Discussion :</u> The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are – i) Sports ii) Current news items iii) Discipline and House Keeping iv) Current topics related to mechanical engineering field.	**08**
04	Student Activities: The students in a group of 3 to 4 will perform **any one** of the following activities (others similar activities may be considered Activity : i) Collect and study IS code for Engineering Drawing.. ii) Collecting information from Market: Nomenclatures and specifications of engineering materials. iii) Specifications of Lubricants. iv) Draw orthographic projections of a given simple machine element using and CAD software	**08**
	Total	**32**

Name of the Course : All Branches of Diploma in Engineering and Technology (Development of Life Skills- I)	
Course code: CE/ME/IE/EJ/DE/ET/EX/EE/EP/CO/IF/IS/ CO/CM/IF/CV/MH/FE/IU/CD/ED/EI	**Semester :** SECOND
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-Nil

Objective :-

S.No	The students will be able to:
1.	• Develop reading skills
2.	• Use techniques of acquisition of information from various sources
3.	• Draw the notes from the text for better learning.
4.	• Apply the techniques of enhancing the memory power.
5.	• Develop assertive skills.
6	• Prepare report on industrial visit.
7.	• Apply techniques of effective time management.
8	• Set the goal for personal development.
9.	• Enhance creativity skills.
10	• Develop good habits to overcome stress.
11.	• Face problems with confidence

Pre-Requisite :-Nil

Contents (Theory)		Hrs/week
Unit -1	Importance of DLS, Introduction to subject, importance in present context ,application	**01**
Unit -2	**Information Search** Information source –Primary, secondary, tertiary Print and non – print, documentary, Electronic Information center, Library , exhibition, Government Departments. Internet Information search – Process of searching, collection of data –questionnaire , taking Interview , observation method.	**02**
Unit – 3	**Written communication** METHOD OF NOTE TAKING Report writing –Concept, types and format.	**01**

Unit – 4	**Self Analysis** Understanding self— Attitude, aptitude, assertiveness, self esteem, Confidence buildings. Concept of motivation.	**02**
Unit – 5	**Self Development** Stress Management –Concept, causes, effects , remedies to Avoid / minimize stress. Health Management – Importance, dietary guidelines and exercises. Time management- Importance, Process of time planning, Urgent Vs importance, Factors leading to time loss and ways to handle it ,Tips for effective time management. EMOTION-CONCEPT, TYPES, CONTROLLING, EMOTIONAL INTELLIGENCE. CREATIVITY-CONCEPT, FACTORS ENHANCING CREATIVITY. GOAL SETTING – CONCEPT, SETTING SMART GOAL.	**07**
Unit – 6	**Study habits** Ways to enhance memory and concentration. Developing reading skill. Organisation of knowledge, Model and methods of learning.	**03**
	Total	**16**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Marshall Cooks	Adams Time management		Viva Books
E.H. Mc Grath , S.J.	Basic Managerial Skills for All		Pretice Hall of India, Pvt Ltd
Allen Pease	Body Language		Sudha Publications Pvt. Ltd.
Lowe and Phil	Creativity and problem solving		Kogan Page (I) P Ltd
Adair, J	Decision making & Problem Solving		Orient Longman
Bishop , Sue	Develop Your Assertiveness		Kogan Page India
Marion E Haynes	Make Every Minute Count		Kogan page India
Pearson Education Asia	Organizational Behavior		Tata McGraw Hill
Michael Hatton (Canada – India Project)	Presentation Skills		ISTE New Delhi
--	Stress Management Through Yoga and Meditation		Sterling Publisher Pvt Ltd .
Richard Hale ,Peter Whilom	Target setting and Goal Achievement		Kogan page India
Chakravarty, Ajanta	Time management		Rupa and Company
Harding ham .A	Working in Teams		Orient Longman

Internet Assistance:

1) http://www.mindtools.com
2) http://www.stress.org
3) http://www.ethics.com
4) http://www.coopcomm.org/workbook.htm
5) http://www.mapfornonprofits.org/
6) http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7) http://eqi.org/
8) http://www.abacon.com/commstudies/interpersonal/indisclosure.html
9) http://www.mapnp.org/library/ethics/ethxgde.htm
10) http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11) http://members.aol.com/nonverbal2/diction1.htm
12) http://www.thomasarmstron.com/multiple_intelligences.htm
13) http://snow.utoronto.ca/Learn2/modules.html
14) http://www.quickmba.com/strategy/swot/

Reference books :Nil

Suggested List of Laboratory Experiments : Nil

Suggested List of Assignments/Tutorial :

S.No	The Term Work Will Consist Of Following Assignments.
1	Library search:- Visit your Institute's Library and enlist the books available on the topic given by your teacher. Prepare a bibliography consisting name of the author, title of the book, publication and place of publication.
2	Enlist the magazines, periodicals and journals being available in your library. Select any one of them and write down its content. **Choose a topic for presentation.**
3	Attend a seminar or a guest lecture, listen it carefully and note down the important points and prepare a report of the same.
4	Visit to any one place like historical/office/farms/development sites etc. and gather information through observation, print resources and interviewing the people.
5	Prepare your individual time table for a week – (b) List down your daily activities. (c) Decide priorities to be given according to the urgency and importance of the activities. (d) Find out your time wasters and mention the corrective measures.
6	Keep a diary for your individual indicating- planning of time, daily transactions, collection of good thoughts, important data, etc
7	Find out the causes of your stress that leads tension or frustration .Provide the ways to Avoid them or to reduce them.
8	Undergo the demonstration on yoga and meditation and practice it. Write your own views, feeling and experiences on it.

Note:- These are the **suggested assignment** for guide lines to the subject teacher. However the subject teachers can select, design any assignment relevant to the topic, keeping in mind the objectives of this subject.

Name of the Course : Mechanical Engineering Group (Workshop Practice)	
Course code: ME/PT/AE/MH/FE	**Semester :** Second
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	--	50@	50

Rationale:

Mechanical diploma technician is expected to know basic workshop practice like, Gas Welding gas cutting. Fitting, Drilling, Tapping, plumbing and hot working processes. The students are required to identify operate and control various machines. The students are required to select and use various tools and equipments for welding, fitting, tapping drilling, plumbing and forging operations.

Aim :-Nil

Objective :-

S.No	The student will able to:
1.	• Know basic workshop processes. • Read and interpret job drawings. • Identify, select and use various marking, measuring, and holding, striking and cutting tools & equipments wood working and sheet metal shops.
2.	• Operate, control different machines and equipments. • Select proper welding rods and fluxes. • Inspect the job for specified dimensions • Produce jobs as per specified dimensions.
3.	• Adopt safety practices while working on various machines. • Measurement skills. • Fitting skills.

Notes: 1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.

2] The workshop diary shall be maintained by each student duly signed by instructor of respective shop

CONTENTS: Subject practical content as shown in the table below:

Skill to be developed:

Intellectual Skills:

1. Ability to read job drawings.
2. Ability to identify and select proper material, tools and equipments and machines.
3. Ability to select proper parameters (like cutting speed, feed, depth cut use of lubricants) in machine.

Motor Skills:

1. Ability to set tools, work piece, and machines for desired operations.
2. Ability to complete job as per job drawing in allotted time.
3. Ability to use safety equipment and follow safety procedures during operations.
4. Ability to inspect the job for confirming desired dimensions and shape.
5. Ability to acquire hands-on experience

Pre-Requisite :-Nil

	Details of Practical Contents	Hrs/week
Unit -1	**CARPENTERY SHOP:** • Any one composite job from the following involving different joint, turning and planning, surface finishing by emery paper, varnishing etc. like square stool, tea table, center table, chaurang, table lamp bed sofa-set, book rack. Cabinet, notice board, shows cases, tables chairs etc. Note:1] One job of standard size (Saleable article shall be preferred) 2] Batch size should be selected depending on volume of work. 3] Job allotted should comprise of 6-8 hours of actual working 4] Student shall calculate the cost of material and labor cost for their job from the drawing.	
Unit -2	**WELDING SHOP** • Any one composite job from involving butt joint lap joint welding process, from the following like Grill, door, window frame, waste paper basket, Chappel stand, Corner flower stand chair , table frame (square pipe 25 mm) cooler frame (folding type) **Note:** 1] One job of standard size (Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work . 3] Job allotted should comprise of 6-8 hours of actual working operations. 4] Student shall calculate the cost of material and labor required for their job from the drawing.	
Unit – 3	**SMITHY SHOP** • Demonstration of different forging tools and Power Hammer. • Demonstration of different forging processes, likes shaping, caulking fullering, setting down operations etc. • One job like hook peg, flat chisel or any hardware item. • **Note**: 1]One job of standard size (Saleable/marketable article shall	

	be preferred) 2] Job allotted should comprise of 4-6 hours of actual working operations. 3] Student shall calculate the cost of material and labor required for their job from the drawing.	
Unit – 4	***PLUMBING SHOP*** • Demonstration of PVC pipe joint with various fittings. • Exercise for students on preparing actual pipeline layout for G.I. Pipe or PVC pipe. Preparing actual drawing and bill of material. Note:1] One job of standard size (Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work. 3] Job allotted should comprise of 6-8 hours of actual working 4] Student shall calculate the cost of material and labor cost for their job from the drawing.	
Unit – 5	***SHEET METAL SHOP*** • One composite job from the following: Letter box, Trunk, Grain Container, Water-heater Container, Bucket, Waste Paper Basket, Cooler Tray, Water-draining Channel, etc. (including soldering and riveting) Note: 1] One job of standard size (Saleable/marketable article shall be preferred) 2] Batch size should be selected depending on volume of work. 3] Job allotted should comprise of 4-6 hours of actual working ions. 4] Student shall calculate the cost of material and labor cost required for their job from the drawing.	
Unit – 6	**Demonstration of power tools and practice of utility items.** • Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories. • Making of electrical switchboard with 2 sockets and piano buttons and with electrical wiring. • Any other item as per the requirement of college/Deptt./ **(Note: Utility item are not to be assessed**	
	Total	64

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S.K. Hajara Chaudhary	Workshop Technology		Media Promotors and Publishers,New Delhi
B.S. Raghuwanshi	Workshop Technology		Dhanpat Rai and Sons, New Delhi
R K Jain	Production Technology		Khanna Publishers, New Delhi
H.S.Bawa	Workshop Technology		Tata McGraw Hill

			Publishers,New Delhi
--	Kent's Mechanical Engineering Hand book		John Wiley and Sons, New York
Video Cassettes / CDS • Learning Materials Transparencies, CBT Packages developed by NITTER Bhopal.			
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Mechanical Engineering Group (Applied Science (Mechanical))	
Course code: ME/PG/PT/AE/MH/FE	**Semester : Second**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit :	

Aim :-

S.No	
1.	
2.	
3.	

Objective :-

S.No	The Student will be able to:
1.	• Differentiate kinetic and kinematics and **S**olve the problems on kinematics and kinetics.
2.	• Graphically represent rectilinear motion, S.H.M. and use for solving engineering problems.
3.	• Use N.D.T. in quality assurance and saving of man power, machining, materials,
4.	• Use principles of illumination for enhancing work efficiency
5.	• Analyze variation of sound intensity with respect to distance.
6.	• Identify different factors affecting acoustical planning of buildings
7.	• Identify different factors affecting indoor lighting.

Pre-Requisite :-Nil

Contents : Theory (Name of The Topic)		Hrs/week	
Unit -1	**1. Kinematics** **1.1 Rectilinear Motion** Equations of Motions-v=u+ a t, $s=ut+1/2at^2$, $V^2=u^2+2as$(only equation), Distance traveled by particle in n^{nt} second, Velocity Time Diagrams-uniform velocity, uniform acceleration and uniform retardation, equations of motion for motion under gravity. **1.2 Angular Motion** Definition of angular displacement, angular velocity, angular acceleration, Relation between angular velocity and linear velocity, Three equations of circular motion (no derivation) angular distance traveled by particle in n^{nt} second (only equation), Definition of S.H.M.	**14**	**15**

Unit -2	and S.H.M. as projection of uniform circular motion on any one diameter, Equation of S.H.M. and Graphical representation of displacement ,velocity, acceleration of particle in S.H.M. for S.H.M. starting from mean position and from extreme position. **2. Kinetics** **2.1** Definitions of momentum, impulse, impulsive force, Statements of Newton's laws of motion and with equations, Applications of laws of motion—Recoil of gun, Motion of two connected bodies by light inextensible string passing over smooth pulley, Motion of lift. **2.2 Work ,power ,Energy** Definition of work, power and energy, equations for P.E. K.E., Work energy principle, Representation of work by using graph, Work done by a torque(no derivation)		
Unit -3	**3. Non –destructive testing of Materials.** **3.1 T**esting methods of materials -Destructive and Nondestructive, Advantages and Limitations of N.D.T., Names of N.D.T. Methods used in industries, Factors on Which selection of N.D.T. dependents, Study of Principle, Set up, Procedure, **3.2** Working, Advantages, limitations, Applications and Application code of following N.D.T. methods -Penetrant method, Magnetic particle method, Radiography, Ultrasonic, Thermography.	**05**	**10**
Unit -4	**Acoustics and Indoor Lighting of Buildings** **4.1 Acoustics** Weber and Fetcher's law, limit of intensity and loudness, echo, Reverberation and reverberation time (Sabine's formula) **,**Timbre (quality of sound), Pitch or Frequency of sound. Factors affecting Acoustical planning of auditorium-- echo, reverberation, creep, focusing, standing wave, coefficient of absorption, sound insulation, noise pollution and the different ways of controlling these factors. **4.2 Indoor lighting** Definition of luminous intensity, intensity of illumination with their SI units, Inverse square law and Photometric equation, Bunsen's photometer— ray diagram, working and applications, Need of indoor lighting ,Indoor lighting schemes and Factors Affecting Indoor Lighting.	**05**	**10**
	Total	**24**	**35**
Practical			
Skills to be developed**:**			
Intellectual skills:	▪ Proper selection of measuring instruments on the basis of range, least count, precision and accuracy required for measurement. ▪ To verify the principles, laws, using given instruments under different conditions. ▪ To read and interpret the graph. ▪ To interpret the results from observations and calculations. ▪ To use these results for parallel problems.		
Motor	▪ Proper handling of instruments.		

skills:	▪ Measuring physical quantities accurately. ▪ To observe the phenomenon and to list the observations in proper tabular form. ▪ To adopt proper procedure while performing the experiment. List of Practical:

1. To represent simple harmonic motion with the help of vertical oscillation of spring and to determine spring constant (K) (Stiffness Constant)

2. To determine time period of oscillation of compound bar pendulum and calculate acceleration due to gravity.

3. To determine the velocity of sound by using resonance tube

4. To compare luminous intensities of two luminous bodies by using Bunsen's photometer.

5. To calculate coefficient of absorption for acoustical materials

6. To determine Joule's constant (J) by electric method

7. To determine wavelength of Sodium light by using Newton's rings

8. To Verify Ampere's rule using Oersted's Experiment and find variation of intensity of magnetic field
   with Current and Distance

9. To determine frequency of sound by using sonometer .

10. To calculate refractive index of material of prism using spectrometer device .

11. To determine the divergence of He-Ne laser beam.

Laboratory based Mini Projects:

1. To detect surface cracks in the working piece by using liquid penetration method (LPT).

2. To determine coefficient of thermal conductivity of good conductor by using Searle's method

3. To determine the moments of inertia (I_α and I_β) of the given irregular body and to determine the rigidity modulus of the material of the given suspension wire by setting up a torsional pendulum.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
V. Rajendran	Physics-I		Tata McGraw- Hill
Arthur Beiser	Applied physics		Tata McGraw- Hill
R.K.Gaur and S.L.Gupta	Engineering Physics		Dhanpatrai

Rensic and Halliday	Physics		--

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

3	

Suggested List of Assignments/Tutorial :- Nil

Part B: Applied Chemistry

Rationale:

This syllabus of chemistry for Mechanical / Production / Automobile Students is classified Under the Category of Applied Science. It is intended to teach students the appropriate use of engineering materials, their protection & lubrication processes in different working conditions of machines.

Objective :-

S.No	The Student will be able to:
1.	Suggest the appropriate use of metals, alloys & non metallic materials in engineering.
2.	Applying the Knowledge to Protect Metallic & Non Metallic Surfaces
3.	Select Lubricants for Smooth Running of Machines.

Contents : Theory (**Name of the Topic**)		Hrs/ week	**Marks**
01	**Electrochemistry** Definition of Electrolyte & Conductor, Difference between Metallic & Electrolytic Conduction, Ionisation, Degree of Ionisation & Factors Affecting Degree of Ionisation, Conductivity of Electrolytes. Definition of Electrochemical Cell, Battery, Charge, Discharge, Closed Circuit Voltage, Open Circuit Voltage, EMF, Internal Resistance, Separator, Classification of Batteries such as Primary, Secondary & Reserve with Examples. Industrial Application of Electrolysis – Metallic or Protective Factors for Selection of Method of Coating, Process of Electroplating, Electrorefining, Electrometallurgy (Applications of Electroplating), Impregnated Coating or Cementation on Base Metal Steel - Coating Metal Zn (Sheradizing),Cr (Chomozing), Al (Colorizing), Applications, Advantages & Disadvantages.	**05**	**07**
02	**Non Metallic Engineering Materials** (Plastic, Rubber, Insulators, Refractories, Composite Material, Ceramics) **1. Engineering Plastic:** Special Characteristics & Engineering Applications of Polyamides or Nylons, Polycarbonates (Like Lexan, Merlan), Polyurethanes (Like Perlon – U), Silicons, Polyacetals, Teflon, Laminated Plastic,	**05**	**05**

	Thermocole, Reinforced Plastic. **2. Ceramics:** Definition, Properties & Engineering Applications, Types – Structural Ceramics, Facing Material, Refractories, Fine Ceramics, Special Ceramics. **3. Refractories:** Definition, Properties, Applications & Uses of Fire Clay, Bricks, Silica Bricks. **4. Composite Materials:** Definition, Properties, Advantages, Applications & Examples.		
03	**Metals & Alloys** **Metals** – Metallurgy of Iron, Terms Involved in Metallurgy, Indian Resources of Fe, Imp Ores, Extraction, Smelting in Blast Furnace, Chemical Reactions in Blast Furnace, Products of Blast Furnace, their Composition, Application, Commercial Forms of Iron, (Pig Iron / Cast Iron, Wrought or Malleable Steel), their Composition, Properties & Applications, Types of Casting (Chilled Casting, Centrifugal Casting & Malleable Casting), Heat Treatment, Heat Treatment of Cast Iron & Steel. **Alloys** – Definition, Types, Ferrous Alloys – Steel, Composition, Properties & Applications of Plain Carbon Steel (Low Carbon, Medium Carbon, High Carbon & Very Hard Steel) & Alloy Steels, (Heat Resisting, Shock Resisting, Magnetic, Stainless, Tool Steel & HSS), Effect of Various Alloying Elements (Cr, W, V, Ni, Mn, Mo, Si) etc. on Steel. Non-Ferrous Alloys – Copper Alloy – Brass, Bronze, Nickel Silver or German Silver, their Composition, Properties & Applications, Aluminium Alloy – Duralumin, Bearing Alloy – Babbitt Metal, Solders – Soft Solder, Brazing Alloy, Tinamann's Solder, Nickel Alloy – Monel Metal, Low Melting Alloys – Woods Metal.	**08**	**10**
04	**Corrosion** Definition, Types, Atmospheric or Chemical Corrosion, Mechanism, Factors Affecting Atmospheric, Corrosion & Immersed Corrosion or Electrochemical Corrosion, Mechanism, Protection of Metals by Purification of Metals, Alloy Formation, Cathode Protection, Controlling the External Conditions & Application of Protective Coatings i.e. Galvanising, Tinning, Metal Spraying, Sherardizing, Electroplating, Metal Clodding, Cementation or Diffusion Method, their Definition, Procedure, Uses, Advantages & Disadvantages, Examples of Non Corrosive Materials, Protection of Corrosion by the Use of Organic Coating Like Paint, Lacquer, Enamels, Emulsion Paints, Special Paints, their Properties & Uses. Special Paints – Heat Resistant, Cellulose Paint, Coaltar Paint, Antifouling Paint their constituents & applications.	**06**	**08**
05	**Lubricant** Lubricant, Types, Lubrication Mechanism by Fluid Film, Baundary, Extreme Pressure, Physical Characteristics of Lubricants Such as Viscosity, Viscosity Index, Oilness, Volatility, Flash & Fire Point, Cloud &	**03**	**05**

	Pour Point, Chemical Characteristics such as Acid Value or Neutralization Number, Emulsification, Saponification Value, Selection of Lubricants for Various Types of Machineries.		
	Total	**27**	35
Practical:	Skills to be developed:		
Intellectual Skills:	• Select proper equipment and instruments • Interpret results		
Motor Skills:	• Accuracy in measurement • Careful use of equipment		

List of Practical:

01 To determine neutralization point of weak acid and weak base by conductivity meter.

02 To determine end point of titration between dil. H_2SO_4 and $BaCl_2$ using conductivity meter.

03 To verify Faraday's second law of electrolysis.

04 To determine pH of given solution by using pH paper, universal indicator and pH meter.

05 To determine the strength of given hydrochloric acid solution by titrating it against sodium hydroxide solution using pH meter.

06 To determine percentage of copper from brass iodometrically.

07 To find the rate of corrosion of Al strip in acidic and basic medium graphically.

08 To determine thinner content in paint.

09 To determine acid value of given lubricant.

10 To determine viscosity of given oil by using Ostwald's viscometer.

11 To determine saponification value of given lubricant.

Laboratory based mini projects

13 To compare the quality of lubricating oil available in the market by testing their physical / chemical characteristics in the laboratory and decide their scope of application.

14 To find the rate of corrosion of different metals like Al, Fe, Cu, steel etc. and decide their scope of utilization in industry for mechanical purposes.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Jain & Jain	Engineering Chemistry		Dhanpat Rai and Sons
S. S. Dara	Engineering Chemistry		S. Chand Publication
B. K. Sharma	Industrial Chemistry		Goel Publication
S. S. Dara	Environmental Chemistry & Pollution Control		S. Chand Publication

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION	
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES	
COURSE NAME: MECHANICAL ENGINEERING	
COURSE CODE : ME/PG/PT/AE/PS/MH/FE/MI	
DURATION OF COURSE : 6 SEMESTERS	
SEMESTER: THIRD	SCHEME : C

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	PR	SESSIONSAL EXAM			ESE		Oral #	TW @	
					TA	CT	Total					
1	Applied Mathematics	3	1	-	10	20	30	70		-	-	4
2	Mechanical Engineering Drawing	3	-	4	10	20	30	70		25	25	5
3	Strength of Materials	2	-	2	10	20	30	70		-	25	3
4	Mechanical Engineering Materials	3	-	-	10	20	30	70		-	-	3
5	Electrical Engineering	2	-	2	10	20	30	70		-	-	2
6	Manufacturing Technology		-	4	-	-	-	-		-	25	3
7	Development of life Skill – II	-	-	2	-	-	-	-		25	25	1
8	Professional Practices-III	-		3							50	2
	Total	**13**	**1**	**17**	**50**	**100**	**150**	**350**		**50**	**150**	**23**

STUDENT CONTACT HOURS PER WEEK: **31 HRS**
HTEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH
, External Assessment @ , Internal Assessment ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, PR - Practical
TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.
Total Marks : 700

Minimum passing for sessional marks is 40%, and for theory subject 40%.
Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : Civil and Mechanical Engineering Group (Applied Mathematics)	
Course code: CE/AE/ME/PG/PT/MH/MI	**Semester : Third**
Duration :	**Maximum Marks :100**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: -- hrs/week	Assignment & Quiz: Marks
Practical : -- hrs/week	End Semester Exam: 70 Marks
Credit: 4	

Aim :-	
S.No	
1.	To develop the essential skills for new technological development and introduces some applications of engineering, to understand the link of Mathematics with engineering principles.

Objective :-	
S.No	The student will be able to**:**
1.	• Apply Mathematical term, concept, principles and different methods for studying engineering subjects
2.	• Apply Mathematical methods to solve technical problems.
3.	• Execute management plans with precision.
4.	• Use Mathematical techniques necessary for daily and practical problems.

Pre-Requisite:-	
S.No	
1.	Sound analytical skills
2.	Knowledge of basic mathematics

Contents	Hrs/week

Chapter	Name of Topic	Hours	Marks
01.	Integration: 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by substitution 1.3.2 Integration of rational functions. 1.3.3 Integration by partial fractions. 1.3.4 Integration by trigonometric transformation. 1.3.5 Integration by parts. 1.4 Definite Integration. 1.4.1 Definition of definite integral. 1.4.2 Properties of definite integral with simple problems.	10	**20**
	1.5 **Applications of definite integrals.** 1.5.1 Area under the curve. Area bounded by two curves, 1.5.2 Volume of revolution. 1.5.3 Centre of gravity of a rod, plane lamina. 1.5.4 Moment of Inertia of uniform rod, rectangular lamina 1.5.5 Theorems of parallel and perpendicular axes.	08	**12**
02.	Differential Equation 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant. 2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Nonhomogeneous, Exact, Linear and Bernoulli equations. **2.3 Applications of Differential equations.** **2.3.1 Rectilinear motion (motion under constant and variable acceleration)** 2.3.2 Simple Harmonic Motion.	10	12 **08**
03	Probability Distribution 3.1 Binomial distribution. 3.2 Poisson's distribution. 3.3 Normal distribution 3.4 Simple examples corresponding to production process.	08	**12**
04	Numerical Methods **4.1 Solution of algebraic equations** Bisection method, Regulafalsi method and Newton – Raphson method. **4.2 Solution of simultaneous equations containing 2 and 3 unknowns**	06 06	08 08

	Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's methods.		
	Total	48	**80**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mathematics for polytechnic	S. P. Deshpande		Pune Vidyarthi Griha Prakashan, Pune
Calculus: single variable	Robert T. Smith		Tata McGraw Hill
Advanced Mathematics for Engineers and Scientist	Murray R Spiegel		Schaum outline series McGraw Hill
Higher Engineering Mathematics	B. S. Grewal		Khanna Publication, New Dehli
Introductory Methods of Numerical analysis	S. S. Sastry		Prentice Hall Of India New Dehli
Numerical methods for Engg. 4th ed.	Chapra		Tata McGraw Hill
Numerical methods for scientific & engineering computations	M. K. Jain & others		Wiley Eastern Publication.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering and Technology (Development of Life Skills-II)	
Course code: ME / PG / PT / AE / FE / MI	**Semester : THIRD**
Duration :	**Maximum Marks : 25**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 1	

Aim :-

S.No	
1.	To develop the abilities and skills to perform at highest degree of quality as an individual as well as a member of core group or team. To enhance capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, solving challenging problems.

Objective :-

S.No	The students will be able to:
1.	• Developing working in teams
2.	• Apply problem solving skills for a given situation
3.	• Use effective presentation techniques
4.	• Apply techniques of effective time management
5.	• Apply task management techniques for given projects
6.	• Enhance leadership traits
7.	• Resolve conflict by appropriate method
8.	• Survive self in today's competitive world
9.	• Face interview without fear
10.	• Follow moral and ethics
11.	• Convince people to avoid frustration

Pre-Requisite:-Nil

Contents		Hrs/week
Topic No	**Contents**	**HOURS**
1	**SOCIAL SKILLS** SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY.	**01**
2	Swot Analysis – Concept , How to make use of SWOT.	**01**
3	**Inter personal Relation** Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	**02**
4	**Problem Solving**	**02**

	I)STEPS IN PROBLEM SOLVING, 1)IDENTIFY AND CLARIFY THE PROBLEM, 2)INFORMATION GATHERING RELATED TO PROBLEM, 3)EVALUATE THE EVIDENCE, 4)CONSIDER ALTERNATIVE SOLUTIONS AND THEIR IMPLICATIONS, 5)CHOOSE AND IMPLEMENT THE BEST ALTERNATIVE, 6)REVIEW **II)Problem solving technique**.(any one technique may be considered) 1) Trial and error, 2) Brain storming, 3) Lateral thinking	
5	**Presentation Skills** Body language -- Dress like the audience Posture, Gestures, Eye contact and facial expression. PRESENTATION SKILL – STAGE FRIGHT, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board	**03**
6	**Group discussion and Interview technique** – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making **INTERVIEW TECHNIQUE** NECESSITY, TIPS FOR HANDLING COMMON QUESTIONS.	**03**
7	**Working in Teams** UNDERSTAND AND WORK WITHIN THE DYNAMICS OF A GROUPS. TIPS TO WORK EFFECTIVELY IN TEAMS, ESTABLISH GOOD RAPPORT, INTEREST WITH OTHERS AND WORK EFFECTIVELY WITH THEM TO MEET COMMON OBJECTIVES, TIPS TO PROVIDE AND ACCEPT FEEDBACK IN A CONSTRUCTIVE AND CONSIDERATE WAY , LEADERSHIP IN TEAMS, HANDLING FRUSTRATIONS IN GROUP.	**02**
8	**Task Management** INTRODUCTION, TASK IDENTIFICATION, TASK PLANNING ,ORGANIZING AND EXECUTION, CLOSING THE TASK	**02**
	Total	**16**

CONTENTS: Practical-

List of Assignment: (Any Eight Assignment)

1) SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats.Following points will be useful for doing SWOT.

a) Your past experiences,
b) Achievements,

c) Failures,
d) Feedback from others etc.

2) Undergo a test on reading skill/memory skill administered by your teacher.

3) Solve the puzzles.

4) Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.(One activity per group)

5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.

6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme.####

7) Conduct an interview of a personality and write a report on it.

8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed

9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

Note: - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

Mini Project on Task Management. Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Adams Time management	Marshall Cooks		Viva Books
Basic Managerial Skills for All	E.H. Mc Grath , S.J.		Pretice Hall of India, Pvt Ltd
Body Language	Allen Pease		Sudha Publications Pvt. Ltd.
Creativity and problem solving	Lowe and Phil		Kogan Page (I) P Ltd
Decision making & Problem Solving	by Adair, J		Orient Longman
Develop Your Assertiveness	Bishop , Sue		Kogan Page India
Make Every Minute Count	Marion E Haynes		Kogan page India
Organizational Behavior	Steven L McShane and Mary Ann Glinow		Tata McGraw Hill
Organizational Behavior	Stephen P. Robbins		Pretice Hall of India, Pvt Ltd
Presentation Skills	Michael Hatton (Canada – India Project)		ISTE New Delhi
Stress Management Through Yoga and	--		Sterling Publisher Pvt Ltd

Meditation			
Target setting and Goal Achievement	Richard Hale ,Peter Whilom		Kogan page India
Time management	Chakravarty, Ajanta		Rupa and Company
Working in Teams	Harding ham .A		Orient Longman

INTERNET ASSISTANCE

1. http://www.mindtools.com
2. http://www.stress.org
3. http://www.ethics.com
4. http://www.coopcomm.org/workbook.htm
5. http://www.mapfornonprofits.org/
6. http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7. http://eqi.org/
8. http://www.abacon.com/commstudies/interpersonal/indisclosure.html
9. http://www.mapnp.org/library/ethics/ethxgde.htm
10. http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11. http://members.aol.com/nonverbal2/diction1.htm
12. http://www.thomasarmstron.com/multiple_intelligences.htm
13. http://snow.utoronto.ca/Learn2/modules.html
14. http://www.quickmba.com/strategy/swot/

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering Group (Electrical Engineering)	
Course code: ME/PG/PT/MH/MI	**Semester : Third**
Duration :	**Maximum Marks : 100**
Teaching Scheme	**Examination Scheme**
Theory : 2 hrs/week	Mid Semester Exam: Marks
Tutorial: -- hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 2	

Aim :-

S.No	
1.	The general aim of the subject is to provide scientific skills and the ability to analyse, develop, and manage complex systems in the field of electrical engineering by using scientific methods

Objective :-

S.No	Student will be able to:
1.	• Identify the type of Electric supply system.
2.	• Use the tariff system & calculate energy requirements and cost of energy.
3.	• Identify different types motors, transformers and drives.
4.	• Select suitable drive as per the requirements.
5.	• Apply knowledge of Electric heating & welding for various operations in manufacturing processes.
6.	• Supervise routine maintenance of electrical machines and supply systems

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction** to Electrical power supply system Generation, Transmission, Distribution & Utilization. AC supply & DC supply	**02**	**02**
02	**AC Fundamentals**: cycle, frequency, phase, period, max, average, r.m.s. value. Concept of current, voltage, power & energy in R, L, & C circuits	**03**	**06**
03	Three phase supply: Star & Delta circuit, Line & Phase relationship, power equation.	**03**	**06**
04	**Measuring Instruments**: Introduction to construction, operation and use of AC & DC ammeter, voltmeter, Electrodynamic Wattmeter, energy meter & digital multimeter, Clip on meter.	**04**	**06**
05	**DC Motor:** Construction and principle of operation. Speed torque characteristics. Types, specifications & ratings and applications. Types of insulation used.	**06**	**07**
06	**A. C .Machines**		
	Transformer: Construction and principle of operation. EMF equation and transformation ratio. Load test, efficiency and regulation. Specifications &	**06**	**09**

	rating. Auto transformer & 3 phase transformer concept only. Applications of transformers.		
	AC motor: Construction and principle of operation of 3 phase induction motor. Speed torque characteristics, slip, speed control (VFD), reversal of rotation, starters. Single phase motor, universal motor, stepper motor & servo motor. Motor specification & ratings. Applications of these motors in various fields. Testing of motors.	**06**	**10**
	Alternator: Construction, principle of operation & applications. Self and separate excitation. Synchronous Motor- Construction, principle of operation, methods of starting & applications	**03**	**04**
07	**Utilisation of Electrical Energy**		
	Industrial applications: Classification of drives, factors for selection of motor for different drives, Enclosures & Mountings	**02**	**05**
	Electric heating & welding: Working principle & types selection of system, specifications & rating	**02**	**03**
	Electrometallurgical & Electro Agro Systems: Concept & principle used in electroplating, Electrical machines used in electro-agro systems (irrigation pumps)	**02**	**03**
08	**Electric wiring & Illumination**: Simple Electric Installations with 2 sockets,2 fans, 2 lamps, fuses. Introduction to different accessories like MCCB, ELCB, wires & cables. Different types of lamps their specifications,	**04**	**04**
09	**Electric safety**, tariff & power conservation, necessity of Earthing, types safety tools, first aid measures, types of tariff, pf improvement only methods, energy conservation & audit, fire extinguishing methods adopted in electrical engineering.	**05**	**05**
	Total	**48**	**70**

PRACTICALS:

Skills to be developed:

Intellectual skills:

1. Identify and select suitable electrical instruments for measurement.
2. Identify and give specifications of electrical motors and transformers.
3. Interpret wiring diagrams for various applications.
4. Identify safety equipments required.
5. Decide the procedure for setting experiments.

Motor skills:

1. Draw wiring diagram
2. Make wiring connections to connect electrical equipments and instruments.
3. Measure electrical power, earthing resistance and other electrical quantities.
4. Calibrate electrical instruments.
5. Use of safety devices while working.
6. Prepare energy consumption bill with present tariff structure.

A) List of Practical:

1) For a given resistive & inductive series & parallel circuit, select ammeter, voltmeter & wattmeter. Make the connections and measure current, voltage and power drawn by the circuit. Measure it by clip on meter & compare it.

2) For a given DC Shunt/Series motor, select suitable meters, make connections as per diagram, check the connections and run the motor. Take the meter readings to draw speed torque characteristics. Make suitable changes in the connections to reverse the direction of rotation.

3) For the above given motor prepare a circuit to control its speed above & below normal, plot its graph.

4) List specifications of given single phase transformer. Perform no load test on the transformer to find transformation ratio.

5) Connect an electronic energy meter to a load, take reading & prepare energy consumption bill with present tariff structure

6) Prepare actual wiring on a board to study and operate one lamp controlled by one switch, staircase wiring, go down wiring using casing capping.

B) Field work:

7) Observe Electric wiring of main building in your campus list the accessories used and draw a general layout

8) Observe earthing of your laboratory, measure its resistance & list its significance

C) Mini project:

9) Prepare a simple electric wiring circuit comprising of 2lamps, 2 sockets, 1 fan with a fuse & check it.

10) Prepare trouble-shooting chart of above motors and identify the faults of a motor or a transformer

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
E. Hughes	Electrical Technology		ELBS
H. Cotton	Electrical Technology		Pitman
B. L. Theraja	Electrical Technology Vol I To Iv		S. Chand

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Diploma in Mechanical Engineering (**Manufacturing Technology**)	
Course code: ME/MH/MI	**Semester :** Third
Duration :	**Maximum Marks : 25**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 4 hrs/week	End Semester Exam: Marks
Credit: 3	

Aim :-

S.No	
1.	The development in materials technology, computer technology and economics, coupled with knowledge about the requirements and demands of manufacturing, are the corner stones of the activities.

Objective :-

S.No	The student will able to
1.	• Know and identify basic manufacturing processes for manufacturing different components.
2.	• Operate & control different machines and equipments.
3.	• Inspect the job for specified dimensions.
4.	• Produce jobs as per specified dimensions.
5.	• Select the specific manufacturing process for getting the desired type of output.
6.	• Adopt safety practices while working on various machines

Pre-Requisite:-

S.No	
1.	Depending on the educational background of the student, the previous knowledge is examined in order to determine if any supplementary examination in relevant subjects may be necessary.

Contents		Hrs/week
Chapter	*Name of the Topic*	**Hours**
01	**Forging** 1.1 Forging Processes – Drop forging, Upset forging, Die forging or press forging. 1.2 Types of dies - Open Die, Closed Die(Single Impression and Multi-impression) Closed die Forging operations - Fullering, Edging, Bending, Blocking, Finishing 1.3 Forgeable material and forgeability, Forging temperature, Grain flow in forged parts, Types of Presses and hammers.	**03**
02	**Rolling and Extrusion** 2.1 Principles of rolling and extrusion. 2.2 Hot and cold rolling.	**03**

	2.3 Types of rolling mills. 2.4 Different sections of rolled parts. 2.5 Methods of extrusion – Direct, Indirect, backward & impact Extrusion, Hot extrusion, Cold extrusion 2.6 Advantages, disadvantages and applications.	
03	**Press working** 3.1 Types of presses and Specifications. 3.2 Press working operations - Cutting, bending, drawing, punching, blanking, notching, lancing 3.3 Die set components.- punch and die shoe, guide pin, bolster plate, stripper, stock guide, feed stock, pilot. 3.4 Punch and die Clearances for blanking and piercing, effect of clearance.	**04**
04	**Lathe Operations** 4.1 Types of lathes – light duty, Medium duty and heavy duty geared lathe, CNC lathe. 4.2 Specifications. 4.3 Basic parts and their functions. Operations and tools – Turning, parting off, Knurling, facing, Boring, drilling, threading, step turning, taper turning.	**03**
05	**Drilling** 5.1 Classification. 5.2 Basic parts and their functions - Radial drilling machine. 5.3 Types of operations. 5.4 Specifications of drilling machine. 5.5 Types of drills and reamers	**02**
06	**Milling** 6.1 Classification. 6.2 Basic parts and their functions – column and knee type. 6.3 Types of operations 6.4 Types of milling cutters.	**02**
07	**Casting** 7.1 Patterns - Material used, types, Patterns allowances, Cores, Core allowances. 7.2 Moulds - Mould materials, Types of sand, Mounding processes Sand molding, Pit molding, machine molding. Shell molding. 7.3 Melting practice. Types of furnaces with specific application Cupola furnace, Electric arc furnace. 7.4 Casting principle and operation 7.5 Special casting processes. viz die casting, centrifugal casting, Investment casting. 7.6 Casting defects	**08**
08	**Welding** 8.1 Classification. 8.2 Gas welding techniques. 8.3 Types of welding flames. 8.4 Arc Welding – Principle, Equipment, Applications 8.5 Shielded metal arc welding. 8.6 Submerged arc welding. 8.7 TIG / MIG welding. 8.8 Resistance welding - Spot welding, Seam welding, Projection welding	**07**

	8.9 Welding defects. 8.10 Brazing and soldering: Types, Principles, Applications	
	Total	32

Notes:

1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher/ workshop superintendent)

2] Theory behind practical is to be covered by the concerned subject teacher/ workshop superintendent.

3] Workshop diary should be maintained by each student duly signed by respective shop instructors

Practical:

Skills to be developed:
Intellectual Skills:

1. Identify basic manufacturing processes.
2. Understand need of pattern allowances.
3. Identify joining methods for fabrication.
4. Specify press tool dies for given cutting/forming operations.
5. Understand various sand casting processes.
6. Understand types of pattern, materials of construction and identify casting defects.

Motor Skills:

1. Operate lathes, drilling, milling machines
2. Use welding machines and equipment
3. Set the tools, jobs and decide cutting parameters of machines
4. Make simple pattern out of wood/themocol
5. Inspect diamensions of jobs using measuring instruments

LIST OF PRACTICALS

1) Assignment on forging die nomenclature.
2) One turning job on lathe containing the operations like plain turning, step turning, grooving, knurling, chamfering.
3) One composite welding job having two different joints. (Batch of four students per job.)
4) One simple job on TIG / MIG welding setup or visit to TIG / MIG welding setup and write report.
5) One composite job containing the operations like face milling, side and face milling (slotting), drilling / tapping (drilled hole should be perpendicular to slotting operation).
6) Making of one simple wooden Pattern (max. 4 students per group, each group should make different type of pattern).
7) Making of one Thermo-Cole Pattern (max. 4 students per group, each group should make different type of pattern).

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S. K. Hajra Chaudary, Bose, Roy	Elements of workshop Technology – Volume I & II		Media Promoters and Publishers limited
D. L. Wakyl	Processes and design for manufacturing		Prentice Hall

O. P. Khanna and Lal	Production Technology - Volume I & II		--
W.A.J. Chapman	Workshop Technology - Volume I , II & III		--
Jhon A Schey	Introduction to Manufacturing Processes		McGraw Hills International
M. Aduthan and A. B. Gupta	Manufacturing Technology		New Age International
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Mechanical Engineering Group Except Automobile Engineering (Mechanical Engineering Materials)	
Course code: ME/PT/PG/MH/MI	**Semester : Third**
Duration :	**Maximum Marks : 100**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: -- hrs/week	Assignment & Quiz: Marks
Practical : -- hrs/week	End Semester Exam: Marks
Credit: 3	

Aim :-	
S.No	
1.	To provide students with a specialist education and training in the area of metals, ceramics, polymers and composites for industrial engineering applications from biomedical device manufacture to future energy solutions.

Objective :-	
S.No	Students should be able to:
1.	• know the properties of Engineering Materials like Metals, non-metals, ferrous metals and non-ferrous metals
2.	• Interpret Iron –Iron Carbide phase equilibrium diagram to find temperatures for heat treatment processes.
3.	• Select the proper materials for different applications like cutting tools, dies, gears & other applications.
4.	• Understand various heat – treatment processes & its applications for various. Components to improve its mechanical properties.
5.	• Understand powder metallurgy process and its applications.
6.	• Understand Non Destructive testing methods & its applications.

Pre-Requisite:-Nil	

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
1.	Engineering Materials and their Properties 1.1 Introduction, Classification and Application of Engineering materials, I.S specification of materials like plain carbon steel, Grey Cast iron, low alloy steels & bearing Materials. 1.2 Properties of metals 1.2.1 Physical Properties – Structure, Density, Melting point. 1.2.2 Mechanical Properties – Strength, elasticity, ductility, malleability, plasticity, toughness, hardness, hardenability, brittleness, fatigue, thermal conductivity, electrical conductivity, thermal coefficient of linear expansion 1.3 Introduction to Corrosion, types of Corrosion, Corrosion resisting	**06**	**08**

	materials.		
2.	Ferrous Metals and Alloys 2.1 Characteristics and application of ferrous metals 2.2 Phase equilibrium diagram for Iron and Iron Carbide. 2.3 Flow diagram for production of Iron and Steel, Classification, composition and uses of cast iron, effect of sulphur, silicon and phosphorous. 2.4 Classification, composition and application of low carbon steel, medium carbon steel and high carbon steel with their chemical composition. 2.5 Alloy Steels: - Low alloy steel, high alloy steel, tools steel & stainless steel. Effect of various alloying elements such as – Chromium, nickel, manganese, molybdenum, tungsten, vanadium. 2.6 Tool Steels: - High speed Steels (HSS), Hot & cold Working dies, shear, punches etc., properties & applications. 2.7 Magnetic materials: - Properties & Applications of commonly used magnetic materials (Permanent magnets and temporary magnets). 2.8 Special Cutting Tool Materials – Diamond, Stelites & Tungsten Carbide	**12**	**18**
3.	Non Ferrous Metals and Alloys 3.1 Properties, applications & chemical compositions of Copper alloys (naval brass, muntz metal, Gun metal & bronzes), Aluminium alloys (Y-alloy & duralumin) & bearing materials like white metals, leaded bronzes & copper lead alloys. 3.2 Desired properties of bearing materials.	**06**	**10**
4.	Heat Treatment of Steels 4.1 Introduction to Heat treatment processes such as Annealing, subcritical annealing, Normalizing, Hardening, Tempering (Austempering & Martempering) - Principle, Advantages, limitations and applications. 4.2 Surface Hardening - Methods of surface hardening, i) case hardening ii) Flame Hardening, iii) Induction Hardening, iv) Nitriding, v) Carburizing - Principle, advantages, limitations and applications	**08**	**14**
5.	Non Metallic Materials 5.1 Polymeric Materials – Introduction to Polymers- types, characteristics, properties and uses of Thermoplastics, Thermosetting Plastics & Rubbers. 5.2 Thermoplastic Plastics - characteristics and uses of ABS, Acrylics, Nylons and Vinyls 5.3 Thermosetting Plastics - Characteristics and uses of polyesters, Epoxies, Melamines & Bakelites. 5.4 Rubbers – Neoprene, Butadiene, Buna & Silicons – Properties & applications. 5.5 Properties and applications of following Engineering Materials – Ceramics, Abrasive, Adhesive and Insulating materials such as Cork, Asbestos, Thermocole and Glass Wool 5.6 Introduction to Composite Materials – Laminated & Fibre reinforced materials - Structure, Properties & Applications.	**08**	**10**
6.	Powder Metallurgy & Nondestructive Testing 6.1 Advantages, limitations and applications of Powder Metallurgy for engineering products. 6.2 Brief Description of Process of Powder Metallurgy – Powder making,	**08**	**10**

	blending, compacting, sintering, infiltration & impregnation. 6.3 Applications of Powder metallurgy for tungsten carbide tip tools & porous bearing. 6.4 Importance of Non-destructive testing, Difference between Destructive and Nondestructive testing. 6.5 Nondestructive testing methods - Radiography (X-Ray & Gamma Ray), Ultrasonic crack detection, Dye penetrant test, Magnaflux test – Comparison & applications.		
	Total	**48**	**70**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
O.P.Khanna	A Text Book of Material Science and Metallurgy		Dhanpat Rai and Sons [1999]
Dr.V.D. Kodgire	Material Science And Metallurgy		Everest Publishing House [1990]
R.K.Rajput	Material Science and Engineering		S.K.Katari and Sons [2002 reprint 2003]
S.K.Hazra and Choudhari	Material Science and Processes		Indian Book Distribution Co. [1982]
Kenneth G. Budinski and Micheal K. Budinski	Engineering Materials Properties and Selection		Pearson Education, New Delhi
ASME	ASME Material Manuals		
Sidney H. Avner	Introduction to Physical metallurgy		Tata Mc Graw Hill edition (2nd)

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering Group (Mechanical Engineering Drawing)	
Course code: AE/PG/PT/ME/MH/MI	**Semester : Third**
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: -- hrs/week	Assignment & Quiz: Marks
Practical : 4 hrs/week	End Semester Exam: Marks
Credit: 5	

Aim :-

S.No	
1.	Understanding of drawing, which includes clear spatial visualization of objects and the proficiency in reading and interpreting a wide variety of production drawings. Also developing drafting skills

Objective :-

S.No	The Student should be able to –
1.	• Interpret industrial drawings.
2.	• Interpret instructions related to manufacturing of components.
3.	• Use IS convention of representing various machine components.
4.	• Visualize the assembly of a given set of details of machine components.
5.	• Know the significance & use of tolerances of size, forms & positions.

Pre-Requisite:-

S.No	
1.	Sound pictorial ability.

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Auxiliary views:** - Study of auxiliary planes, Projection of objects on auxiliary planes. Completing the regular views with the help of given auxiliary views (Use first angle method of projection)	**08**	**12**
02	**Intersection of solids:-** Curves of intersection of the surfaces of the solids in the following cases (a) Prism with prism, Cylinder with cylinder, Prism with Cylinder When (i) the axes are at 90° and intersecting (ii) The axes are at 90° and Offset (b) Cylinder with Cone When axis of cylinder is parallel to both the reference planes and cone resting on base on HP and with axis intersecting and offset from axis of cylinder	**08**	**10**
03	**Developments of Surfaces**. Developments of Lateral surfaces of cube,	**08**	**10**

	prisms, cylinder, pyramids, cone and their applications such as tray, funnel, Chimney, pipe bends etc.		
04	**Conventional Representation:-** 1. Standard convention using SP – 46 (1988) (a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber (b) Long and short break in pipe, rod and shaft. (c) Ball and Roller bearing, pipe joints, cocks, valves, internal / external threads. (d) Various sections- Half, removed, revolved, offset, partial and aligned sections. (e) Knurling, serrated shafts, splined shafts, and chain wheels. (f) Springs with square and flat ends, Gears, sprocket wheel (g) Countersunk & counterbore. (h) Tapers	**04**	**08**
05	**Limits, Fits and Tolerances:-** 1. Characteristics of surface roughness- Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods. 2. Introduction to ISO system of tolerencing, dimensional tolerances, elements of interchangeable system, hole & shaft based system, limits, fits & allowances. Selection of fit. 3. Geometrical tolerances, tolerances of form and position and its geometric representation. 4. General welding symbols, sectional representation and symbols used in Engineering practices	**04**	**08**
06	**Details to Assembly** 1. Introduction- 2. Couplings – Universal couplings & Oldham's Coupling 3. Bearing – Foot Step Bearing & Pedestal Bearing 4. Lathe tool Post 5. Machine vice & Pipe Vice 6. Screw Jack 7. Steam Stop Valve	**08**	**12**
07	**Assembly to Details** 1. Introduction – 2. Pedestal Bearing 3. Lathe Tail Stock 4. Drilling Jig 5. Piston & connecting rod 6. Gland and Stuffing box Assembly 7. Valve – Not more than eight parts 8. Fast & loose pulley	**08**	**10**
	Total	**48**	**70**

Practical:
Skills to be developed:

Intellectual Skills:

1. Understand interpenetration of soil.
2. Interpret limits, fits and tolerances on a given drawing.
3. Visualize assembly of components from given details.
4. Interpret Conventional symbols as per IS code SP46.
5. Identify different materials and their properties.

Motor Skills:

1. Draw front view and top view of solids Penetrating one with other.
2. Conventionally represent limit, fits and tolerances on a given drawing as per the manufacturing processes.
3. Give surface roughness values and symbols on a part drawing..
4. Setting and use of different drawing equipments.
5. Record bill of materials in assembly drawing.
6. Use computer aided drafting package.

List of Practical:

(Use first angle method of projection)

1. Intersection of Solids
   (i) One Sheet containing atleast two problems.
   (ii) Atleast four problems for home assignment in sketch book.
2. Development of surfaces
   Any two problems on development of surfaces of different objects. (one Sheet)
3. Auxiliary views
   One sheet containing two problems
   At least two problems as home assignment in sketch book
4. Conventional Representation as per SP – 46 (1988) - one sheet
5. Limit, Fit, Tolerances and Machining Symbols – one sheet
6. Assembly to detailed drawings of components including conventional representation of tolerances and surface finish symbols:
   One sheet covering any one assembly and its details
   At least two problems as home assignment in sketch book
7. Details to Assembly
   Draw One sheet covering any one assembly and its details.
   Solve at least two problems as home assignment in sketchbook.
8. Two problems on assembly drawings using any CAD Package
   (Assembly containing maximum 6 to 7 components-minimum 12 hours)

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N.D.Bhatt	Machine Drawing		Charotar Publication, Anand
IS Code SP 46 (1988)	Code of practice for general engineering drawing.		Engineering Drawing Practice for School and colleges
L.K.Narayanan, P.Kannaich,	Production Drawing		New Age International Publication

K.VenkatReddy			
P.S.Gill	Machine Drawing		S.K.Kataria and Sons
M.L.Dabhade	Engineering Graphics (For Topic on Auxiliary Views)		--
Sidheshwar	Machine Drawing		Tata McGraw Hill
Reference books :			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
D.Jolhe	Engineering Drawing		Tata McGraw Hill
Suggested List of Laboratory Experiments :			
Suggested List of Assignments/Tutorial :			

Name of the Course : Mechanical and Production Engineering / Production Technology (Professional Practices-III)			
Course code: ME/PT/PG/MH/MI		**Semester :** Third	
Duration :		**Maximum Marks : 50**	
Teaching Scheme		**Examination Scheme**	
Theory : -- hrs/week		Mid Semester Exam: Marks	
Tutorial: -- hrs/week		Assignment & Quiz: Marks	
Practical : 3 hrs/week		End Semester Exam: Marks	
Credit: 2			
Aim :-			
S.No			
1.	To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.		
Objective :-			
S.No	Student will be able to:		
1.	• Acquire information from different sources.		
2.	• Prepare notes for given topic.		
3.	• Present given topic in a seminar.		
4.	• Interact with peers to share thoughts.		
5.	• Prepare a report on industrial visit, expert lecture		
Pre-Requisite:-Nil			
Contents			Hrs/week
Serial No.	Activities		Hours

1	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. **TWO** industrial visits may be arranged in the following areas / industries : i) Manufacturing organizations for observing various manufacturing processes including heat treatment ii) Material testing laboratories in industries or reputed organizations iii) Auto workshop / Garage iv) Plastic material processing unit v) ST workshop / City transport workshop	08
2	Lectures by Professional / Industrial Expert be organized from **ANY THREE** of the following areas : i) Use of a plastics in automobiles. ii) Nonferrous Metals and alloys for engineering applications iii) Surface Treatment Processes like electroplating, powder coating etc. iv) Selection of electric motors. v) Computer aided drafting. vi) Industrial hygiene. vii) Composite Materials. viii) Heat treatment processes. ix) Ceramics x) Safety Engineering and Waste elimination	08
3	**Individual Assignments :** **Any two** from the list suggested a) Process sequence of any two machine components. b) Write material specifications for any two composite jobs. c) Collection of samples of different plastic material or cutting tools with properties , specifications and applications. d) Preparing models using development of surfaces. e) Assignments on bending moment , sheer forces , deflection of beams and torsion chapters of strength of material. f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable. g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes. h) List the various properties and applications of following materials – a. Ceramics b. fiber reinforcement plastics c. thermo plastic plastics d. thermo setting plastics e. rubbers. OR Conduct **ANY ONE** of the following activities through active participation of students and write report i) Rally for energy conservation / tree plantation. ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc. iii) Conduct aptitude , general knowledge test , IQ test	08

	iv) Arrange **any one** training in the following areas : a) Yoga. B) Use of fire fighting equipment and First aid Maintenance of Domestic appliances.	
4	**Modular courses (Optional) :** A course module should be designed in the following areas for max. 12 hrs. Batch size – min. 15 students. Course may be organized internally or with the help of external organizations. a) Forging Technology. b) CAD-CAM related software. c) Welding techniques. d) Personality development. e) Entrepreneurship development.	08
5	**3-D Design using software** Computer screen, coordinate system and planes, definition of HP,VP, reference planes How to create them in 2nd/3rd environment. Selection of drawing site & scale. Commands of creation of Line, coordinate points, Axis, Poly lines, square, rectangle, polygon, sp line, circles, ellipse, text, move, copy, offset, Mirror, Rotate, Trison, Extend, Break, Chamfer, Fillet, Curves, Constraints fit tangency, perpendicularity, dimensioning Line convention, material conventions and lettering. The Student should draw – different orthographic Views (including sections), Auxiliary views according to first/ Third angle method of projection. (Minimum two sheets, each containing two problems) after learning the contents as above.	16
	Total	**48**

Text Books:- Nil

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering Group (Strength of Materials)	
Course code: ME/PG/PT/AE/MH/MI	**Semester : Third**
Duration :	**Maximum Marks : 125**
Teaching Scheme	**Examination Scheme**
Theory : 2 hrs/week	Mid Semester Exam: Marks
Tutorial: -- hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 3	

Aim :-

S.No	
1.	To understand & analyze various types of loads, stresses & strains along with main causes of failure of machine parts. Understanding principles of machine design. Mechanical properties of materials for selecting the suitable materials for various engineering applications.

Objective :-

S.No	The Student should be able to:
1.	• Understand the fundamentals of solid mechanics.
2.	• Acquire elementary knowledge of stresses, strains & material properties.
3.	• Understand & analyze the basic principles involved in the behavior of machine parts under load in the context of designing it.
4.	• Understand & analyze the mechanical properties of the various materials.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Mechanical Properties of Materials, Simple stresses & Strains** 1.1 Types of loads, Simple stresses & strains viz. tensile, compressive, Shear, Crushing, Thermal stresses, Hoop stresses & corresponding strains, Volumetric Strain, Bulk modulus, Hook's law, Young's modulus, Modulus of Rigidity, stress-strain curves for ductile & brittle materials, Poisson's ratio. 1.2 Concept of stresses & strains in thin cylindrical & spherical shells subjected to internal pressure. 1.3 Concepts of Buckling – Rankine's & Euler's formulae for buckling load for columns / shafts under compression, concepts of equivalent length for various end conditions. 1.4 Concepts of Deflection & slope of beams – relation between bending moment & slope. Deflection of simply supported beams and cantilever beams subjected to point load. (No derivation) (Problems on compressive & tensile stresses, Thermal stresses, butt & lap riveted joints, simple cases of buckling).	**10**	**18**

02	**Strain Energy** 2.1 Concept, derivation & use of expression for deformation of axially loaded members under gradual, sudden & impact load. 2.2 Strain energy due to self-weight.	**03**	**04**
03	**Bending Moment & Shear Force** 3.1 Shear force, bending moment & relation between them. 3.2 Shear force & bending moment diagrams for simply supported beam & cantilevers subjected to point loads & Uniformly distribution load, concept of Uniformly varying load & couples acting on beam	**08**	**12**
	3.3 Location of point of contraflexure. (Problems to be based on simply supported & cantilever beams with point load & UDL only)		
04	**Moment of Inertia** 4.1 Definition of Moment of inertia, Moment of inertia of different laminae, radius of gyration. 4.2 Parallel & perpendicular axis theorem. 4.3 Moment of inertia of rectangular, circular, semicircular. Triangular, Hollow Rectangular, symmetrical I - Section, Channel section, Tee- section, angle section about centroidal axis. 4.4 Polar moment of inertia.	**03**	**06**
05	**Bending & Shear stresses** 5.1 Theory of simple bending, equation of bending. 5.2 Assumptions in the theory of bending, moment of resistance, section modulus & neutral axis. 5.3 Shear stresses – concepts of direct & transverse shear stress.	**06**	**06**
06	**Combination of Bending & Direct stresses** 6.1 Axial load, eccentric load, direct stresses, bending stresses maximum & minimum stresses. 6.2 Application of the above concepts for machine parts such as offset links, C-clamp, Bench vice, Drilling machine frame, stresses at base of a short column, condition for no tension at extreme fibres, total stress variation diagrams. (Simple problems on above applications)	**08**	**10**
07	Principal Planes & Principal Stresses 7.1 Definition of principal plane & principal stresses. 7.2 Expression for normal and tangential stress, maximum shear stress. 7.3 Stresses on inclined planes. 7.4 Position of principal planes & planes of maximum shear. 7.5 Graphical solution using Mohr's circle of Stresses.	**06**	**08**
8.1	Torsion 8.1 Concept of Pure Torsion, Torsion equation for solid and hollow circular shafts. Assumptions in theory of pure Torsion. 8.2 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft)	**04**	**06**
	Total	**48**	**70**

Practical:

Skills to be developed:

Intellectual Skill:

1 Identification of different parts of machine and their function.
2 Interpretation failure patterns of different metal under different action.
3 Extrapolating test result or observation during test.
4 Testing different metals and comparison of experimental result.

Motor Skill:

1 Sketch of standard specimen, arrangement for test on respective machines.
2 Measurement of different parameters.
3 Handling Instrument.
4 Observing behavior of different metal during test.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Andrew Pytel Fedrinand L. Singer	Strength of Material		Addison-Wesley An imprint of Addison Wesley Longman, Inc. Forth edition
G.H.Ruder	Strength of Material		ELBS with Macmillan third edition
B.K.Sarkar	Strength of Material		Tata McGraw hill New Delhi
Dr. R. K.Bansal	A Text Book strength of Material		Laxmi Publication New Delhi
S Ramamrutham	Strength of Material		Dhanpat Rai & Publication New Delhi
R.S.Khurmi	Strength of Material		S.Chand Company Ltd. Delhi
G.K.Narula K.S.Narula	Materials Science		Tata McGraw hill New Delhi

Reference books :- Nil

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :Nil

List of Practical:

Study and demonstration of Universal Testing Machine & its attachments.
Study & demonstration of Extensometer.
Tension Test on mild steel, Aluminium & compression test on cast iron on Universal Testing Machine.
Direct Shear Test of mild steel on Universal Testing Machine.
Brinell Hardness Test on Mild Steel.
Rockwell hardness Test on Hardened Steel.
Izod & Charpy - Impact tests of a standard specimen.
Torsion Test on Mild steel bar.
Assignments: Drawing sheet on shear force & bending Moment diagrams for a given loading (At least four problems.). a) Estimation of principal stresses and maximum shear strain for a given combined loading by analytical & Mohr's circle method. (At least two problems.).

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME: MECHANICAL ENGINEERING

COURSE CODE : ME/MH/MI

DURATION OF COURSE : 6 SEMESTER

SEMESTER: FOURTH **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	P	SESSIONSAL EXAM			ESE	PR @	Oral #	TW @	
					TA	CT	Total					
1	Theory of Machines & Mechanisms	3	-	2	10	20	30	70		-	25	4
2	Fundamentals of Electronics	3	-	2	10	20	30	70		-	-	4
3	Production Processes	1	-	3	10	20	30	70		-	25	3
4	Thermal Engineering	3	-	2	10	20	30	70		25	25	4
5	Fluid Mechanics and Machinery	3	-	2	10	20	30	70		25	25	4
6	Computer Programming	1	-	2	-	-	-	-		-	-	2
7	Professional Practices - IV	-	-	3	-	-	-	-		-	50	2
	Total	**14**	**0**	**17**	**50**	**100**	**150**	**350**		**50**	**150**	**23**

STUDENT CONTACT HOURS PER WEEK: **31**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

, External Assessment @ , Internal Assessment ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, P - Practical

TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

Total Marks : 700

Minimum passing for sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : Mechanical Engineering Group (Computer Programming**)**	
Course code: ME/AE/PT/PG/MH	**Semester : Fourth**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : 1 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 2	

Aim :-

S.No	
1.	To develop important skills which underlie programming abstract.
	To develop the ability to see patterns and to abstract from specific examples to the more general case.

Objective :-

S.No	Students should be able to:
1.	• Break a given task into subtasks.
2.	• Enhance logical thinking.
3.	• Develop 'C' programs for simple applications.

Pre-Requisite:-

S.No	
1.	Sound knowledge of computer.

Contents		Hrs/week
Chapter	**Name of the Topic**	**Hours**
1.	**Introduction -** Problem, definition and analysis, algorithm, flow charts, tracing and dry running of algorithms. Introduction to 'C' programming, simple program using Turbo 'C' compiler and execution of 'C' program	**02**
2.	C Fundamentals: Character set, constants, data types, identifiers, key words, variable declarations Types of Operators – unary, binary, arithmetic, relational, logical, assignment. Hierarchy of operators, expressions, library functions, Use of input/ output functions viz. Printf( ), Scanf( ), getch( ), putch( )	**03**
3.	Use of Control Statements:- if-else, while loop, do – while loop, for loop, switch, break and continue. Writing, Compiling, Executing and debugging programs	**05**
4.	Introduction to Subscripted variables, arrays, defining and declaring one and two dimensional arrays, reading and writing	**03**

5.	Concept of String, string input / output functions Defining and accessing a user defined functions, Passing of arguments, declaration of function prototypes Storage classes: automatic, external, static variables	**03**
	Total	**16**

Practical:

Intellectual Skills:

- Prepare and interpret flow chart of a given problem.
- Represent data in various forms.
- Use various control statements and functions

Motor Skills:

- Write program in 'C' language.
- Run and debug 'C' program successfully.

List of Practical:

To write simple program having engineering application involving following statements

2. Use of Sequential structure
3. Use of if-else statements
4. Use of for statement
5. Use of Do-While Statement
6. Use of While statement
7. Use of brake and Continue statement
8. Use of multiple branching Switch statement
9. Use of different format specifiers using Scanf( ) and Printf( )
10. Use of one dimensional array e.g. String, finding standard deviation of a group data
11. Use of two dimensional array of integers/ reals

Defining a function and calling it in the main

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Byron Gotfried	Introduction to 'C' programming		Tata McGraw Hill
Yashwant Kanitkar	Let us 'C'		BPB publications
Denis Ritchie and Kerninghan	Introduction to 'C' programming		Prantice Hall Publications
Balguruswamy	Programming in 'C'		Tata Mc- Graw Hill

Reference books :- Nil

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical and Production Engineering/Production Technology (Fluid Mechanics & Machinery)	
Course code: ME/PT/PG/MH	**Semester : Fourth**
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	To develop and apply the concepts introduced in Fluid Mechanics to engineering applications in turbo machinery and flow measurement.
2.	To introduce and apply to concepts of similarity and scaling within fluid mechanics
3.	To review flow measurement devices / techniques, from industrial machines to modern, laser-based methods.

Objective :-

S.No	The student will be able to
1.	• Measure various properties such as pressure, velocity, flow rate using various instruments.
2.	• Calculate different parameters such as co-efficient of friction, power, efficiency etc of various Systems.
3.	• Describe the construction and working of turbines and pumps.
4.	• Test the performance of turbines and pumps.
5.	• Plot characteristics curves of turbines and pumps.

Pre-Requisite:-

S.No	
1.	Knowledge of mathematics
2.	Knowledge of applied thermodynamics

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Properties of fluid** 1.1 Density, Specific gravity, Specific Weight, Specific Volume 1.2 Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity 1.3 Vapour Pressure, Compressibility	**04**	**04**

02	**Fluid Pressure & Pressure Measurement** 2.1 Fluid pressure, Pressure head, Pressure intensity 2.2 Concept of absolute vacuum, gauge pressure, atmospheric pressure, absolute pressure. 2.3 Simple and differential manometers, Bourden pressure gauge. 2.4 Concept of Total pressure on immersed bodies, center of pressure. **Note:** Numericals on Manometers, Total Pressure & Centre of pressure	**09**	**12**
03	**Fluid Flow** 3.1 Types of fluid flows 3.2 Continuity equation 3.3 Bernoulli's theorem 3.4 Venturimeter – Construction, principle of working, Coefficient of discharge, Derivation for discharge through venturimeter. 3.5 Orifice meter – Construction, Principle of working, hydraulic coefficients, Derivation for discharge through Orifice meter 3.6 Pitot tube – Construction, Principle of Working **Note :-** Numericals on Venturimeter, orifice meter, pitot tube	**09**	**12**
04	**Flow Through Pipes** 5.1 Laws of fluid friction (Laminar and turbulent) 5.2 Darcy's equation and Chezy's equation for frictional losses. 5.3 Minor losses in pipes 5.4 Hydraulic gradient and total gradient line. 5.5 Hydraulic power transmission through pipe **Note:** Numericals to estimate major and minor losses	**05**	**06**
05	**Impact of jet** 4.1 Impact of jet on fixed vertical, moving vertical flat plates. 4.2 Impact of jet on curved vanes with special reference to turbines & pumps **Note -** Simple Numericals on work done and efficiency	**09**	**08**
06	**Hydraulic Turbines** 6.1 Layout of hydroelectric power plant. 6.2 Features of Hydroelectric power plant. 6.3 Classification of hydraulic turbines. 6.4 Selection of turbine on the basis of head and discharge available 6.5 Construction and working principle of Pelton wheel, Francis and Kaplan turbine. 6.6 Draft tubes – types and construction, Concept of cavitation in turbines 6.7 Calculation of Work done, Power, efficiency of turbine.	**10**	**10**
07	A] Centrifugal Pumps 7.1 Construction , principle of working and applications 7.2 Types of casings and impellers.	**10**	**10**

	7.3 Concept of multistage 7.4 Priming and its methods, Cavitation 7.5 Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH 7.6 Performance Characteristics of Centrifugal pumps 7.7 Trouble Shooting 7.8 Construction, working and applications of submersible, jet pump Note :- Numericals on calculations of overall efficiency and power required to drive pumps. B] Reciprocating Pump 7.9 Construction ,working principle and applications of single and double acting reciprocating pumps. 7.10 Concept of Slip, Negative slip, Cavitation and separation 7.11 Use of Air Vessel. 7.11 Indicator diagram with effect of acceleration head & frictional head. Note:- No Derivations and Numericals on reciprocating pumps.	**08**	**06**
	Total	**64**	**70**

Practical:

Skills to be developed:

Intellectual Skills:

1) Select and use appropriate flow measuring device.

2) Select and use appropriate pressure measuring device.

3) Analyze the performance of pumps and turbines.

Motor Skills:

1) Use flow measuring device.

2) Use pressure measuring device.

3) Operate pumps and turbines.

List of Practical:

01. Calibration of Bourden pressure gauge with the help of Dead Weight Pressure gauge.

02. Verification of Bernoulli's Theorem.

03. Determination of Coefficient of Discharge of Venturimeter.

04. Determination of Coefficient of Discharge, coefficient of contraction and coefficient of velocity of orifice meter.

05. Determination of coefficient of friction of flow through pipes.

06. Trial on Pelton wheel to determine overall efficiency.

07. Trial on centrifugal pump to determine overall efficiency.

08. Trial on reciprocating pump to determine overall efficiency.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Ramamrutham S.	Hydraulic, fluid mechanics & fluid machines	Dhanpat Rai and Sons New Delhi	
Modi P. N. and Seth S. M.	Hydraulics and fluid mechanics including Hydraulic machines	Standard Book House. New Delhi	
Streeter Victor, Bedford K.W., Wylie E.B	Fluid Mechanics	McGraw Hill Int.	
K. Subramanya	One Thousand Solved Problems in Fluid Mechanics	Tata McGraw Hill	

Pump manufactures' catalogs such as Kirloskar Brothers, KSB, Kishor pumps etc.

Reference books :- Nil

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical and Production Engineering/Production Technology (Fundamentals of Electronics)	
Course code: ME/PT/PG/MH	**Semester : Fourth**
Duration :	**Maximum Marks : 100**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	Provide the fundamental knowledge in electronics to enable understanding of its applications
2.	Provide hands-on opportunities for students to construct electronic circuits and build electronic projects of varying difficulty levels, ranging from simple to intermediate.
3.	Cultivate and sustain students' interest in learning through circuit simulations and self-assessment activities.
4.	Promote active learning through activities such as information search and presentations

Objective :-

S.No	Students should be able to:
1.	• Identify and test different components.
2.	• Use principles of circuit operations and its applications.
3.	• Distinguish various elements in digital electronics.
4.	• Understand working of different types of power supplies.
5.	• Use test instruments.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Electronic Devices Introduction to electronic devices, their symbols, principle of working and testing procedure – Diode, Zener diode, Power diode, Varactor diode, Bipolar Junction Transistor (BJT), Field Effect Transistor(FET) - JFET & MOSFET, Uni-junction Transistor(UJT), power devices – DIAC,TRIAC, SCR, Photo devices-, LDR, Photo diode, Photo transistor, LED & LED display (7 segment), Liquid crystal display(LCD), opto –coupler, thermister-NTC,PTC	**10**	**16**
	Power supply		

02	Circuit diagram and operation- Half wave, full wave & bridge rectifier. Filters – L, C, L-C, π filter Concept of unregulated power supply, regulated power supply- line regulation & load regulation. Principle of operation, block diagram and application of shunt regulated power supply, series regulated power supply, switch mode power supply (SMPS), 3 pin IC regulated, IC 723 adjustable power supply. Block diagram of UPS, Concept of online and off line UPS. Concept of constant current limiting and fold back current limiting, concept of constant voltage source, constant current source	**09**	**15**
03	Transistor Transistor as a switch and amplifier, single stage transistor amplifier CB, CE and CC configuration and their applications, RC coupled and direct coupled amplifier, their frequency response and application. Power amplifier- class A, class B, class C, class AB, their comparison on operating point, conduction cycle, efficiency, application.(No circuits expected) Oscillator – Requirement of oscillator circuit, Barkhauson's criteria of oscillator, circuit diagram and its application-. Phase shift oscillator, Hartley oscillator, Colpitts oscillator, Crystal oscillator.	**09**	**15**
04	OP Amp Block diagram, configurations and use of op amp as - Inverting, Non-inverting, Summing, Voltage to current converter, current to voltage converter, differentiator, Comparator, Wien bridge oscillator, Schmitt's trigger, Instrument amplifier	**05**	**10**
05	Digital Electronics Number system- Decimal, Binary, Hexadecimal, BCD, Decimal to binary conversion, , Decimal – Hexadecimal conversion. Study of logic gates, Symbol, truth table and IC numbers - NOT, AND, OR, NAND, NOR, XOR, XNOR and NAND as universal gate. Flip Flops – Block diagram of flip flop, RS flip flop, D flip flop ,Toggle , JK flip flop, Master Slave JK flip flop, Clocked flip flop – level triggered and edge triggered , Application of flip flop – Frequency divider, Ring counter, Shift register. Seven segment driving circuit, Encoder, Decoder, Multiplexer, De multiplier.	**09**	**14**
06	**IC 555 -** Block diagram, Multi vibrator circuit diagram and working for Mono stable, Bi stable and Astable Multivibrator, Analog to Digital Converters , Digital to Analog converter Block diagram and working of – Welding control circuits –sequential timer Temperature control circuits using SCR,FWR Speed control circuits Level control circuit using variable capacitor and potentiometer.	**06**	**10**
Total	**48**	**80**	
Practical:			

Skills to be developed:

Intellectual Skills:

1. Identification and selection of components.
2. Interpretation of circuits.
3. Understand working of various types of power supplies.

Motor skills:

a. Drawing of circuits.
b. Measurement of various parameters using multimeter.
c. Testing of components using LCR meter, IC tester.
d. Follow standard test procedure.

List of Practical:

1. Use of multimeter (analog and digital) for current, voltage and resistance measurement (Use of colour code for resistors).
2. Study of front panel of CRO and measurement of frequency and voltage.
3. I) Measurement of L, C, R on LCR meter
   II) Testing of an IC using IC tester
4. Testing of components like diode, FET, MOSFET, LED, SCR, diac, triac, Zener diode ,inductor, capacitor using a multimeter
5. Line and load regulation of un-regulated power supply and regulated power supply.
6. To plot the frequency response of single stage RC coupled amplifier and calculate band width.
7. Verification of Op-Amp as inverting and non inverting amplifier.
8. To generate a square wave by using Schmitt trigger.
9. Verify truth tables for logic gates- . NOT, AND, OR, NAND, NOR, XOR, XNOR
10. Construct a ring counter using JK flip-flop and verify count sequence.
11. Design a square wave oscillator for 100 Hz using IC 555.(Use astable multivibrator).
12. Speed control of AC/DC motor by using SCR, UJT.

Note : 1) Teachers are expected to make students familiar with the Data Books and Operation Manuals and also encourage them to visit related websites.
2) At least one practical from the above list be performed by using simulation software.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
V.K. Mehta	Principles of Electronics		S. Chand & Company Ltd. New Delhi
Paul Malvino	Electronic Principles		Tata McGraw Hill Publishers
A. Mottershead	Electronic Devices & Components'		Prentice Hall of India
R.P. Jain	Modern Digital Electronics		Tata McGraw Hill Publishers
Grob Bernard	Basic Electronics		Tata McGraw Hill Publishers
Paul B. ZBar, Albert p.Malvino,Michael	Basic Electronics - a Text Lab Manual		Tata McGraw Hill Publishers

A. Miller			
Paul B. ZBar	Industrial Electronics - a Text Lab Manual		Tata McGraw Hill Publishers
Reference books :- Nil			
Suggested List of Laboratory Experiments : - Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Mechanical and Production Engineering/Production Technology (Production Processes**)**		
Course code: ME/PT/PG/MH		**Semester : Fourth**
Duration :		**Maximum Marks : 125**
Teaching Scheme		**Examination Scheme**
Theory : 1 hrs/week		Mid Semester Exam: Marks
Tutorial: hrs/week		Assignment & Quiz: Marks
Practical : 3 hrs/week		End Semester Exam: Marks
Credit: 3		

Aim :-	
S.No	
1.	To provide education at diploma level in aspects of production process technology which are of relevance to scientists, engineers and other professions who operate in the manufacturing and automobile industry and related sectors, particularly in the production, process and development areas.
2.	To study various types of basic production processes. To select, operate and control the appropriate processes for specific applications and production processes, surface finishing processes and plastic processes.

Objective :-	
S.No	The student will be able to:
1.	• Use the basic machine tools like lathe, drilling and milling.
2.	• Know about broaching machine and its applications.
3.	• Understand the importance of surface finish and related surface finishing methods..
4.	• Program and use basic on machines.
5.	• Understand and select the gear cutting processes.
6.	• Understand and select plastic molding processes

Pre-Requisite:-	
S.No	
1.	Knowledge of basic manufacturing processes.

Contents	Hrs/week

Chapter	Name of the Topic	Hours	Marks
01	**Turning** **1.1 Lathe** : Angle calculations for taper turning. Cutting tool nomenclature and tool signature. Cutting parameters and machining time calculation. **1.2 CNC Lathe** Introduction, classification, advantages, positioning system, constructional features. Part programming : programming format, word, statement, block. Preparatory and miscellaneous code, Fixed cycles in programming – canned cycle, do-loop, subroutine.	**03** **10**	**08** **22**
02	**Drilling** Twist drill nomenclature. Cutting parameters , machining time calculation, Deep hole drilling.	**02**	**06**
03	*Milling and gear cutting* **3.1 Milling** Cutting parameters, machining time calculation, Milling operations – plain milling, side and face milling, form milling, gang milling, end milling, face milling, T- slot milling, slitting. **3.2 Gear cutting** Gear cutting on milling machine –Dividing head and Indexing methods Gear hobbing, Principle of operation, Advantages And limitations. Hobbing techniques – climb and conventional, Gear shaping - Principle of operation, advantages, disadvantages, Gear finishing processes - Gear shaving , Gear grinding, Gear burnishing, gear lapping .	**03** **06**	**06** **12**
04	**Grinding** Classification of machines , Grinding wheel composition, types and shapes, Designation. Types of Grinding operations.	**02**	**05**
05	**Super Finishing Processes** 6.1 Honing, 6.2 Lapping, 6.3 Burnishing, 6.4 Buffing and polishing.	**02**	**05**
06	**Plastic Moulding** Types of plastic, Compression molding, Transfer moulding, Injection moulding, blow molding, vacuum forming, extrusion, calendaring, rotational moulding.	**04**	**06**
	Total	**32**	**70**

Practical:

Note: One hour of the practical per week is to be utilized for instructions by subject teacher to explain & demonstrate the accessories, tool holding & work holding devises as mentioned in practical contents. The student will write assignments based on these sessions.

Skills to be developed:

Intellectual skills:

1. Understand the axis identification of CNC lathe
2. Understand the various types of preparatory and miscellaneous codes.
3. Calculate machining time for different operations.
4. Identify cutting tool nomenclature / marking systems.
5. Know the significance of various super finishing methods.
6. Understand the different processes of gear cutting.
7. Understand various plastic molding methods.
8. Write programs for CNC Lathe.

Motor Skills:

1. Operate lathe, CNC lathe, drilling and milling machines.
2. Execute part programming.
3. Operate grinding machine.
4. Use the indexing mechanism.

List of Practical:

1) One assignment on cutting tool nomenclature and tool signature of single point cutting tool.
2) Industrial visit to observe plastic processing shop and report on the visit.
3) One job on lathe containing the operations like plain turning, threading, boring, taper turning.
4) One job on CNC lathe containing the operations like plain turning, taper turning and curvature. (Group of two students , each group must use different program for different job dimensions)
5) One job containing drilling, milling, reaming, gear cutting (spur gear) per job max. two students.
6) One job containing surface grinding / cylindrical grinding for tolerances ± 30 micron,(For the job already made on milling machine /lathe).
7) One assignment on accessories & attachment – chucks, mandrels, carrier and catch plates rests, face plate and angle plate, grinding attachment used on lathe.
8) One assignment on accessories & attachment, work holding & tool holding devises used on milling machine.
9) One assignment each on shaper, planer, boring machine, broaching machine.
10) One assignment each on tool nomenclature & geometry of boring tool, broaching tool, milling cutters.

One assignment on types of grinding wheels.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
S. K. Hajra Chaudary, Bose, Roy	Elements of workshop Technology-Volume I & II		Media Promoters and Publishers Limited.
O. P. Khanna & Lal	Production Technology Volume- I & II		Dhanpat Rai Publications.
W. A. J. Chapman, S. J. Martin	Workshop Technology-Volume –I,II & III		Viva Books (p) Ltd.
O.P. Khanna	A text book of Foundry Tech.		Dhanpat Rai Publications.
R.B. Gupta	Production Technology		Satya Prakashan New Delhi

H.S.Bawa	Workshop Technology Volume-I& II		Tata McGraw-Hill
John A. Schey	Introduction to Manufacturing Processes		McGraw-Hill
M. Adithan A. B. Gupta	Manufacturing Technology		New age International
Pabla B. S. M. Adithan	CNC machines		New age international limited.
B. L. Juneja	Fundamental of metal cutting and machine tools		New age international limited.
Steve Krar, Albert Check	Technology of Machine Tools.		McGraw-Hill International.
P. N. Rao	CAD/CAM Principals and Applications		Tata McGraw-Hill
P. N. Rao	Manufacruting Technology Metal Cutting & Machne tools		Tata McGraw-Hill
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Mechanical Engineering Group (Professional Practices-IV)	
Course code: ME/PT/PG/MH	**Semester : Fourth**
Duration :	**Maximum Marks : 50**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 3 hrs/week	End Semester Exam: Marks
Credit: 2	

Aim :-	
S.No	
1.	To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.

Objective :-	
S.No	Student will be able to:
1.	• Acquire information from different sources
2.	• Prepare notes for given topic
3.	• Present given topic in a seminar
4.	• Interact with peers to share thoughts
5.	• Prepare a report on industrial visit, expert lecture

Pre-Requisite:-	
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Contents		Hrs/week
Sr. No.	**Activities**	**Practical Hours**

1	**Industrial Visits** Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries : Sugar Factory / Dairy / Chemical Industry / Thermal Power Plant . vi) Machine shop having CNC machines. vii) ST workshop / Auto service station viii) City water supply pumping station ix) Manufacturing unit to observe finishing and super finishing processes.	**14**
2	**Lectures by Professional / Industrial Expert lectures to be organized from any two of the following areas:** Interview Techniques. Modern Boilers – Provisions in IBR Applications of Sensors and Transducers Alternate fuels – CNG / LPG , Biodiesel, Ethanol, hydrogen Piping technology	**06**
3	**Information Search :** Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report **any one** topic. Following topics are suggested : v) Engine lubricants & additives vi) Automotive gaskets and sealants vii) Engine coolants and additives viii) Two and Four wheeler carburetor. ix) Power steering x) Filters xi) Different drives/Transmission systems in two wheelers. xii) Types of bearings – applications and suppliers. xiii) Heat Exchangers xiv) Maintenance procedure for solar equipment. Tools holder on general purpose machines and drilling machines.	**08**
4	**Seminar :** Seminar topic shall be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)	**08**
5	Mini Project / Activities : (any one) a) Prepare one model out of card board paper / acrylic / wood / thermocol / metal such as : i) Elliptical Trammel ii) Pantograph iii) Coupling iv) Cams and Followers v) Geneva mechanism b) Dismantling of assembly (e.g. jig / fixtures , tool post , valves etc.) Take measurement and prepare drawings / sketches of different parts. c) Make a small decorative water fountain unit. d) Toy making with simple operating mechanisms.	**12**
	Total	**48**

Text Books:- Nil

Reference books :- Nil			
Suggested List of Laboratory Experiments : - Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : Mechanical Engineering Group (Theory of Machines and Mechanisms)			
Course code: ME/PT/PG/AE/MH		**Semester :** Fourth	
Duration :		**Maximum Marks :**	
Teaching Scheme		**Examination Scheme**	
Theory : hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : hrs/week		End Semester Exam: Marks	
Credit:			

Aim :-	
S.No	
1.	To focus on understanding the concept of machines, mechanisms and their elements. Also study kinematics aspects of various links in mechanisms. To form foundation for kinematics synthesis, analysis and design of mechanisms.

Objective :-	
S.No	Student will be able to:
1.	• Know different machine elements and mechanisms.
2.	• Understand Kinematics and Dynamics of different machines and mechanisms.
3.	• Select Suitable Drives and Mechanisms for a particular application.
4.	• Appreciate concept of balancing and Vibration.
5.	• Develop ability to come up with innovative ideas

Pre-Requisite:-	

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
1.	Fundamentals and types of Mechanisms 1.1 Kinematics of Machines: - Definition of Kinematics, Dynamics, Statics, Kinetics, Kinematic link, Kinematic Pair and its types, constrained motion and its types, Kinematic chain and its types, Mechanism, inversion, machine and structure. 1.2 Inversions of Kinematic Chain. 1.2.1 Inversion of four bar chain, coupled wheels of Locomotive & Pentograph. 1.2.2 Inversion of Single Slider Crank chain- Rotary I.C. Engines mechanism, Whitworth quick return mechanism, Crank and Slotted lever quick return mechanism. 1.2.3 Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism & Oldham's Coupling. 1.3 Common Mechanisms 1.3.1 Bicycle free wheel Sprocket mechanism. 1.3.2 Geneva Mechanism.	**12**	**14**

	1.3.3 Ackerman's Steering gear mechanism. 1.3.4 Foot operated air pump mechanism.		
2.	Velocity and Acceleration in Mechanism 2.1 Concept of relative velocity and relative acceleration of a point on link, angular velocity and angular acceleration, inter- relation between linear and angular velocity and acceleration. 2.2 Drawing of velocity and acceleration diagram of a given configuration, diagrams of simple mechanisms. Determination of velocity and acceleration of a point on link by relative velocity method [Excluding coriollis components of acceleration]. 2.3 Analytical method [no derivation] and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.	**09**	**09**
3.	Cams and Followers 3.1 Concept, definition and application of Cams and Followers. 3.2 Classification of Cams and Followers. 3.3 Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation. 3.4 Drawing of profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (graphical method).	**08**	**08**
4.	Power Transmission 4.1 Types of Drives – Belt, Chain, Rope, Gear drives & their comparison. 4.2 Belt Drives - flat belt, V– belt & its applications, material for flat and V-belt, angle of lap, belt length. Slip and creep. Determination of velocity ratio, ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission(Simple numericals) 4.3 Chain Drives – Advantages & Disadvantages, Selection of Chain & Sprocket wheels, methods of lubrication. 4.4 Gear Drives – Spur gear terminology, types of gears and gear trains, their selection for different application, train value & Velocity ratio for compound, reverted and simple epicyclic gear train, methods of lubrication, Law of gearing. 4.5 Rope Drives – Types, applications, advantages & limitations of Steel ropes.	**14**	**16**
5.	Flywheel and Governors 5.1 Flywheel - Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C. Engine (no Numericals). Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance. 5.2 Governors - Types, concept, function and application & Terminology of Governors. 5.3 Comparison between Flywheel and Governor.	**06**	**06**
6.	Brakes, Dynamometers, Clutches & Bearings 6.1 Function of brakes and dynamometer, types of brakes and Dynamometers, comparison between brakes and dynamometer. 6.2 Construction and working of i) shoe brake, ii) Band Brake, iii) Internal expanding shoe brake iv) Disc Brake.	**12**	**14**

	6.3 Concept of Self Locking & Self energizing brakes. 6.4 Numerical problems to find braking force and braking torque for shoe & band brake. 6.5 Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer, iii) Eddy current Dynamometer. 6.6 Clutches- Uniform pressure and Uniform Wear theories. 6.7 Function of Clutch and its application, Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv)Cone clutch v) Diaphragm clutch. (Simple numericals on single and Multiplate clutch). 6.8 Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lost in friction (no derivation). Simple numericals.		
7.	Balancing & Vibrations 7.1 Concept of balancing. Balancing of single rotating mass. Graphical method for balancing of several masses revolving in same plane. 7.2 Concept and terminology used in vibration, causes of vibrations in machines, their harmful effects and remedies.	**03**	**03**
	Total	**64**	**70**

Practical:

Skills to be developed:

Intellectual Skills:

1. Understand working of free wheel mechanism of a bicycle, Geneva mechanism, steering gear mechanism etc.
2. Determine velocity and acceleration of links in a given mechanism.
3. Analyse balancing of rotating masses in a single plane.
4. Interpret interrelationship between components of various braking mechanisms.
5. Understand concepts of vibrations in various machineries, their harmful effects and remedies.
6. Compare various power transmission devices.

Motor Skills:

1. Drawing of velocity and acceleration diagrams.
2. Assembly and dismantling of brakes and clutches.
3. Drawing of cam profiles from a given data for i. C. Engine.
4. Drawing of velocity and acceleration diagram.

Note - The Term work shall consist of Journal / lab manual and A-3 size sketch book.

List of Practical:

1) Find the ratio of time of cutting stroke to the time of return stroke for quick return mechanism of a shaper machine.
2) Sketch & describe working of bicycle free wheel sprocket mechanism.
3) Determination of velocity and acceleration by relative velocity method (four problems).
4) Determination of velocity and acceleration of piston of an I.C. engine's Slider Crank mechanism by Klein's construction, for different position of crank in between 0^0 and 360^0. Represent graphically velocity verses crank angle and acceleration verses crank angle.

5) Draw the profile of radial cam for the given motion of follower. (At least four problems)
6) Determine the radius of rotation of flyball for different speed of governor and draw a graph between radius of rotation versus speed.
7) Dismantling and assembly of mechanically operated braking mechanism for two wheelers.
8) Determination of power transmitted by any belt drive using any one dynamometer.
9) Dismantling and assembly of multiplate clutch of two-wheeler.
10) Determine graphically balancing of several masses rotating in a single plane.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Khurmi Gupta	Theory of machines		Eurasia publishing House Pvt. Ltd. 2006 edition
S.S.Rattan	Theory of Machine		McGraw Hill companies II Edition
P.L.Ballaney	Theory of machines		Khanna Publication
Timo Shenko	Theory of machines		Wiley Eastern
Jagdishlal	Theory of machines		Bombay Metro – Politan book ltd.
Ghosh - Mallik	Theory of machines		Affilated East west press
Beven T.	Theory of machines		CBS Publication
J.E.Shigley	Theory of machines		Mc Graw Hill

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering (Thermal Engineering)	
Course code: ME/MH	**Semester :** Fourth
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-	
S.No	
1.	To understand the principles, construction & working of various power producing & power absorbing devices like boilers, turbines, compressors, pumps etc., To understand the concept of energy, work, heat & conversion. To study of various sources of energy, basic laws & concept of thermodynamics, gas laws, properties of steam & generation. Heat transfer forms the basis for different power engineering application. Boilers find application in different process industries. Steam turbines and condensers are the major component of any steam power plant.

Objective :-	
S.No	The Students should be able to:
1.	• Know various sources of energy & their applications.
2.	• Apply fundamental concepts of thermodynamics to thermodynamic systems.
3.	• Understand various laws of thermodynamics.
4.	• Apply various gas laws & ideal gas processes to various thermodynamic systems.
5.	• Calculate properties of two phase system by using steam tables/ mollier charts.
6.	• Explain construction & working of boilers, mountings & accessories

Pre-Requisite:-Nil	

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
1.	**Sources of energy** 1.1 Brief description of energy sources **- Classification of energy sources** **- Renewable, Non-Renewable** 1.2 Fossil fuels, including CNG, LPG. 1.3 Solar - Flat plate and concentrating collectors & its application. - Solar Water Heater - Photovoltaic Cell, Solar Distillation. 1.4 Wind, Tidal, Geothermal 1.5 Biogas, Biomass, Bio-diesel 1.6 Hydraulic, Nuclear	**08**	**06**

	1.7 Fuel cell – list of fuel cells		
2.	Fundamentals of Thermodynamics 2.1 Concepts of pure substance, types of systems , properties of systems , Extensive and Intensive properties with units and conversion like P, V, ρ And temperature. Point function and path function. 2.2 Work and Energy - Thermodynamic definition of work, heat, difference between heat and work, P.E., K.E, Internal Energy, Flow work, concepts of enthalpy, entropy. 2.3 Laws of Thermodynamic - Zeroth Law, Temperature measurement, principle of energy conservation, irreversibility, Second Law of Thermodynamics, Kelvin Plank, Clausius statements and their equivalence, Concept of perpetual motion machine 1 and 2. 2.4 Application of Thermodynamic laws - Steady Flow Energy equation and its application to open system like boiler, engine, nozzle, turbine, compressor & condenser. 2.5 Application of Second law to Heat Engine, Heat Pump and Refrigerator.	**12**	**14**
3.	Ideal Gases 3.1 Concept of Ideal gas, Charle's law, Boyle's law, Avogadro's law, equation of state, Characteristic gas constant and universal gas constant. 3.2 Ideal gas processes: - - Isobaric, Isochoric, Isothermal, Adiabatic, Polytropic, Isentropic with representation of the processes on P-V and T-S diagram (only simple numericals)	**08**	**14**
4.	Steam and Steam Boiler 4.1 Generation of steam at constant pressure with representation on various charts such as T-H, T-S, H-S, P-H. Properties of steam and use of steam table, Quality of steam and its determination with Separating, throttling and combined Separating and throttling calorimeter (no numerical). 4.2 Vapour process : - - constant pressure, constant volume, constant enthalpy, constant entropy	**14**	**14**

	(numericals using steam table and Mollier chart), Rankine Cycle 4.3 Steam Boilers: - - Classification of boilers. - Construction and working of - Cochran, Babcock and Wilcox, La-mont and Loeffler boiler. Boiler draught natural and Mechanical. 4.4 Boiler mounting and accessories [to be covered in practical].		
5.	Steam Turbines and Condensers 5.1 Steam nozzle: - - Continuity equation, types of nozzles, concept of Mach number, critical pressure, application of steam nozzles. 5.2 Steam turbine: - - Classification of turbines, Construction and working of Impulse and Reaction turbine. 5.3 Compounding of turbines, Regenerative feed heating, bleeding of steam, nozzle control governing (no velocity diagrams and numerical). 5.4 Steam condenser: - - Dalton's law of partial pressure, function and classification of condensers, construction and working of surface condensers. 5.5 Sources of air leakage, concept of condenser efficiency, vacuum efficiency (no numerical). 5.6 Cooling Towers. - Force draught, natural draught and induced draught.	**12**	**14**
6.	Heat Transfer 6.1 Modes of heat transfer: - - Conduction, convection and radiation. 6.2 Conduction by heat transfer - Fourier's law, thermal conductivity, conduction through cylinder, thermal resistance, composite walls, combined conduction and convection (Simple numerical) 6.3 Heat transfer by Radiation: - - Thermal Radiation, Absorptivity, Transmissivity, Reflectivity, Emissivity, black and gray bodies, Stefan-Boltzman law. 6.4 Heat Exchangers: - - Shell and tube, plate type, multiphase heat exchangers. Materials Used and	**10**	**08**

	applications of heat exchangers.		
	Total	**64**	**70**

Practical:

Skills to be developed:

Intellectual Skill :

1. Understand different sources of energy and their applications.
2. Understand various concepts and fundamentals of thermodynamics.
3. Understand concepts and laws of ideal gasses.
4. Understand vapour processes, steam boilers and different mountings and accessories.
5. Understand modes of heat transfer and concept of heat exchanges.
6. Interpret steam tables, mollier chart and relationship between different thermodynamic properties.

Motor Skills :

1. Collect and write technical specifications of photovoltaic cells and identify different components on panels of photovoltaic cells.
2. Conduct trial on the setup for calculation of thermal conductivity of metal rod
3. Trace path of flue gases and water steam circuit in a boiler.
4. Conduct trial on solar water heating system.

List of practical:

1. Collection of technical data and specification of photovoltaic cell by referring to manufacturers' catalogues.
2. Study and Trial on solar water heating system.
3. Report on visit to wind power generation plant / biogas plant / hydraulic power plant.
4. Trace the flue gas path and water-steam circuit with the help of boiler model and write a report.
5. Report on visit to sugar factory / Dairy / steam power plant with specifications of boiler and list of mountings and accessories.
6. Calculation of thermal conductivity of a solid metallic rod.
7. Verification of Stefan-Boltzman's law
8. Study and compare various heat exchangers such as radiators, evaporators, condensers, plate heat exchangers etc.

Numericals on vapour processes and ideal gas processes (minimum two problems on each)

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Domkundwar V. M.	A Course in Thermal Engineering		Dhanpat Rai & Co.
P. L. Ballaney	A Course in Thermal Engineering		Khanna Publishers
R. S. Khurmi	A text book of Thermal Engineering.		S. Chand & co. Ltd.
R. K. Rajput	A Course in Thermal Engineering		Laxmi Publication, Delhi
Patel and Karmchandani	Heat Engine Vol. - I & II		Acharya Publication

P. K. Nag	Engineering Thermodynamics		Tata McGraw Hill
B. K. Sarkar	Thermal Engineering		Tata McGraw Hill
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME: MECHANICAL ENGINEERING

COURSE CODE : ME/MH/MI

DURATION OF COURSE : 6 SEMESTER

SEMESTER: FIFTH **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	P	SESSIONSAL EXAM			ESE		Oral #	TW @	
					TA	CT	Total					
1	Advanced Manufacturing Processes	3	-	2	10	20	30	70		-	25	4
2	Power Engineering	3	-	2	10	20	30	70		-	-	4
3	Measurements & Control	3	-	2	10	20	30	70		-	25	4
4	Metrology & Quality Control	4	-	2	10	20	30	70		25	25	4
5	ELECTIVE	-	-	-	10	20	30	70		25	25	4
	Tool Engineering			2								
	Automobile Engineering			2								
	Power Plant Engineering			2								
	Mechatronics			2								
6	Industrial Project & Entrepreneurship Development	-	-	2	-	-	-	-		-	-	2
7	Professional Practices – V	-	-	3	-	-	-	-		-	50	2
	Total	**13**	**0**	**17**	**50**	**100**	**150**	**350**		**50**	**150**	**24**

STUDENT CONTACT HOURS PER WEEK: **30**

HTEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

, External Assessment @ , Internal Assessment ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, P - Practical

TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

Total Marks : 700

Minimum passing for sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : MECHANICAL AND PRODUCTION ENGINEERING / PRODUCTION TECHNOLOGY (ADVANCED MANUFACTURING PROCESSES)			
Course code: ME/PG/PT/MH/MI		**Semester : FIFTH FOR ME/PG/PT AND SIXTH FOR MH/MI**	
Duration :		**Maximum Marks : 125**	
Teaching Scheme		**Examination Scheme**	
Theory : 3 hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : 2 hrs/week		End Semester Exam: Marks	
Credit: 4			
Aim :-			
S.No			
1.	To know about the advancements in the area of manufacturing and production processes. To impart knowledge & skills necessary for working in modern manufacturing environment. To get familiarized with working principles and operations performed on non traditional machines, machining center, SPM, automated machines and maintenance of machine tools.		
Objective :-			
S.No	The student will be able to		
1.	• Know different non traditional machining processes, CNC milling machines,		
2.	• Understand the working of Special Purpose Machines.		
3.	• Work as maintenance engineer.		
4.	• Know the Operation and control of different advanced machine tools and equipments.		
5.	• Produce jobs as per specified requirements by selecting the specific machining process.		
6.	• Adopt safety practices while working on various machines.		
7.	• Develop the mindset for modern trends in manufacturing and automation.		
Pre-Requisite:-Nil			
Contents		Hrs/week	
Chapter	Name of the Topic	Hours	Marks

01	**Non traditional machining processes** 1.1 Electrical discharge Machining. Principle of working, Setup of EDM, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, Applications e.g. microhole drilling, curve hole drilling. 1.2 Wire cut EDM - Principle of working, Setup of WEDM, controlling Parameters, Applications. 1.3 Laser Beam Machining. Physical principle of Laser, Laser action in ruby rod, Types of Lasers. Set-up for LBM. Characteristics, controlling Parameters, Applications, Application Of Laser Beam for Welding (LBW) 1.4 Other non traditional machines such as ECM Principle of working, Applications.	05 03 05 03	08 04 08 04
02	**CNC milling machines** Vertical and horizontal machining center: Constructional features, Axis identification, Electronic control system. Automatic tool changer and tool magazine. CNC programming: Preparatory functions (G code), miscellaneous functions (M code), Part programming including subroutines and canned cycles. Principles of computer aided part programming.	12	16
03	**Machine Tool Automation: Introduction and Need.** (A) Single spindle automates, transfer lines. (B) Elements of control system, Limit switches, Proximity switches, Block diagram for feedback and servo control system, Introduction to PLC, Block diagram of PLC.	05 07	08 08
04	**Special Purpose Machines (SPM)** Concept, General elements of SPM, Productivity improvement by SPM, Principles of SPM design.	03	06
05	**Maintenance of Machine Tools** Types of maintenance, Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping. Introduction to Total Productive Maintenance (TPM).	05	08
	Total	48	70

Practical:

Skills to be developed:

Intellectual skills:

1) To select an appropriate non conventional machining process for required component.
2) To write programs for CNC milling machine.
3) To specify the requirement for special purpose machines and automation.
4) To select the maintenance procedure for given machine tool.

Motor Skills:

1) To execute part programs on CNC milling machine / machining center.
2) To repair and maintain machine tools and sub systems.
3) To use and operate different hand tools required for repair and maintenance.
4) To identify and rectify the faults in the given sub assembly.

tes: 1. The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher / workshop superintendent)
2. Theory behind practical is to be covered by the concerned subject teacher / workshop superintendent.
3. Workshop diary should be maintained by each student duly signed by respective shop instructors

List of Practical:

1) Two jobs on CNC milling having following operations – face milling, slotting, Contour machining. (Group of two students , each group must use different program for different job dimensions)
2) One assignment on part programming on machining center.
3) One assignment on machine tool installation procedure.
4) Industrial visit to observe automats and report on the tools, fixtures and cams used on automats.
5) Industrial visit to observe at least one non traditional machining process and report on visit.
6) Dismantling and Assembly of any one – a) Tailstock on lathe b) Apron Mechanism. c) Tapping attachment on drilling machine. d) Lathe Chuck
7) Report on mounting and dismounting procedure of following (any two) – a) Milling machine arbor. b) Vertical milling head. c) Tool post
8) One assignment on USM, CHM, EBM, AJM, WJM, PAM.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Amitabh Ghosh , Mallik	Manufacturing Science		East-West Press Pvt. Ltd.
HMT, Banglore	Production Technology		Tata Mc-Graw Hill
Pabla B. S. M. Adithan	CNC machines		New Age international limited.
H.P.Garg	Industrial maintenance		S. Chand & Co. Ltd.
P. K. Mistra	Non conventional Machining		Narvasa Publishining House
Lindley R. Higgins	Maintenance Engg. Handbook		Mc-Graw Hill
Begman, Amsted	Manufacturing Processes		John Willey and Sons.
B. L. Juneja	Fundamental of metal cutting and machine tools		New age international limited.
Steve Krar, Albert Check	Technology of Machine Tools.		Mc-Graw-Hill International.
P. N. Rao	CAD/CAM Principals and Applications		Tata McGrow-Hill

P. N. Rao	Manufacruting Technology Metal Cutting & Machne tools		Tata McGrow-Hill
Reference books :- Nil			
Suggested List of Laboratory Experiments : - Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (AUTOMOBILE ENGINEERING (ELECTIVE – I))			
Course code: ME/MH/MI		**Semester : FIFTH FOR ME AND SIXTH FOR MH/MI**	
Duration :		**Maximum Marks : 150**	
Teaching Scheme		**Examination Scheme**	
Theory : 2 hrs/week		Mid Semester Exam: Marks	
Tutorial: -- hrs/week		Assignment & Quiz: Marks	
Practical : -- hrs/week		End Semester Exam: Marks	
Credit: 4			
Aim :-			
S.No			
1.	To understand & apply the knowledge about various system, subsystems & their inter-relationships of the automobile for the manufacturing of advanced automotive techniques.		
Objective :-			
S.No	The student will be able to:		
1.	• Know automotive market in India.		
2.	• Identify various automotive systems & subsystems.		
3.	• Explain working & construction of various automotive systems & subsystems.		
4.	• Carry out preventive maintenance & performance resting of vehicle.		
Pre-Requisite:-Nil			

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction of Automobile** 1.1 Classification of automobiles 1.2 Vehicle layout & types 1.3 Body construction **-** Types & Nomenclature of car body. Introduction to aerodynamic body shapes 1.4 Automobile market in India of "on road vehicles", major manufacturers, their products & their collaborations.	**06**	**08**
02	**Automobile Transmission** 2.1 Clutch- necessity, construction & working of coil spring & diaphragm spring type clutch. 2.2 Gear Box- tractive effort and tractive resistance, types of G.B construction & working of constant mesh G.B., & synchromesh G.B., Epicyclic G.B., Torque converter, Overdrive, Transfer case 2.3 Final drive- necessity, construction & working of propeller shaft & differential. 2.4 Axle- Type of rear axles, front axles & their applications.	**12**	**18**

03	**Control Systems** 3.1 Steering system- Requirement of steering system. Construction and working of steering linkage. Steering gear box- construction & working of rack and pinion & re-circulating ball type gearbox. Introduction to Power steering, Steering geometry- camber, caster, toe-in, toe-out, Kingpin inclination & their effects. 3.2 Brake system- construction & working of hydraulic & Pneumatic brakes. Comparison of disc & drum brake.	**08**	**14**
04	**Suspension systems, wheels & Tyres** 4.1 Necessity & classification of suspension system. 4.2 Working & construction of Leaf spring, rigid axle suspension. 4.3 Introduction to air suspension 4.4 Construction & working of McPherson & wishbone, trailing link suspensions. 4.5 Construction & working of telescopic shock absorbers. 4.6 Construction & working of spoked wheel, disc wheel & light alloy cast wheel. 4.7 Types of rims, their construction & working. 4.8 Construction, working & comparison of radial, cross-ply and tubed, tubeless tyre & tyre specifications 4.9 Factors affecting tyre life 4.10Wheel Alignment and Balancing	**08**	**12**
05	**Automobile Electrical Systems & Body** 5.1 Battery- working, construction & rating of battery. 5.2 Ignition system- construction & working of electronic and CDI ignition system. 5.3 Starting system- construction & working of starting motor. 5.4 Charging system- construction & working of alternator 5.5 Wiring system-harnessing & colour codes. 5.6 Lighting system-head light, tail light, indicator light & their circuits. 5.7 Gauges- construction & working of Fuel level gauge, oil gauge and water temperature gauge. 5.8 Use of microprocessor in automobile control systems	**14**	**18**
	Total	**48**	**70**

Practical:

Skills to be developed:

Intellectual Skills:

1. Select tools and equipments
2. Find fault of battery and charging system
3. Identify component and system
4. Use service manual for information search
5. Compare conventional fuels with LPG and CNG fuels for automobiles
6. Observe various components and systems like transmission, braking and charging

Motor Skills:

1. Understand proper handling of tools, equipments
2. Adopt the recommended procedures of maintenance, testing – as mentioned in service manual
3. Handle components of CNG and LPG kit

List of Practical:

1. Carrying out preventative maintenance of four wheeler as per manufacturers specifications.
2. Carrying out preventative maintenance of two wheeler as per manufacturers specifications.
3. Demonstration of single plate coil spring & diaphragm spring type clutch.
4. Demonstration of synchromesh gearbox.
5. Demonstration of differential.
6. Demonstration of rack & pinion steering gearbox.
7. Demonstration of rigid axle suspension.
8. Demonstration of hydraulic brake system
9. Testing of battery and charging system.
10. Study of LPG / CNG kit retrofitting.
11. Visit to four- wheeler service station & any automobile manufacturing unit.
12. Mini project :- Student will prepare a project report & present a seminar

Title:- Automotive market In India.

Collect following information.

a) Top 10 Car/MUV/2W/Heavy vehicle Manufacturers in India & their sale in last 2 Years.
b) Top 5 models of Car/MUV/2W/Heavy vehicle Manufacturers in India.
c) New models launched in last 3 years of Car/MUV/2W/Heavy vehicle. Survey modern features in these vehicle.
d) Proposed launches in next two years in Car/MUV/2W/Heavy vehicle. Survey modern features in these vehicle .

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
K. K. Jain and R.B. Asthana	Automobile Engineering		Tata Mcgraw hill
William Crouse	Automobile Mechanics		Tata Mcgraw hill
SRINIVASAN	Automobile Mechanics		Tata Mcgraw hill
H.M.Sethi	Automotive Technology		Tata Mcgraw hill
G.B.S. Narang	Automobile Engineering		Khanna Publication
Harold T. Glenn	Auto Mechanics		Bennett & Mckknight
Kirpal Singh	Automobile Engineering Vol. I and Vol. II		Standard Publication
Joseph Hitner	Automotive Mechanics		--

C. D.

- C. D. Prepared By MSBTE under its CAI Package Program.
- C. D. on various Topics of Automobile Engineering By SAE

Reference books :- Nil

Suggested List of Laboratory Experiments : Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING GROUP **(INDUSTRIAL PROJECT AND ENTREPRENEURSHIP DEVELOPMENT)**	
Course code: ME/PT/AE/PG /MH	**Semester :** FIFTH FOR ME / PG / PT/ AE AND SIXTH FOR MH/MI
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : 2 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit: 2	

Aim :-

S.No	
1.	To explore the emerging opportunities and to inculcate the entrepreneurial values during their educational tenure. This subject will help in developing the awareness and interest in entrepreneurship and create employment for others.

Objective :-

S.No	
1.	• To identify and train potential entrepreneurs.
2.	• To motivate the entrepreneurial instinct
3.	• To develop necessary knowledge and skills among the participants.
4.	• To help in analyzing the various options to select the most appropriate product suiting to the entrepreneur and the market.
5.	• To give a clear picture about the process and procedures involved in setting up an small scale Industrial unit or a bigger unit.
6.	• To impart basic managerial skills and understandings to run the project efficiently and effectively.
7.	• To analyst the environmental issues to be addressed relating to the proposed project.

Pre-Requisite:-Nil

Contents

PART A) Industrial Project

Following activities related to project are required to be dealt with, during this semester

1. Form project batches & allot project guide to each batch. (Max. 4 students per batch)
2. Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic / Problem / work should be approved by Head of department.
3. Each project batch should prepare action plan of project activities & submit the same to respective guide.

4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.

5. Action Plan should be part of the project report.

Part B: Entrepreneurship Development

OBJECTIVES:
Students will be able to

1) Identify entrepreneurship opportunity.
2) Acquire entrepreneurial values and attitude.
3) Use the information to prepare project report for business venture.

Develop awareness about enterprise management.

Contents		Hrs/week
Chapter	**Name of the Topic**	**Hours**
01	**Entrepreneurship, Creativity & Opportunities** **1.1) Concept, Classification & Characteristics of Entrepreneur** **1.2) Creativity and Risk taking.** **1.2.1) Concept of Creativity & Qualities of Creative person.** **1.2.2) Risk Situation, Types of risk & risk takers.** **1.3) Business Reforms.** **1.3.1) Process of Liberalization.** **1.3.2) Reform Policies.** **1.3.3) Impact of Liberalization.** **1.3.4) Emerging high growth areas.** **1.4) Business Idea** **Methods and techniques to generate business idea.** **1.5) Transforming Ideas in to opportunities transformation involves Assessment of idea &Feasibility of opportunity** **1.6) SWOT Analysis**	**03**
02	**Information And Support Systems** **2.1) Information Needed and Their Sources.** Information related to project, Information related to	**03**

	support system, Information related to procedures and formalities **2.2) SUPPORT SYSTEMS** **1**) Small Scale Business Planning, Requirements. 2) Govt. & Institutional Agencies, Formalities 3) Statutory Requirements and Agencies.	
03	**Market Assessment** 3.1) Marketing -Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	**02**
04	**Business Finance & Accounts** **Business Finance** 4.1) Cost of Project 1) Sources of Finance 2) Assessment of working capital 3) Product costing 4) Profitability 5) Break Even Analysis 6) Financial Ratios and Significance **Business Account** 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit,	**03**
05	**Business Plan & Project Report** 5.1) Business plan steps involved from concept to commissioning Activity Recourses, Time, Cost 5.2) **Project Report** 1) Meaning and Importance 2) Components of project report/profile **(Give list**) 5.3) **Project Apprisial** 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	**03**
06	**Enterprise Management And Modern Trends** 6.1) **Enterprise Management**: - 1) Essential roles of Entrepreneur in managing enterprise 2) Product Cycle: Concept And Importance 3) Probable Causes Of Sickness 4) Quality Assurance Importance of Quality, Importance of testing 6.2) E-Commerce Concept and process	**02**

	6.3) Global Entrepreneur	
	Total	**16**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Entrepreneurship Development	E. Gorden K.Natrajan		Himalaya Publishing. Mumbai
Entrepreneurship Development	Preferred by Colombo plan staff college for Technical education.		Tata Mc Graw Hill Publishing co. ltd. New Delhi.
A Manual on How to Prepare a Project Report	J.B.Patel D.G.Allampally		EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
A Manual on Business Opportunity Identification & Selection	J.B.Patel S.S.Modi		
National Derectory of Entrepreneur Motivator & Resource Persons.	S.B.Sareen H. Anil Kumar		
New Initiatives in Entrepreneurship Education & Training	Gautam Jain Debmuni Gupta		
A Handbook of New Enterpreneurs	P.C.Jain		
Evaluation of Enterpreneurship Development Programmes	D.N.Awasthi , Jose Sebeastian		
The Seven Business Crisis & How to Beat Them.	V.G.Patel		
Poornima M. Charantimath	Entrepreneurship Development of Small Business Enterprises		Pearson Education, New Delhi
Special Edition for MSBTE	Entrepreneurship Development		McGraw Hill Publication
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore		Wheeler Publisher New Delhi

Entrepreneurship Development			TTTI, Bhopal / Chandigadh

2) VIDEO CASSETTES

NO	SUBJECT	SOURCE
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmedabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
2	Assessing Entrepreneurial Competencies	
3	Business Opportunity Selection and Guidance	
4	Planning for completion & Growth	
5	Problem solving-An Entrepreneur skill	

GLOSSARY:

INDUSTRIAL TERMS
Terms related to finance, materials, purchase, sales and taxes.

Components of Project Report:

1. Project Summary (One page summary of entire project)
2. Introduction (Promoters, Market Scope/ requirement)
3. Project Concept & Product (Details of product)
4. Promoters (Details of all Promoters- Qualifications, Experience, Financial strength)
5. Manufacturing Process & Technology
6. Plant & Machinery Required
7. Location & Infrastructure required
8. Manpower (Skilled, unskilled)
9. Raw materials, Consumables & Utilities
10. Working Capital Requirement (Assumptions, requirements)
11. Market (Survey, Demand & Supply)
12. Cost of Project, Source of Finance
13. Projected Profitability & Break Even Analysis
14. Conclusion.

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mary Coulter.	*Entrepreneurship in Action.*	2008.	Prentice Hall of India Pvt. Ltd., New Delhi.
Mohanty, S.K.	*Fundamentals of Entrepreneurship*	2009..	Prentice Hall of India Pvt. Ltd., New Delhi.

Suggested List of Laboratory Experiments :

S.No	
1	Field visit to successful enterprise - study of characteristics of successful entrepreneurs - case study

2	Communication skills - listening and note taking - simulated exercises
3	Development of project proposals - SWOT analysis
4	Development of project proposals - formulation of project plan
Suggested List of Assignments/Tutorial :	
S.No	**Assignments**
1	Assess yourself-are you an entrepreneur?
2	Prepare a project report and study its feasibility.

Name of the Course : MECHANICAL AND PRODUCTION ENGINEERING / PRODUCTION TECHNOLOGY (MEASUREMENTS AND CONTROL)	
Course code: ME/PT/PG/MH/MI	**Semester : FIFTH FOR ME/PG/PT AND SIXTH FOR MH/MI**
Duration :	**Maximum Marks : 125**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	To study advances in technology, measurement techniques, types of instrumentation devices, innovations, refinements. Also study the principles of instrumentation, transducers & measurement of non electrical parameters like temperature, pressure, flow, speed, force and stress.

Objective :-

S.No	Student will be able to:
1.	• Understand the principle of operation of an instrument.
2.	• Appreciate the concept of calibration of an instrument.
3.	• Select Suitable measuring device for a particular application.
4.	• Distinguish between various types of errors.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Significance of measurement:, classification of instruments, static terms and characteristics- range and span, accuracy and precision, reliability, calibration, hysterisis and dead zone, drift, sensitivity, threshold and resolution, repeatability and reproducibility, linearity. Dynamic characteristics- speed of response, fidelity and dynamic errors, overshoot. Measurement of error- classification of errors, environmental errors, signal transmission errors, observation errors, operational errors. 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 .	**12**	**18**
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 systems, proportional control action. Applications of measurements and	**08**	**12**

	control for setup for boilers, air conditioners ,motor speed control.		
03	**Displacement measurement** Potentiometer, LVDT, Eddy current generation type, tachometer, incremental and absolute type. Speed measurement - Mechanical Tachometers, Revolution counter & timer, Slipping Clutch Tachometer, Electrical Tachometers, Eddy current Drag Cup Tachometer, Magnetic and photoelectric pulse counting methods, Contactless Electrical tachometer, Inductive Pick Up, Capacitive Pick Up, Stroboscope	**08**	**10**
04	Temperature measurements**-** Non-electrical methods- bimetal and liquid in glass thermometer, pressure thermometer Electrical methods- RTD, platinum resistance thermometer, thermistor Thermoelectric methods- elements of thermocouple, law of intermediate temperature, law of intermediate metals, thermo emf measurement. Quartz thermometer, Pyrometers- radiation and optical	**06**	**10**
05	Flow measurements**-** Variable head flow meters, variable area meter-rota meter, turbine meter, anemometer- hot wire and hot film, electromagnetic flow meter, ultrasonic flow meter. **Strain Measurement-** Stress-strain relation, types of strain gauges, strain gauge materials, resistance strain gauge- bonded and unbounded, types (foil, semiconductor, wire wound gauges), , selection and installation of strain gauges load cells, rosettes	**07**	**10**
06	Miscellaneous Measurement **Acoustics measurement- sound characteristics – intensity, frequency, pressure, power – sound level meter, piezoelectric crystal type.** Humidity measurement –hair hygrometer, Humistor hygrometer Liquid level measurement – direct and indirect methods Force measurement -Tool Dynamometer (Mechanical Type) Shaft Power Measurement - Eddy Current Dynamometer, Strain Gauge Transmission Dynamometer.	**07**	**10**
	Total	**48**	**70**

Practical:

Skills to be developed:

Intellectual skills:

1. Analyse the result of calibration of thermister
2. Interpret calibration curve of a rotameter
3. Evaluate the stress induces in a strain gauge
4. Verify the characteristics of photo transister and photo diode

Motor skills:

1. Test and calibration of a thermocouple
2. Handle various instruments
3. Draw the calibration curves of rotameter and thermister

4. Measure various parameters using instruments

List of Practical:

1. Measurement of strain by using a basic strain gauge and hence verify the stress induced.
2. Speed Measurement by using Stroboscope / Magnetic / Inductive Pick Up.
3. Measurement of flow by using rotameter.
4. Displacement measurement by inductive transducer.
5. Temperature control using Thermal Reed switch & Bimetal switch.
6. Temperature calibration by using Thermocouple.
7. Determination of negative temperature coefficient and calibration of a thermister.
8. Measurement of force & weight by using a load cell.
9. Liquid Level Measurement by using Capacitive Transducer system.
10. Verify characteristics of photo transducer & photo diode.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
A.K.Sawhney	Mechanical Measurements & Instrumentation		Dhanpat Rai & Sons, New Delhi.
R.V. Jalgaonkar	Mechanical Measurement & Control		Everest Publishing House, Pune
D.S.Kumar	Mechanical Measurements & Control		Metropolitan Publications, New Delhi
C.S. Narang	Instrumentation Devices & Systems		Tata McGraw Hill Publications
R.K.Jain	Mechanical & Industrial Measurements		Khanna Publications, New Delhi
B.C.Nakra and K.K.Chaudhry	Instrumentation, Measurement and Analysis		Tata Mc Graw Hill Publication

Reference books :Nil

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : MECHANICAL ENGINEERING GROUP (MECHATRONICS (ELECTIVE-I))	
Course code: ME/PT/AE/PG/MH/MI	**Semester : FIFTH FOR ME / PT / AE / PG AND SIXTH FOR MH/MI**
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	The integration of electronics engineering, electrical engineering, computer technology and control engineering with mechanical engineering as a part in the design, manufacture and maintenance of wide range of engineering products and processes. To study the systems used in automation.

Objective :-

S.No	Students should be able to:
1.	• Identify various input and output devices in an automated system.
2.	• Understand and draw ladder diagrams.
3.	• Write simple programs for PLCs.
4.	• Interpret and use operations manual of a PLC manufacturer.
5.	• Use simulation software provided with the PLC.
6.	• Understand interfacing of input and output devices

Pre-Requisite:-

S.No	
1.	Knowledge of mathematical topics like Calculus, Differential equations, Probability and Statistics.

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Sensors, Transducers and Actuators** Principle, working and applications of-Limit switches, proximity switches like inductive ,capacitive and optical (deflecting and through beam type) , Thumb wheel switches magnetic reed switches ,Optical encoders-displacement measurement,rotary,incremental, opto-couplers. Actuator – 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**	**08**
02	8085 Microprocessor Architecture, Pin configuration, working of microprocessor, and	**08**	**10**

	applications. Introduction to ICs used for interfacing such as – Programmable peripheral devices , USART, memory, keyboard, display – LCD,LED,I/O device, ADC, DAC etc **8051 Microcontroller** Architecture, Pin configuration, working of microcontroller, Applications Comparison of microprocessor and microcontroller , advantages and disadvantages		
03	**Programmable Logic Controller (PLC)** Introduction, PLC definition, PLC block diagram, Difference between relay panel and PLC, ,power supply, input/output modules (analog, digital) concepts of sink/source, set/reset, latch/unlatch, advantages and disadvantages, installation , troubleshooting and maintenance	**08**	**12**
04	**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	**16**	**22**
05	**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,	**06**	**10**
06	Online, offline, stop/run modes of operations, uploading/downloading between PLC and PC, Introduction to SCADA and DCS	**04**	**08**
	Total	**48**	**70**

Practical:

Intellectual Skills:

1. Identification of various sensors and transducers used in automated systems
2. Interpretation of circuits in automation
3. Interpretation and use

Motor skills:

1. Use of simulation software for PLCs
2. Preparation of ladder diagrams
3. Testing of interfacing ICs

List Of Practical**:**

Term work shall consist of detailed report on the following experiments :

1. Identification and demonstration of different sensors and actuators.
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.

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

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Bolton W.	Mechatronics- Electronic control systems in Mechanical and Electrical Engineering		Pearson Education Ltd.
Histand B.H. and Alciatore D.G.	Introduction to Mechatronics and Measurement systems		Tata McGraw Hill Publishing
John W. Webb and Ronald Reis	Programmable Logic Controllers		Prentice Hall of India
NIIT	Programmable Logic Control – Principles and Applications		Prentice Hall of India
Kolk R.A. and Shetty D.	Mechatronics systems design		Vikas Publishing, New Delhi
Mahalik N.P.	Mechatronics principles, concepts and applications		Tata McGraw Hill Publishing

Reference books :- Nil

Name of Authors	Titles of the Book	Edition	Name of the Publisher
	Mechatronics		HMT

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : MECHANICAL AND PRODUCTION ENGINEERING / PRODUCTION TECHNOLOGY (METROLOGY & QUALITY CONTROL)	
Course code: ME/PT/PG/MH/MI	**Semester : FIFTH FOR ME / PG / PT AND SIXTH FOR MH/MI**
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : 4 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	To study different measuring parameters of machined components and the appropriate fitment of interchangeable components in the assemblies. Study the determination of physical magnitude and ensure the control of quality. The different methods and instruments used for linear and angular measurements, geometrical parameters (like surface finish, Squareness, Parallelism, Roundness etc ..) and the use of gauges and system of limits, Fits, Tolerances etc. Also required to analyze, Interpret and present the data collected, graphically & statistically for ensuring the quality.

Objective :-

S.No	Students will be able to:
1.	• Define accuracy, precision, calibration, sensitivity, repeatability and such relevant terms in metrology.
2.	• Select appropriate instrument/s for specific measurement.
3.	• Analyze and interpret the data obtained from the different measurements processes and present it in the graphical form, statistical form.
4.	• Construct and draw the control charts.
5.	• Understand ISo certification procedure and quality system.

Pre-Requisite:-

S.No	
1.	Calculus for Mathematical and Physical Sciences
2.	Multivariable Calculus
3.	General Physics

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to metrology** **1.1 Metrology Basics** Definition of metrology, Categories of metrology, Scientific metrology, Industrial metrology, Legal metrology, Need of inspection, **Revision of** (no questions be set) -	**03**	**04**

	Precision, Accuracy, Sensitivity, Readability, Calibration, Traceability, Reproducibility, Sources of errors, Factors affecting accuracy, Selection of instrument, Precautions while using an instruments for getting higher precision and accuracy. **1.2 Standards and Comparators** Definition and introduction to line standard, end standard, Wavelength standard, Slip gauge and its accessories, Length bars. Definition, Requirement of good comparator, Classification, use of comparators, Working principle of comparators, Dial indicator, Sigma comparator, Pneumatic comparator, Electrical, Electronic, Relative advantages and disadvantages. **1.3 Limits, Fits ,Tolerances and Gauges** Concept of Limits, Fits, And Tolerances, Selective Assembly, Interchangeability, Hole And Shaft Basis System, Taylor's Principle, Design of Plug, Ring Gauges, IS919-1993 (Limits, Fits & Tolerances, Gauges IS 3477-1973, concept of multi gauging and inspection. **1.4 Angular Measurement** Concept, Instruments For Angular, Measurements, Working And Use of Universal Bevel Protractor, Sine Bar, Spirit Level, Principle of Working of Clinometers, Angle Gauges (With Numerical on Setting of Angle Gauges).	**06** **05** **03**	**08** **06** **04**
02	Threads and Gear Metrology **2.1 Screw thread Measurements** ISO grade and fits of thread, Errors in threads, Pitch errors, Measurement of different elements such as major diameter, minor diameter, effective diameter, pitch , Two wire method, Thread gauge micrometer, Working principle of floating carriage dial micrometer. **2.2 Gear Measurement and Testing** Analytical and functional inspection, Rolling test, Measurement of tooth thickness (constant chord method), gear tooth vernier, Errors in gears such as backlash, runout, composite.	**03** **03**	**03** **03**
03	Testing Techniques **3.1 Measurement of surface finish** Primary and secondary texture, Sampling length, Lay, terminology as per IS 3073- 1967, direction of lay, Sources of lay and its significance, CLA, Ra, RMS, Rz values and their interpretation, Symbol for designating surface finish on drawing, Various techniques of qualitative analysis, Working principle of stylus probe type instruments. **3.2 Machine tool testing** Parallelism, Straightness, Squareness, Coaxiallity, roundness, run out, alignment testing of machine tools as per IS standard procedure.	**03** **06**	**04** **06**
04	Quality Control **A) Quality :** Definitions, meaning of quality of product & services, Quality characteristics, Quality of design, Quality of conformance, Quality of performance, Concept of reliability, Cost, Quantity assurance, Cost of rework & repair, Quality & Inspection, Inspection stages.	**04**	**04**

	B) Total Quality Management : 1) Principles of total quantity management. i) Customer focus. ii) Commitment by top management. iii) Continuous improvement–PDCA, Quality Circles. iv) Employee empowerment (JIDOKA). 2) Quality Audit: Concept of audit practices, lead assessor certification. 3) Six sigma: Statistical meaning, methodology of system Improvement , DMAIC cycle, Yellow belt, Green belt, Black belt certification. **C) ISO 9000 Series & other standards** Concept, ISO 9000 series quality standards, QS14000, Standards in general, Its evaluation & Implications, necessity of ISo certification, other Quality systems	**06** **04**	**06** **04**
05	Elementry Statistics & it's application in quality control **5.1 Statistical Quality Control** – Meaning and importance of SQC, Variable and attribute Measurement. control charts – inherent and assignable sources of variation, control charts for variables – X & R charts, control charts for attributes p, np, C charts, process capability of machine, determination of statistical limits, different possibilities, Rejection area, Statistically capable and incapable processes, Cp, Cpk. **5.2 Acceptance Sampling –** Concept, Comparison with 100% inspection, Different types of sampling plans, with merits and demerits, OC curve, It's importance and significance, Producers risk, Consumer's risk, AQL, AOQL, IQL, LTPD	**10** **08**	**10** **08**
	Total	**64**	**70**

Practical:

Skill to be developed:

Intellectual Skills:

1. To understand principle, working of various measuring instruments.
2. Selection of proper instruments for measurement.
3. Calculation of least count of instrument.
4. Take reading using the instrument
5. Interpret the observation and results
6. Collection and recording of data
7. Analysis of data.

Motor Skills:

1. Setting the instruments for zero error adjustment.
2. Proper alignment of the instrument with work piece
3. Handling of instruments
4. Care and maintenance of instruments.
5. Measure the dimensions form the instruments.
6. Calibration and traceability of the instruments
7. Graphical representation of data.

Notes:

1. The practical shall be conducted by the subject teacher, by taking actual measurements of different parameters on the jobs prepared by earlier batches in workshop practice or actual measurement of

component dimension.

2. The data collected from the practical of basic measuring instruments may be used for experiments of SQC.

3. During practical examination student should measure at least five parameters by using two to three different measuring instruments and evaluation of practical be done considering

   (a) Selection of appropriate measuring instrument by the examinee.
   (b) Computation of Least count of instrument used.
   (c) Correctness of measurements of the measured.

List of Practical:

1. Standard use of basic measuring instruments. Surface plate, v-block, sprit level, combination set, filler gauge, screw pitch gauge, radius gauge, vernier caliper, micrometer and slip gauges to measure dimension of given jobs.
2. To find unknown angle of component using sine bar and slip gauges.
3. Study and use of optical flat for flatness testing.
4. Measurement of screw thread elements by using screw thread micrometer, screw pitch gauge.
5. Study and use of dial indicator as a mechanical comparator for run out measurement, roundness comparison.
6. Measurement of gear tooth elements by using gear tooth vernier caliper and span micrometer, verification of gear tooth profile using profile projector,.
7. Testing of machine / machine tool for flatness, parallelism, perpendicularity by autocollimator.
8. Draw the frequency histogram, frequency polygon and ogee for given samples (min 5o reading) and find mean, mode, median.
9. To draw the normal distribution curve and find standard deviation, variance, range
10. To draw and interpret the control limit for variable measurement (X and R chart).

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
R. K. Jain	Engineering metrology		Khanna Publisher, Delhi.
J.F.W. Galyer and C. R. Shotbolt	Metrology for Engineers		ELBS
K. J. Hume	Engineering Metrology		Kalyani publishers
I.C. Gupta	A text book of Engineering metrology		Dhanpat Rai and Sons,
M. Adithan and R. Bahn	Metrology Lab. Manual		T.T.T.I. Chandigarh.
M. Mahajan	Statistical Quality Control		Dhanpat Rai and Sons ,
T.T.T.I. Chennai	Quality control		Tata McGraw Hill,
Juran U.M. and Gryna	Quality planning and analysis		Tata McGraw Hill,
National productivity council	Inspection and quality control		N.P.C., New Delhi.

N. Logothetis	Managing for Total Quality		Prentice – Hall, Delhi.
Lauth Alwan	Statistical Process analysis		Tata McGraw Hill.

2. IS/ International Codes :

IS 919 – 1993 Recommendation for limits, fits and tolerances
IS 2029 – 1962 Dial gauges.
IS 2103 – 1972 Engineering Square
IS 2909 – 1964 Guide for selection of fits.
IS 2921 – 1964 Vernier height gauges
IS 2949 – 1964 V Block.
IS 2984 – 1966 Slip gauges.
IS 3139 – 1966 Dimensions for screw threads.
IS 3179 – 1965 Feeler gauges.
IS 3455 – 1966 Tolerances for plain limit gauges.
IS 3477 – 1973 Snap gauges.
IS 6137 – 1971 Plain plug gauges.
IS 3651 – 1976 Vernier Caliper
IS 4218 - Isometric screw threads
IS 4440 – 1967 Slip gauges accessories
IS 5359 – 1969 Sine bars
IS 5402 – 1970 Principle and applications of sine bars
IS 5939 – 1970 Sine angles, sine tables.

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
A.J.T. Scarr	Metrology & Precision Engg.	1967	Tata McGraw hill

Suggested List of Laboratory Experiments : Nil

Suggested List of Assignments/Tutorial :Nil

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (POWER ENGINEERING)	
Course code: ME / MH / MI	**Semester : FIFTH FOR ME AND SIXTH FOR MH/MI**
Duration :	**Maximum Marks : 100**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	To study working, testing and maintenance of I.C. Engines. Use of air compressors, energy saving in air compressors and understand thermodynamic aspect of air compressor. Use of Gas turbine for power generation and for jet propulsion. To understand the fundamentals of refrigeration and air-conditioning.

Objective :-

S.No	The Students should be able to:
1.	• Apply continuity equation to nozzles.
2.	• Describe construction and working of various types of steam turbines.
3.	• Explain use of different types of steam condensers and compare various steam condensers.
4.	• Describe internal combustion engine.
5.	• Calculate various performance characteristics of IC Engines by conducting trial.
6.	• Understand working of gas turbines and its application.
7.	• Select appropriate type of compressor to suit the requirements.
8.	• Calculate performance parameters of Air compressor.
9.	• Understand Refrigeration & Air-conditioning processes and their application

Pre-Requisite:-

S.No	
1.	Knowledge of basic thermodynamics & heat power

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**I.C. Engine** 1.1 Power Cycles - Carnot, Otto, Diesel, Dual, Brayton Cycle, representation on P-V, T-S diagram and Simple numerical on Otto cycle only. 1.2 Classification of I.C. Engines 1.3 Two stroke and four stroke Engines Construction and working, comparison, valve timing Diagram.	**14**	**18**

	1.4 Brief description of I.C. Engine combustion (SI & CI), scavenging, preignition, detonation, supercharging, turbo charging, simple Carburetor, M.P.F.I., fuel injection pump 1.5 List of fuel, lubricant additives and their advantages.		
02	**I.C. Engine Testing and Pollution Control** 2.1 Engine Testing - I.P., B.P. Mechanical, Thermal relative and volumetric efficiency, BSFC, Heat Balance sheet. 2.2 Morse Test, Motoring test 2.3 Pollution Control - Pollutants in exhaust gases of petrol and diesel engines, their effects on environment, exhaust gas analysis for petrol and diesel engine, Catalytic Converter, Bharat stage I, II, III norms.	**12**	**14**
03	**AIR COMPRESSER** 3.1 Introduction 3.2 uses of compressed air - Classification of air compressors - Definition: - Compression ratio - Compressor capacity - Free Air Delivered - Swept volume 3.3 Reciprocating air compressor - Construction and working of single stage and two stage compressor - Efficiency: - Volumetric , Isothermal & Mechanical (only simple numerical) - Advantages of multi staging. 3.4 Rotary Compressor - Construction and working of screw, lobe, vane, centrifugal compressors (No numerical) - Comparison and applications of reciprocating and rotary compressors - Purification of air to remove oil, moisture and dust 3.5 Methods of energy saving in air compressors.	**12**	**14**
04	**Gas Turbine And Jet Propulsion** 4.1 Classification and applications of gas turbine. 4.2 Constant volume and constant pressure gas turbines. - Closed cycle and open cycle gas turbines and their comparison. 4.3 Methods to improve thermal efficiency of gas turbine- Regeneration, inter- cooling, reheating using T- Ø diagram (no analytical treatment) 4.4 Jet Propulsion - Principles of turbojet, turbo propeller, Ram jet. 4.5 Rocket propulsion - Solid propellants and liquid propellants, components of liquid propellants rocket engine.	**12**	**10**
05	**Refrigeration and Air- Conditioning** 5.1 Introduction - COP of Heat Pump and refrigerator, Tonnes of Refrigeration.	**14**	**14**

	5.2 Vapour compression system - Vapour compression refrigeration cycle, components of Vapour Compression Cycle. Applications- Water cooler Domestic refrigerator, Ice plant & cold storage. 5.3 Psychrometry - Properties of air, psychrometric chart & processes (No Numerical) 5.4 Air conditioning systems - Definition of Air conditioning and classification of Air conditioning Systems.		
	Total	**64**	**70**

Practical:

Intellectual Skills:

1. Identify components of IC Engines.
2. Understand working principals of IC Engines, Compressors and refrigeration systems.
3. Analyze exhaust gases and interpret the results.
4. Use internet for information search.
5. Interpret the test results.
6. Select tools and gauges for inspection and maintenance.

Motor skills:

1. Assemble and dismantle engine according to given procedure.
2. Follow the procedure to start an engine.
3. Operate IC Engine test rig, refrigeration test rig for measuring various parameters and plotting them.
4. Operate exhaust gas analyzer for measuring pollutants.

List of Practical:

1. Dismantling assembly of petrol/diesel engine
2. Trial on single/multicylinder petrol and diesel engine with heat balance sheet
3. Morse Test on Multicylinder Diesel/Petrol engine
4. Measurement of I.C. pollutants with the help of Exhaust gas Analyzer for petrol / diesel engine with the help of Exhaust gas
5. Trial on two-stage Reciprocating compressor
6. Collection and analysis of manufacturer's catalogue for Reciprocating/Screw compressor
7. Visit website- http://library.think.quest.org
   http://www.grc.nasa.goe
   and prepare a brief report on gas turbine and jet propulsion.
8. Trial on Refrigeration Test Rig for calculation of C.O.P, power required, refrigerating effect.
9. Identify the components and trace the flow of refrigerant through various components in window air conditioner.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher

V. M. Domkundwar	Course in Thermal Engineering		Dhanpat Rai & Co
P.L.Ballaney	Thermal Engineering		Khanna Publishers
R.S.Khurmi	Text Book of Thermal Engineering		S.Chand & Co. Ltd
Patel. Karamchandani	Heat Engine Vol.-I and Vol.-II		Acharya Publication
R. k. Jain	Automobile Engineering		Tata McGraw Hill
Reference books :			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
K.C.Agrawal	Industrial power engg.& application handbook		
Suggested List of Laboratory Experiments : -Nil			
Suggested List of Assignments/Tutorial :- Nil			

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (POWER PLANT ENGINEERING (ELECTIVE-I))	
Course code: ME/MH/MI	**Semester : FIFTH FOR ME AND SIXTH FOR MH/MI**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	Industries are expected to generate their own power and supply the excess power to national grid. Alternate energy sources are also harnessed to meet the increasing demand. To study the layout, components of different power plants and economic aspects of power plants.

Objective :-

S.No	Students should be able to:
1.	• Get familiar with present and future power scenario of India.
2.	• Calculate efficiency of power generation cycles.
3.	• Understand working of high pressure boilers, coal and ash handling systems of power plant.
4.	• Draw layout, understand the working and compare different power plants.
5.	• Enlist sources of waste heat and explain method of heat recovery.
6.	• Explain constructional features of non conventional energy source devices.
7.	• Appreciate economical and operational aspects of power plants.

Pre-Requisite:-

S.No	
1.	Knowledge of basic thermodynamics & heat power

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to power plant** 1.1 Power scenario in India 1.2 Types of power plants – Hydro, Nuclear, Thermal, Future trends in power sector. 1.3 Analysis of steam cycles- Carnot, Rankine, Reheat cycle, Regenerative cycle, Methods of reheating, Advantages and disadvantages of reheat cycle, 1.4 Gas turbine cycle	**05**	**08**

02	**Steam power plant** 2.1 Layout of steam power plant, general features of selection of site 2.2 High pressure boilers – Construction and working of Sub-critical and Super-critical boilers. 2.3 Coal and ash handling system- equipments for in plant handling of coal such as belt conveyor, screw conveyor, bucket elevator, Coal crushing, Pulverized fuel handling system, Ball mill, Pulverized fuel and their advantages, Multi retort stoker, Pulverized fuel burner, Hydraulic and pneumatic ash handling, Electrostatic precipitator. 2.4 Boiler Feed water treatment 2.5 Environmental aspects of steam power plant - water pollution, air pollution, emission standard and its control	**10**	**14**
03	**Nuclear power plant** 3.1 Fusion and fission reaction, general criteria for selection of site. 3.2 Elements of nuclear power station, layout, types of nuclear reactors. 3.3 Nuclear fuels, coolant & moderators. 3.4 Working of PWR, BWR, CANDU, BREEDER type reactor. 3.5 Safety precautions and waste disposals.	**09**	**12**
04	**Gas turbine power plant** 4.1 General Layout, selection of site, Gas turbine power plants in India. 4.2 components of gas turbine plants, gas turbine Fuels. 4.3 Comparison of Gas turbine plant with diesel and Steam power plant. 4.4 Environmental impact of gas turbine power plant. Waste Heat recovery	**06**	**08**
05	5.1 Sources of waste heat 5.2 Heat recovery forms & methods – Sensible and latent Heat recovery. 5.3 Use of waste heat- Agricultural, green house, Animal shelter, Aqua cultural uses, process heating. 5.4 waste Heat recovery boilers	**05**	**10**
06	**Non conventional power generation plants** 6.1 Geothermal power plant- types, economical justification 6.2 Tidal power plant- factors affecting suitability of site, working of different tidal power plants, advantages and disadvantages 6.3 Wind power plant- different types, advantages and Disadvantages. 6.4 Solar power plant 6.5 Magneto Hydro dynamics power plant 6.6 Small hydro power plant 6.7 Introduction to Plasma technology	**05**	**08**
07	**Economics and operational aspects** 7.1 Prediction of load, selection of types of generation, number of generating units. 7.2 Load duration curves, cost analysis, elements, controlling the cost of power plant (simple numerical) 7.3 Major electrical equipments in power station- generator, step-up transformer, switch gear, electrical motors	**08**	**10**
	Total	**48**	**70**

Practical:

Skills to be developed:

Intellectual skills:

1. Understand working of various power plants
2. Understand constructional features and working of devices used in non conventional energy sources
3. Understand economical and operational aspects of power plants
4. Calculate the efficiency of power generation cycles

Motor skills:

1. List technical details of components and subsystems of power plants
2. Draw layouts of different power plants
3. Operate devices using solar energy inputs

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
P. K. Nag	Power plant engineering		Tata McGraw Hill
Fredrick T. Mosse	Power plant engineering		East-West press
A. Chkrabarti and M. L. Soni	A text book of Power System Engineering		Dhanpat Rai and Co
Arora and Domkundwar	A course in power plant engineering		Dhanpat Rai and Co

2. Computer Based Training Packages/Computer Aided Instructions Packages/CDs:

1. Power Plant Familiarization Vol-I to IV.
   - Ash Handling System.
   - Gas Turbine and combined cycle power plant.
   - Power Station Safety.
   - Environmental pollution & pollution control.
   - Pulverizers and feeders.
   - Renewable energy sources,

   (Developed by National Power Training Institute , South Ambazari Road, Nagpur)

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Thomas C. Elliott,	Standard handbook of power plant engineering	1997	Tata McGraw Hill

Suggested List of Laboratory Experiments : Nil

Suggested List of Assignments/Tutorial :

S.No	Assignments
1	• Visit to steam power plants/nuclear power plants/wind power plants/ Hydro power plants

	and prepare a report.
2	• Collect information & Technical details of nuclear power plants.
3	• Collect information & Technical details of Steam power plants.
4	• Collect information & Technical details of Solar & Wind power plants.
5	• Study of economic and operational aspects of power plants (simple numerical).
6	• Assignment on Coal & Ash Handling system.
7	• Assignment on Waste Heat recovery systems.

Name of the Course : MECHANICAL AND PRODUCTION ENGINEERING / PRODUCTION TECHNOLOGY (PROFESSIONAL PRACTICES – V)		
Course code: ME/PT/PG/MH/MI		**Semester : FIFTH FOR ME/PG/PT AND SIXTH FOR MH / MI**
Duration :		**Maximum Marks : 50**
Teaching Scheme		**Examination Scheme**
Theory : hrs/week		Mid Semester Exam: Marks
Tutorial: hrs/week		Assignment & Quiz: Marks
Practical : 3 hrs/week		End Semester Exam: Marks
Credit: 2		
Aim :-		
S.No		
1.	To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.	
Objective :-		
S.No	Student will be able to:	
1.	• Acquire information from different sources.	
2.	• Prepare notes for given topic.	
3.	• Present given topic in a seminar.	
4.	• Interact with peers to share thoughts.	
5.	• Prepare a report on industrial visit, expert lecture	
Pre-Requisite:-Nil		
Contents		Hrs/week

Serial No.	Activities	Practical Hours
01	**Industrial Visits** Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work.(**2 visits**) Following are the suggested types of Industries/ Fields – i) Automobile manufacturing / auto component manufacturing units to observe the working of SPM ii) Refrigeration and air conditioning manufacturing / servicing units / industries / workshops iii) Automobile service stations for four wheelers iv) Co-ordinate measuring machine to observe its construction working specifications and applications. v) Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc. vi) Wheel Balancing unit for light and/or heavy motor vehicles. vii) Food processing unit. viii) Textile industry machinery manufacturing / servicing units. ix) Hydro electric and Thermal power plants. x) Automotive Research Association of India, Pune, Central Iinstitute of Road Transport, Pune, Vehicle Research and Development establishment , Ahmednagar. xi) Engine testing, exhaust gas analysis and vehicle testing xii) PWD workshop. xiii) Safety museum at Central Labour Institute, Sion, Mumbai	**08**
02	**The Guest Lecture/s** From field/industry experts, professionals to be arranged (2 Hrs duration), minimum 4 nos. from the following or alike topics. The brief report to be submitted on the guest lecture by each student as a part of Term work a) Electronic fuel injection systems b) Exhaust gas analysis. c) Vehicle testing. d) Transducer application in automobiles. e) Environmental pollution & control. f) Vehicle aerodynamics & design. g) Earth moving machines. h) Automobile pollution, norms of pollution control. i) Biotechnology j) Nanotechnology k) Rapid prototyping l) Programmable logic controllers m) TQM n) MPFI o) Hybrid motor vehicles p) Packaging technology q) Appropriate technology	**10**

	r) Six sigma systems s) LPG / CNG conversion kit.	

03	**Group Discussion :** The students should discuss in group of six to eight students and write a brief report on the same, as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are (**any one**)- i) CNG versus LPG as a fuel. ii) Petrol versus Diesel as a fuel for cars. iii) Trends in automobile market. iv) Load shading and remedial measures. v) Rain water harvesting. vi) Trends in refrigeration Technology. vii) Disaster management. viii) Safety in day to day life. ix) Energy Saving in Institute. x) Nano technology.	**10**
04	**Seminar : (any 2 topics)** Seminar topic should be related to the subjects of fifth semester / topics from guest lectures. Students shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes for a group of 2 students)	**12**
05	**Mini Projects : (in a group of 4-5 students)** 1) Design / drawing of simple jigs, fixtures 2) Thermocouple based temperature controller. 3) Pump on / off timer 4) Models of jigs / fixtures 5) Layout design of SSI units / factory / workshop of the institute 6) **Models of material handling route systems** OR **Modular Course on any one of the suggested or alike relevant topic be undertaken by a group of students (Min 10) :** a) LPG/CNG conversion of vehicles b) Advance features in CAD – CAM c) basics of PLC programming d) die design e) JIT techniques f) Non traditional manufacturing methods g) jigs and fixture design h) 3D Modeling I) finite element method j) Mechatronics k) Advanced computer programming l) maintenance of home appliances m) value stream mapping n) piping technology	**04**
6	**Student Activities** – Students in a group of 3 to 4 shall perform **ANY TWO** of the following activities (Other similar activities may be considered) and write a report as a part of term work. **Activities :-** 1. Collection of data regarding loan facilities or other facilities available through different organizations / banks to budding entrepreneurs 2. Survey and interviews of successful entrepreneurs in near by areas 3. Survey of opportunities available in thrust areas identified by Government or DIC.	**04**

	4. Measuring Screw thread parameters on floating carriage dial micrometer and select the optimum diameter of wire. 5. Survey of data regarding different types of pumps with specifications from manufacturers catalogue, local markets, end users (any other engineering products may be considered for survey) 6. Survey of farm implements used by farmers	
	Total	**48**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mark Ratner and Daniel Ratner	Nanotechnology		Pearson Educatuion, New Delhi
Yoram Korem	Computer Control of Manufactring System		Mcgraw Hill Publication
Sunil Chopra, Peter Meindl	Supply Chain Management		Pearson Educatuion, New Delhi

Reference books :- Nil

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : MECHANICAL ENGINEERING (TOOL ENGINEERING (ELECTIVE-I))	
Course code: ME/MH/MI	**Semester : FIFTH FOR ME AND SIXTH FOR MH/MI**
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	To impart, concepts, principles & procedures of tool engineering to achieve highest productivity and perform duties as a technician in tool room, shop floor, quality control & assist tool Engineer in design of tools and production processes

Objective :-

S.No	The students will be able to:
1.	• Select cutting tools and its material using data book and manufacturer's catalogue.
2.	• Estimate tool wear and tool life.
3.	• Use press tools and dies effectively.
4.	• Design strip layout for given component.
5.	• Decide appropriate cutting fluid for machining process improvement.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Metal Cutting** **1.1** Mechanics of Metal cutting: requirements of tools, cutting forces – types of chips, chip thickness ratio, shear angle – simple numericals only, types of metal cutting process – orthogonal, oblique and form cutting. Cutting fluids – types, characteristics and applications. Tool wear, Types of wear, Tool life - Tool life equations. Machinability – definition, factors affecting machinability, machinability index. **1.2** Tool materials: Types, characteristics, applications. Heat treatment of tool steels, Specification of carbide tips, Types of ceramic coatings. **1.3** Cutting Tool Geometry: Single point cutting tool, drills, reamers, milling cutters.	**12** **05** **03**	**16** **08** **06**
02	**Press Tools** **2.1 Presses:** Types, Specification.	**03**	**04**

	2.2 Types of dies and construction: Simple Die, Compound Die, Progressive Die, Combination Die. Punch & die mountings, pilots, strippers, misfeed detectors, Pressure Pads, Knock outs, stock guide, Feed-Stop, guide bush, guide pins. **2.3 Die Design Fundamentals:** Die Operations- blanking, piercing, shearing, cropping, notching, lancing, coining, embossing, stamping, curling, drawing, bending, forming. Die set, Die shoe, Die area, Calculation of clearances on die and punch for blanking and piercing dies, Strip layout, Calculation of material utilization factor. **2.4 Forming Dies:** Bending: methods, Bending Dies, bend allowance, spring back, spanking, bending pressure, pressure pads, development of blank length. Drawing: operations, Metal flow during drawing. Calculation of Drawing blank size, variables affecting metal flow during drawing, single action and double action dies, combination dies.	**05** **07** **09**	**06** **10** **14**
03	**Fundamentals of Other Tools** Constructional features of - Pressure Die casting dies, metal extrusion dies, injection molding dies, forging dies, plastic extrusion dies.	**04**	**06**
	Total	**48**	**70**

Practical:

Intellectual skills:

- To understand & differentiate types of presses & press operation.
- To understand types of dies & their working principles.
- To select suitable strip layout for a given work piece.
- To calculate blank length & blank diameter of a given work piece.
- To understand tool angles of various cutting tools & their importance.
- To select suitable punch, pilot & stripper for a given application
- To calculate cutting force & shear angle.

Motor Skills:

- To draw strip layout & other figures
- To draw different types of dies.
- To draw types of cutting tools showing various angles.
- To design & draw drawing die for a given component.

List of Practical:

1. Report on Visit to press shop for study of presses.
2. Sketches of Combination Die, Progressive Die, Compound die, Inverted Die, Drawing Die, Bending Die.
3. Drawing of strip layout of simple component (Different component for every student) , and calculation of material utilization factor.
4. Sketches of Injection Moulding die, Pressure die-casting die, forging die.
5. Two assignments on calculation of Cutting forces and shear angle based on Merchant's circle.
6. One assignment each on development of blank length for bending operation and single stroke

drawing operation.

7. One assignment on designation of carbide tools.
8. Sketches of different types of cutting tools showing details of tool angles.
9. One assignment on types of Punches and pilots, strippers
10. Design of blanking die – Drawing sheets showing assembly & details.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Donaldson Anglin	Tool Design		Tata Mc Graw Hill
P. C. Sharma	A Text Book OF Production Engineering		S Chand & Co.
H. M. T.	Production Technology		Tata Mc Graw Hill
R. K. Jain	Production Technology		Khanna Publishers
A.S.T.M.E.	Fundamental of tool design.		Prentice-Hall of India.
M.H.A. Kempster	Introduction to Jig and Tool Design		Viva publ.
P. H. Joshi	Jigs and Fixtures		Tata Mc Graw Hill
P. H. Joshi	Press Tools		Tata Mc Graw Hill

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
American Society of Tool and Manufacturing Engineers	Tool engineers handbook	1959	McGraw-Hill

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME: MECHANICAL ENGINEERING

COURSE CODE : ME / MH / MI

DURATION OF COURSE : 6 SEMESTERS

SEMESTER: SIXTH SEMESTER **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	PR	SESSIONSAL EXAM			ESE	PR	Oral #	TW @	
					TA	CT	Total					
1	Management	03	--	--	10	20	30	70	--	--	--	3
2	Design of Machine Elements	04	--	02	10	20	30	70	--	25	25	5
3	Industrial Fluid Power	03	--	02	10	20	30	70	--	25	25	4
4	Production Technology	03	--	--	10	20	30	70	--	--	--	3
5	**Elective II (Any One)**											
	Alternate Energy Sources & Management $	03	--	02	10	20	30	70	--	--	25	4
	Material Handling Systems	03	--	02	10	20	30	70	--	--	25	4
	Refrigeration & Air-Conditioning	03	--	02	10	20	30	70	--	--	25	4
	CAD-CAM & Automation	03	--	02	10	20	30	70	--	--	25	4
6	Industrial Project	--	--	06	--	--	--	--	--	50#	50	3
7	Professional Practices - VI	--	--	04	--	--	--	--	--	--	50@	2
	Total	**16**	**--**	**16**	**50**	**100**	**150**	**350**	**--**	**100**	**175**	**24**

STUDENT CONTACT HOURS PER WEEK: **32**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

, External Assessment @ , Internal Assessment ESE - End Semester Exam.

ABBREVIATIONS: CT- Class Test, TA - Teachers Assessment, L - Lecture, TU - Tutorial, P - Practical

TA: Attendance & surprise quizzes = 6 marks. Assignment & group discussion = 4 marks.

Total Marks :775

Minimum passing for sessional marks is 40%, and for theory subject 40%.

Assessment of Practical, Oral & term work to be done as per the prevailing norms of curriculum implementation & assessment.

Name of the Course : DIPLOMA IN MECHANICAL, AUTOMOBILE ENGINEERING AND PRODUCTION ENGINERING / TECHNOLOGY (ALTERNATE ENERGY SOURCES AND MANAGEMENT (ELECTIVE II))	
Course code: ME/PT/AE/PG/MH/MI	**Semester : SIXTH FOR ME/PT/PG/AE AND SEVENTH FOR MH/MI**
Duration :	**Maximum Marks : 125**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	To develop, operate and maintain alternative energy sources systems. It is therefore essential to know basics of energy conversion, conservation, energy audit and waste heat recovery techniques.

Objective :-

S.No	Students should be able to:
1.	• Develop awareness for effective utilization of alternative energy sources.
2.	• Identify different components of solar energy and wind energy devices.
3.	• Identify and analyze biomass plant.
4.	• Identify and apply energy conservation techniques for commonly used power absorbing and generating devices.
5.	• Apply principles of energy conservation and energy management techniques.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction to Energy Sources 1.1 Introduction. 1.2 Major sources of energy: Renewable and Non-renewable. 1.3 Primary and secondary energy sources. 1.4 Energy Scenario: - Prospects of alternate energy sources. - Need of Alternate energy sources.	**06**	**06**
02	Solar Energy 2.1 Principle of conversion of solar energy into heat and electricity 2.2 Solar Radiation: Solar Radiations at earth's surface Solar Radiation Geometry: Declination, hour angle, altitude angle, incident angle, zenith angle, solar azimuth angle 2.3 Applications of Solar energy: - - Construction and working of typical flat plate collector and solar concentrating collectors and their applications,	**08**	**10**

	advantages and limitations - Space heating and cooling. - Photovoltaic electric conversion. - Solar distillation, Solar cooking and furnace. - Solar pumping and Green House. Agriculture and Industrial process heat. (no derivations and numericals)		
03	Wind Energy 3.1 Basic Principle of wind energy conversion. 3.2 Power in wind, Available wind power formulation, Power coefficient, Maximum power 3.3 Main considerations in selecting a site for wind mills. 3.4 Advantages and limitations of wind energy conversion. 3.5 Classification of wind mills 3.6 Construction and working of horizontal and vertical axis wind mills, their comparison 3.7 Main applications of wind energy for power generation and pumping.	**06**	**08**
04	Energy from Biomass 4.1 Common species recommended for biomass. 4.2 Methods for obtaining energy from biomass 4.3 Thermal classification of biomass a) Gasified, b) Fixed bed and fluidized 4.4 Application of gasifier 4.5 Biodiesel production and application 4.6 Agriculture waste as a biomass 4.7 Biomass digester 4.8 Comparison of Biomass with conventional fuels	**08**	**10**
05	Energy Conservation & Management**:-** 5.1 Global and Indian energy market 5.2 Energy scenario in various sectors and Indian economy 5.3 Need and importance of energy conservation and management 5.4 Concept of Payback period, Return on investment (ROI), Life cycle cost, Sankey diagrams, specific energy consumption.	**04**	**08**
06	**Energy Conservation Techniques** 6.1 Distribution of energy consumption 6.2 Principles of energy conservation. 6.3 Energy audit 6.4 Types of audit 6.5 Methods of energy conservation 6.6 Cogeneration and its application 6.7 Combined cycle system 6.8 Concept of energy management 6.9 Study of different energy management techniques like - Analysis of input - Reuse and recycling of waste - Energy education - Conservative technique and energy audit	**08**	**14**
07	**Economic approach of Energy Conservation**	**08**	**14**

	7.1 Costing of utilities like steam, compressed air, electricity and water. 7.2 Ways of improving boiler efficiency 7.3 Thermal insulation, Critical thickness of insulation 7.4 Waste heat recovery systems, their applications, criteria for installing unit. 7.5 An introductory approach of energy conservation in compressed air, refrigeration, air conditioning, pumps and fans.		
	Total	**48**	**70**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Dr B.H.Khan	Non conventional energy Resources		Tata McGraw Hill
G. D. Rai	Non conventional energy sources		Khanna publication
S. P. Sukhatme	Solar energy		Tata McGraw Hill
H. P. Garg	Solar energy		Tata McGraw Hill
Arrora Domkundwar	Power plant engineering		Dhanpat Rai & co.
P.H. Henderson	India- The energy sector		University Press
D. A. Ray	Industrial energy conservation		Pergaman Press
W. C. Turner	Energy management handbook		Wiley Press
K. M. Mittal	Non-conventional energy source		-
Krupal Singh Jogi	Energy resource management		Sarup and sons

2. Cassettes/CD/websites:

1. CDs developed by National Power Training Institute, (Under the ministry of Power, Government of India) Opposite VNIT, South Ambazari road, Nagpur

2. Website of Bureau of Energy and Efficiency. (www.bee-india.nic.in)
3. Website for Akshay Urja News Bulletin. (www.mnes.nic.in)

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Ghosh, Tushar K., **Prelas**, Mark A.	**Energy Resources and Systems**		Springer

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :

S.No	Assignments

1	• To collect information about global and Indian energy market.
2	• To perform an experiment on solar flat plate collector used for water heating.
3	• To study construction and working of photo voltaic cell.
4	• To study construction, working and maintenance of solar cooker.
5	• Visit to plant of solar heating system for hotel/hostel/railway station etc.
6	• To study construction and working of horizontal axis wind mill or to visit a nearest wind farm.
7	• To visit a biomass/ biogas plant of municipal waste or else where.
8	• Perform energy audit for workshop/Office/Home/SSI unit.
9	• Study of various waste heat recovery devices.

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (**CAD-CAM & AUTOMATION (ELECTIVE – II)**)	
Course code: ME/AE/MH/MI/PG/PT	**Semester : SIXTH FOR ME/AE/PG/PT AND SEVENTH FOR MH/MI**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit:	

Aim :-

S.No	
1.	To study quality & precision oriented shorter manufacturing cycle time with the use of CAD/CAM technology

Objective :-

S.No	Student should be able to:
1.	• Understand the fundamentals & use CAD.
2.	• Conceptualize drafting and modeling in CAD.
3.	• Prepare CNC part programming.
4.	• Operate CNC machines.
5.	• Conceptualize automation and FMS

Pre-Requisite:-

S.No	
1.	The prerequisites of this subject have been introduced in earlier subjects such as engineering graphics, engineering drawing & mechanical engineering drawing.

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to CAD/CAM** Computers in industrial manufacturing. Product Cycle, CAD/CAM CAD/CAM hardware:- basic structure, CPU, Memory, I/O devices, Storage devices and system configuration.	**06**	**10**
02	**Geometric Modelling** Requirement of geometric modelling, Types of geometric models. Geometric construction method-sweep, solid modelling- Primitives & Boolean operations, free formed surfaces (Classification of surface only) (No numerical treatment)	**10**	**14**
03	**Introduction to computer numerical Control** Introduction - NC, CNC, DNC, Advantages of CNC, The coordinate system in CNC, Motion control system - point to point, straight line, Continuous path	**05**	**08**

	(Contouring). Application of CNC.		
04	**Part programming** Fundamentals, manual part programming, NC –Words, Programming format, part programming, use of subroutines and do loops, computer aided part programming (APT).	**12**	**14**
05	**Industrial Robotics** Introduction, physical configuration, basic robot motions, technical features such as - work volume, precision and speed of movement, weight carrying capacity, drive system, End effectors, robot sensors. Application – Material transfer, machine loading, welding, spray coating, processing operation, assembly, inspection.	**09**	**14**
06	**Automation** Basic elements of automated system, advanced automation functions, levels of automation. Flexible manufacturing system :-Introduction, FMS equipment, FMS application, Introduction to CIM	**06**	**10**
	Total	**48**	**70**

Practical:

Skills to be developed:

Intellectual Skills:

1. Interpret the various features in the menu of solid modeling package.
2. Synthesize various parts or components in an assembly.
3. Prepare cnc programmes for various jobs.
4. Understand the concept of finite element method.
5. Prepare a report of visits.

Motor skills:

1. Operate a turning center and a machining center.
2. Operate and use solid modeling packages for drawing of assemblies.
3. Draw sketches of assemblies for converting into solid models.
4. Handle various tools used in cnc.

List of Practicals:

1. Two assignments on CAD for 2D drafting (Using AutoCAD)
2. Two assignments on CAD for 3D Modelling. (Using any 3-D Modelling software like CATIA, ProE, Sdidworks etc.)
3. Manufacturing one turning and one Milling component on CNC.
4. At least four assignments on part programming using subroutines do loops for turning and milling component.
5. Report writing on visit to industry having CNC machine.
6. Report writing on visit to industry having robot Application.
7. Report writing on visit to Industry having Automation in manufacturing.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
P.N.Rao	CAD/CAM Principles and Applications		Tata McGraw-Hill
RadhaKrishna P. & Subramanyam	CAD/CAM/CIM		Wiley EasternLtd

B.S.Pabla and M.Adithan	CNC Machine		New age International(P)Ltd
Groover M.P. & Zimmers Jr	Computer Aided design and manufacturing		Prentice hall of India
Reference books :			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
Lalit narayan,M. Rao	Computer Aided design and manufacturing		PHI
Suggested List of Laboratory Experiments :			
Suggested List of Assignments/Tutorial :			

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (**DESIGN OF MACHINE ELEMENTS**)	
Course code: ME/MH/MI	**Semester : SIXTH FOR ME AND SEVENTH FOR MH/MI**
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : 4 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 5	

Aim :-

S.No	
1.	To enable the student to design and draw simple machine components used in small and medium scale industries. Fundamental knowledge of Applied Mechanics, Strength of Materials, Engineering Materials and Theory of Machines is essential. To develop analytical abilities to give solutions to engineering design problems.

Objective :-

S.No	Students should be able to:
1.	• Analyze the various modes of failure of machine components under different load patterns.
2.	• Design and prepare part and assembly drawings.
3.	• Use design data books and different codes of design.
4.	• Select standard components with their specifications from manufacturer's catalogue.
5.	• Develop drawings on CAD software.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Introduction to Design** 1.1 Machine Design philosophy and Procedures 1.2 General Considerations in Machine Design 1.3 Fundamentals:- Types of loads, concepts of stress, Strain, Stress – Strain Diagram for Ductile and Brittle Materials, Types of Stresses such as Tension, Compression, Shear, Bearing pressure Intensity, Crushing, bending and torsion, Principle Stresses (Simple Numerical) 1.4 Creep strain and Creep Curve 1.5 Fatigue, S-N curve, Endurance Limit. 1.6 Factor of Safety and Factors governing selection of factor of Safety. 1.7 Stress Concentration – Causes & Remedies 1.8 Converting actual load or torque into design load or torque using design factors like velocity factor, factor of safety & service factor. 1.9 Properties of Engineering materials, Designation of materials as per IS and introduction to International standards & advantages of	**10**	**12**

	standardization, use of design data book, use of standards in design and preferred numbers series. 1.10 Theories of Elastic Failures – Principal normal stress theory, Maximum shear stress theory & maximum distortion energy theory.		
02	***Design of simple machine parts*** 1.11 Cotter Joint, Knuckle Joint, Turnbuckle 1.12 Design of Levers:- Hand/Foot Lever & Bell Crank Lever 1.13 Design of C – Clamp, Off-set links, Overhang Crank, Arm of Pulley	**08**	**10**
03	***Design of Shafts, Keys and Couplings and Spur Gears*** *1.14 Types of Shafts, Shaft materials, Standard Sizes, Design of Shafts (Hollow and Solid) using strength and rigidity criteria, ASME code of design for line shafts supported between bearings with one or two pulleys in between or one overhung pulley* 1.14 Design of Sunk Keys, Effect of Keyways on strength of shaft. 1.15 Design of Couplings – Muff Coupling, Protected type Flange Coupling, Bush-pin type flexible coupling. 1.16 Spur gear design considerations. Lewis equation for static beam strength of spur gear teeth. Power transmission capacity of spur gears in bending.	**12**	**14**
04	***Design of Power Screws*** 1.17 Thread Profiles used for power Screws, relative merits and demerits of each, Torque required to overcome thread friction, self locking and overhauling property, efficiency of power screws, types of stresses induced. 1.18 Design of Screw Jack, Toggle Jack.	**10**	**10**
05	***Design of springs*** 1.19 Classification and Applications of Springs, Spring – terminology, materials and specifications. 1.20 Stresses in springs, Wahl's correction factor, Deflection of springs, Energy stored in springs. 1.21 Design of Helical tension and compression springs subjected to uniform applied loads like I.C. engine valves, weighing balance, railway buffers and governor springs. 1.22 Leaf springs – construction and application	**07**	**07**
06	***Design of Fasteners*** 1.23 Stresses in Screwed fasteners, bolts of Uniform Strength. 1.24 Design of Bolted Joints subjected to eccentric loading. 1.25 Design of parallel and transverse fillet welds, axially loaded symmetrical section, Merits and demerits of screwed and welded joints	**07**	**09**
07	***Antifriction Bearings*** 1.26 Classification of Bearings – Sliding contact & rolling contact. 1.27 Terminology of Ball bearings – life load relationship, basic static load rating and basic dynamic load rating, limiting speed. Selection of ball bearings using manufacturer's catalogue.	**05**	**04**
08	***Ergonomics & Aesthetic consideration in design*** 1.28 Ergonomics of Design – Man –Machine relationship. Design of Equipment for control, environment & safety. 1.29 Aesthetic considerations regarding shape, size, color & surface finish.	**05**	**04**

	Total	**64**	**70**

Assignments:

Skills to be developed:

Intellectual skills:

1. Understand the basic philosophy and fundamentals of Machine Design.
2. Apply and use the basic knowledge of earlier subjects like mechanical Engineering. materials, strength of materials and theory of machines.
3. Analyse and evaluate the loads, forces, stresses involved in components and subassemblies and decide the dimensions.
4. Understand the modes of failures of m/c components and decide the design criteria and equations.
5. Understand the concept of standardization and selecting standard components.
6. Understand the methods of computer aided design practices.

Motor skills:

1. Draw the components assembly as per the designed dimensions.
2. Modify drawings and design as per requirement.
3. Use the different design software.
4. Use different design data books and IS codes.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
V.B.Bhandari	Introduction to Machine Design		Tata Mc- Graw Hill
R.K.Jain	Machine Design		Khanna Publication
Pandya & Shah	Machine design		Dhanpat Rai & Son
Joseph Edward Shigley	Mechanical Engg. Design		Mc- Graw Hill
PSG Coimbtore	Design Data Book		PSG Coimbtore
Abdulla Shariff	Hand Book of Properties of Engineering Materials & Design Data for Machine Elements		Dhanpat Rai & Sons
Hall, Holowenko, Laughlin	Theory and Problems of Machine Design		Mc- Graw Hill

1. IS/ International Codes

a) IS 4218: 1967 ISO Metric Threads
b) IS 2693: 1964 Cast Iron Flexible Couplings
c) IS 2292: 1963 Taper keys & Keyways
d) IS 2293: 1963 Gib Head Keys & Keyways
e) IS 2389: 1963 Bolts, Screws, Nuts & Lock Nuts
f) IS 4694: 1968 Square threads

g) IS 808: 1967 Structural Steel
h) SKF Catalogue for Bearings

2. SOFTWARE

1) Think 3 CAD Software developed by acebrain.
2) E-Yantra Software, developed by FEAST.

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Robert L.Mott,Jong Tang	Machine Elements in Mechanical Design		Pearson
Jack A. Collins, Henry R. Busby	Mechanical Design of Machine Elements and Machines		Willey Publications

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :

S.No	List of Assignments:
1	Assignment on selection of materials for given applications [at least five applications should be covered] using design data book. List the mechanical properties of material selected. **2 Hrs**
2	Problems on design of simple machine parts like Cotter Joint, Knuckle Joint, Bell Crank Lever, Turn Buckle, Off – Set link, Arm of Pulley (One example on each component) with free hand sketches. **6 Hrs**
3	Design Project No. 1 Observe the system where transmission of power takes place through shaft, Keys, coupling, pulley and belt drive. Get the required information regarding power transmitted (power output by motor or engine etc.). By selecting suitable materials, design the shaft, key and coupling. Also select suitable Ball Bearing from Manufacture's catalogue. Prepare design report and assembly drawing indicating overall dimensions, tolerances, and surface finish. Also prepare bill of materials. (Activity should be completed in a group of five to six students) **6 Hrs**
4	Design Project No. 2 Observe the System where transmission of power takes place through power Screws. (e.g. Lead screw of lathe, feed screws of machine tools, Clamping screws, Toggle Jack screw, etc.) Get the required information regarding effort, clamping force, etc., and selecting suitable materials design screw, nut and different simple components in assembly. Prepare design report and assembly drawing indicating overall dimensions, tolerances and surface finish. Also prepare bill of materials. (Activity should be completed in a group of five to six students) **4 Hrs**
5	Assignments on design of Helical Springs, Screwed joints, Welded joints [one each] with free hand sketches. **2 Hrs**
6	CAD Drawing for project No 1 or 2 should be prepared in practical and print out should be attached along with respective drawing sheets **8 Hrs**
7	Survey of Prime movers – Electric motors / I.C. Engines available in the market along with specifications suitable for your design project. Survey report should be prepared with the relevant catalogue. **4 Hrs**

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (INDUSTRIAL FLUID POWER)	
Course code: ME/MH/MI/PG/PT	**Semester : SIXTH FOR ME/PG/PT AND SEVENTH FOR MH/MI**
Duration :	**Maximum Marks : 150**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	Use of Oil Hydraulic systems & pneumatic systems all fields of engineering as clean source of motive power and. Low cost automation with the use of Pneumatic systems

Objective :-

S.No	The student will be able to.
1.	• Identify various components of hydraulic & pneumatic systems.
2.	• Know the working principle of various components used for hydraulic & pneumatic systems.
3.	• Select appropriate components required for simple hydraulic and pneumatic circuits.
4.	• List probable causes of faults or defects in the components of hydraulic & pneumatic circuits.

Pre-Requisite:-

S.No	
1.	Knowledge of Fundamentals of fluid power (hydraulic and pneumatic) and its components as well as principles, functions and terminology

Contents		Hrs/week	
Chapter	**Name of the topic**	**Hours**	**Marks**
01	**Introduction to oil hydraulic systems** 1.1 Practical applications of hydraulic systems. 1.2 General layout of oil hydraulic systems. 1.3 Merits and limitations of oil hydraulic systems.	**03**	**04**
02	**Components of Hydraulic systems** 2.1 Pumps – Vane pump, gear pump, Gerotor pump, screw pump, piston pump 2.2 Valves – Construction, working and symbols of Pressure control valves – pressure relief valve, pressure reducing, pressure unloading Direction control valves – Poppet valve, spool valve, 3/2, 4/2 D.C. valves, Sequence valves. Flow control valves – pressure compensated, non pressure	**22**	**08** **08**

	compensated flow control valve. 2.3 Actuators- Construction, working and symbols of Rotary Actuators - Hydraulic motors Linear Actuators – Cylinders - single acting, double acting. 2.4 Accessories – Pipes, Hoses, fittings, Oil filters, Seals and gaskets, Accumulators. (Types, construction, working principle and symbols of all components)		**04** **06**
03	**Hydraulic Circuits** 3.1 Meter in, Meter out circuits 3.2 Bleed off circuit 3.3 Sequencing circuit 3.4 Hydraulic circuits for Milling machine, Shaper machine, Motion synchronization circuit.	**07**	**06**
04	**Introduction to pneumatic Systems** 4.1 Applications of pneumatic system 4.2 General layout of pneumatic system 4.3 Merits and limitations of pneumatic systems	**04**	**06**
05	**Components of pneumatic system** 5.1 Compressor **–** Reciprocating & Rotary compressors. 5.2 Control Valves – Pressure regulating valves, Flow Control valves, Direction Control Valves.	**22**	**04** **06**
	5.3 Actuators – Rotary - Air motors, Types, construction, working principle Linear- Cylinders- Types, construction & working principle 5.4 Accessories – Pipes, Hoses, Fittings, FRL unit (Types, construction, working principle and symbols of all components)		**06** **06**
06	Pneumatic Circuits Speed control circuits. Sequencing circuits.	**06**	**06**
	Total	**64**	**70**

Practical:

Skills to be developed:

Intellectual skills:

1. Prepare simple hydraulic & pneumatic circuits.
2. Compare the performance of hydraulic & pneumatic systems.
3. Identify the faults & suggest remedies in hydraulic & pneumatic circuits.
4. Select proper circuit considering its application

Motor skills:

1. Connect different components as per given drawing
2. Perform repairing and replacement of defective components in the circuit
3. Draw the hydraulic and pneumatic circuits using symbols

List of Practical:

1) Demonstration of meter in and meter out circuit.
2) Demonstration of sequencing circuit.
3) Demonstration of hydraulic circuit for shaper machine.
4) Demonstration of pneumatic circuit for speed control of double acting cylinders.
5) Demonstration of pneumatic circuit for speed control of pneumatic motor.
6) Study of trouble shooting procedures of various hydraulic and pneumatic circuits.
7) Selection of circuit components for simple hydraulic and pneumatic circuits.

Mini Projects:

1) Survey of oil used for hydraulic circuits -specifications, manufacturer's names, costs etc.
2) Study of any one mobile hydraulic system like in earth moving equipments and its detailed report.

OR

Study of any one stationary hydraulic system, like in any machine tool and its detailed report.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Pippenger Hicks	Industrial Hydraulics		McGraw Hill International
Majumdar S.R	Oil Hydraulic system-Principle and maintenance		Tata McGraw Hill
Majumdar S.R	Pneumatics Systems Principles and Maintenance		Tata McGraw Hill
Stewart	Hydraulics and Pneumatics		Taraporewala Publication

2. Catalogues:

Various system components' manufacturers' Catalogues.

3. CDs:

CDs developed by various system components' manufacturers.

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Charles Hedges	Industrial fluid power	1984	Womack Educational Publications
Peter Rhoner	Industrial hydraulic control	1987	Prentice Hall

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil	

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (INDUSTRIAL PROJECT)	
Course code: ME/MH/MI/AE/PG/PT	**Semester : SIXTH FOR ME/AE/PG/PT AND SEVENTH FOR MH/MI**
Duration :	**Maximum Marks : 100**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 6 hrs/week	End Semester Exam: Marks
Credit: 3	

Aim :-

S.No	
1.	To solve the problems involving drawings, designs, manufacturing, installation, testing and maintenance of machines. In order to cultivate the systematic methodology for problem solving using acquired technical knowledge & skills, and to enhance the generic skills & professional skills.

Objective :-

S.No	The student will be able to-
1.	• Identify, analyze & define the problem.
2.	• Generate alternative solutions to the problem identified.
3.	• Compare & select feasible solutions from alternatives generated.
4.	• Design, develop, manufacture & operate equipment/program.
5.	• Acquire higher-level technical knowledge by studying recent development in mechanical engineering field.
6.	• Compare machines/devices/apparatus for performance practices.
7.	• Work effectively in a team.

Pre-Requisite:-Nil

Contents	Hrs/week

Contents:

Part A-Project

A batch of maximum 4 students will select a problem and then plan, organize & execute the project work of solving the problem in a specified duration. Student is expected to apply the knowledge & skills acquired. Batch may select any one problem/project work from following categories.

a) Fabrication of small machine / devices/ test rigs/ material handling devices/ jig & fixtures/ demonstration models, etc. Report involving aspects of drawing, process sheets, costing, Installation, commissioning & testing should be prepared and submitted.

b) Design & fabrication of mechanisms, machines, Devices, etc. Report involving aspects of designing & fabricating should be prepared & submitted .

c) Development of computer program for designing and /or drawing of machine components, Simulation of movement & operation, 3D modeling, pick & place robots etc.

d) Industry sponsored projects- project related with solving the problems identified by industry should be selected. One person / engineer from industry is expected to work as co- guide along with guide from institution.

e) Literature survey based projects: Project related with collection tabulation, classification, analysis & presentation of the information. Topic selected must be related with latest technological developments in mechanical or mechatronics field, and should not be a part of diploma curriculum. Report should be of min 60 pages.

f) Investigative projects- Project related with investigations of causes for change in performance or structure of machine or component under different constraints through experimentation and data analysis.

g) Maintenance based projects: The institute may have some machine/ equipment/ system which are lying idle due to lack of maintenance. Students may select the specific machines/equipment/system. Overhaul it, repair it and bring it to working condition. The systematic procedure for maintenance to be followed and the report of the activity are submitted.

h) Industrial engineering based project: Project based on work study, method study, methods improvement, leading to productivity improvement, data collection, data analysis and data interpretation be undertaken.

i) Low cost automation projects: Project based on hydraulic/pneumatic circuits resulting into low cost automated equipment useful in the identified areas.

j) Innovative/ Creative projects – Projects related with design, develop & implementation of new concept for some identified useful activity using PLC, robotics, non-conventional energy sources, CIM , mechatronics, etc.

k) Environmental management systems projects: Projects related with pollution control, Solid waste management, liquid waste management, Industrial hygiene, etc, Working model or case study should be undertaken.

l) Market research/ survey based projects: Projected related with identification of extent of demand, sales forecasting, Comparative study of marketing strategies, Comparative study of channels of distribution, Impact of variables on sales volume, etc. The project involves extensive survey & market research activities information to be collected through various mechanisms/tools & report is prepared.

m) Project based on use of appropriate technology particularly benefiting rural society or economically weaker section.

n) Project can be selected other than the area specified above. Project should provide viable and feasible solution to the problem identified. Report should be of min 50 pages.

Part B- Seminar

Every student will prepare & deliver the seminar. Evaluation of seminar will be carried out by panel of at least

three teaching staff from mechanical/ production /automobile department.

1. Selection of topic for the seminar should be finalized in consultation with teacher guide allotted for the batch to which student belongs.
2. Seminar report should be of min.10 & max. 20 pages & it should be certified by guide teacher and head of the department
3. for presentation of seminar, following guide lines are expected to be followed:-
   a) Time for presentation of seminar: 7 to 10 minutes /student.
   b) Time for question/answer : 2 to 3 minutes /student
   c) Evaluation of seminar should be as follows:-
   Presentation: 15 marks
   Use of A. V. aids: 05 marks
   Question /answer: 05 marks
   Total: 25 marks
   d) use of audio visual aids or power point presentation is desirable.
4. Topic of the seminar should not be from diploma curriculum
5. Seminar can be on project selected by batch.

Skills To Be Developed:

Intellectual Skills

1. Design the related machine components & mechanism.
2. Convert innovative or creative idea into reality.
3. Understand & interpret drawings & mechanisms
4. Select the viable, feasible & optimum alternative from different alternatives.

Motors skills

1. Use of skills learnt in workshop practical.
2. Assemble parts or components to form machine or mechanisms.
3. Classify & analyze the information collected.
4. Implement the solution of problem effectively.

Notes: 1) Project group size: Maximum 4 students
2) Project report will be of minimum 40 pages unless otherwise specified.
3) Project diary should be maintained by each student.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Karl Smith	Project management & team work		Tata- Mc Graw Hill
Cliffored gray & Erik Lasson	Project management		Tata- Mc Graw Hill

Reference books :- Nil			
Suggested List of Laboratory Experiments : - Nil			
S.No			
Suggested List of Assignments/Tutorial :- Nil			

2. Magazines:

1. Invention intelligence magazine
2. Popular mechanics Journals/ Magazines

Name of the Course : DIPLOMA IN PRODUCTION ENGINEERING / TECHNOLOGY (MANAGEMENT)	
Course code: EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/ AE/CE/CS/CR/CO/ CM/IF/EE/EP/CH/CT/PS/CD/ED/EI/CV/FE/IU/ MH/MI/TX	**Semester : SIXTH FOR EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT /AE/CE/ CS/CR/CO/CM/IF/EE/EP/CH/CT/PS /TX AND SEVENTH FOR MH / MI/CD/ED/EI/ CV/FE/IU**
Duration :	**Maximum Marks : 100**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit: 3	

Aim :-

S.No	
1.	To study the techniques for improvement in productivity of the people and equipment. to plan the production schedule accordingly organize material supply for the manufacturing activities. To minimize the direct and indirect cost by optimizing the use of resources available. To learn accounting process, inventory control and process planning. Modern manufacturing system employ techniques such as JIT, TPM , FMS, 5'S', kaizen which should be known to the technician.

Objective :-

S.No	The students will able to:
1.	• Familiarize environment in the world of work
2.	• Explain the importance of management process in Business.
3.	• Identify various components of management.
4.	• Describe Role & Responsibilities of a Technician in an Organizational Structure.
5.	• Apply various rules and regulations concerned with Business & Social Responsibilities of the Technician.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter No.	**Name of the Topics**	**Hours**	**Marks**
01	**Overview Of Business** 1.1. Types of Business • Service • Manufacturing • Trade 1.2. Industrial sectors Introduction to • Engineering industry	**02**	02

	• Process industry • Textile industry • Chemical industry • Agro industry 1.3 Globalization • Introduction • Advantages & disadvantages w.r.t. India 1.4 Intellectual Property Rights (I.P.R.)		
02	**Management Process** 2.1 What is Management? • Evolution • Various definitions • Concept of management • Levels of management • Administration & management • Scientific management by F.W.Taylor 2.2 Principles of Management (14 principles of Henry Fayol) 2.3 Functions of Management • Planning • Organizing • Directing • Controlling	**07**	**10**
03	**Organizational Management** 3.1 Organization :- • Definition • Steps in organization 3.2 Types of organization • Line • Line & staff • Functional • Project 3.3 Departmentation • Centralized & Decentralized • Authority & Responsibility • Span of Control 3.4 Forms of ownership • Propriotership • Partnership • Joint stock • Co-operative Society • Govt. Sector	**07**	**10**
04	**Human Resource Management** 4.1 Personnel Management • Introduction • Definition • Functions 4.2 Staffing • Introduction to HR Planning	**08**	**14**

	• Recruitment Procedure 4.3 Personnel– Training & Development • Types of training ➢ Induction ➢ Skill Enhancement 4.4 Leadership & Motivation • Maslow's Theory of Motivation 4.5 Safety Management • Causes of accident • Safety precautions 4.6 Introduction to – • Factory Act • ESI Act • Workmen Compensation Act • Industrial Dispute Act		
05	**Financial Management** 5.1. Financial Management- Objectives & Functions 5.2. Capital Generation & Management • Types of Capitals • Sources of raising Capital 5.3. Budgets and accounts • Types of Budgets ➢ Production Budget (including Variance Report) ➢ Labour Budget • Introduction to Profit & Loss Account (only concepts) ; Balance Sheet 5.4 Introduction to – • Excise Tax • Service Tax • Income Tax • VAT • Custom Duty	**08**	**14**
06	**Materials Management** 6.1. Inventory Management (No Numerical) • Meaning & Objectives 6.2 ABC Analysis 6.3 Economic Order Quantity • Introduction & Graphical Representation 6.4 Purchase Procedure • Objects of Purchasing • Functions of Purchase Dept. • Steps in Purchasing 6.5 Modern Techniques of Material Management • Introductory treatment to JIT / SAP / ERP	**08**	**14**
07	**Project Management** (No Numerical) 7.1 Project Management • Introduction & Meaning • Introduction to CPM & PERT Technique	**08**	**06**

	• Concept of Break Even Analysis 7.2 Quality Management • Definition of Quality , concept of Quality , Quality Circle, Quality Assurance • Introduction to TQM, Kaizen, 5 'S', & 6 Sigma		
	TOTAL	**48**	**70**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Dr. O.P. Khanna	Industrial Engg & Management		Dhanpal Rai & sons New Delhi
Dr. S.C. Saksena	Business Administration & Management		Sahitya Bhavan Agra
W.H. Newman E.Kirby Warren Andrew R. McGill	The process of Management		Prentice- Hall
Rustom S. Davar	Industrial Management		Khanna Publication
Banga & Sharma	Industrial Organisation & Management		Khanna Publication
Jhamb & Bokil	Industrial Management		Everest Publication , Pune

Reference books :- Nil

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA INMECHANICAL ENGINEERING (MATERIAL HANDLING SYSTEM (ELECTIVE II))			
Course code: ME/MH/MI		**Semester : SIXTH FOR ME AND SEVENTH FOR MH/MI**	
Duration :		**Maximum Marks : 100**	
Teaching Scheme		**Examination Scheme**	
Theory : 3 hrs/week		Mid Semester Exam: Marks	
Tutorial: hrs/week		Assignment & Quiz: Marks	
Practical : 2 hrs/week		End Semester Exam: Marks	
Credit: 4			
Aim :-			
S.No			
1.	To know the operational features of the material handling equipment & its practical application, carrying parts & products in a shop from one work station to another and from shop to another shop or taking care of stockpiling and reclaiming operations, material handling equipment/systems enable the process to go on without interruptions & at a predetermined space. To understand, select, operate and maintain the material handling equipments.		
Objective :-			
S.No	The student will be able to.		
1.	• Understand constructional & operational features of various materials handling systems.		
2.	• Identify, compare & select proper material handling equipment for specified applications.		
3.	• Know the controls & safety measures incorporated on material handling equipment.		
4.	• Understand different material handling processes used in industries.		
5.	• Appreciate the role of material handling devices in mechanization & automation of industrial process.		
Pre-Requisite:-Nil			
Contents **Notes:** 1) Design aspects of material handling equipment are to be ignored. 2) No derivations & mathematical treatment.		Hrs/week	
Chapter	**Name of topic**	**Hours**	**Marks**
01	Introduction to Material Handling System Main types of material handling equipments & their applications, types of load to be handled, types of movements, methods of stacking, loading & unloading systems, principles of material handling systems.	**04**	**06**
02	Hoisting Machinery & Equipments 2.1 Construction, working & maintenance of different types of hoists such as lever operated hoist , portable hand chain hoist, differential hoists, worm geared and spur geared hoists, electric & pneumatic hoists, jumper. 2.2 Construction, working & maintenance of different types of cranes such	**12**	**18**

	as rotary cranes, trackless cranes, mobile cranes, bridge cranes, cable cranes, floating cranes & cranes traveling on guide rails. 2.3 Construction, working & maintenance of elevating equipments such as stackers, industrial lifts, freight elevators, passenger lifts, and mast type's elevators, vertical skip hoist elevators.		
03	Conveying Machinery 3.1 Construction, working & maintenance of traction type conveyors such as belt conveyors, chain conveyors, bucket elevators, escalators. 3.2 Construction, working & maintenance of traction less type conveyors such as gravity type conveyors, vibrating & oscillating conveyors, screw conveyors, pneumatic & hydraulic conveyors, hoppers gates & feeders.	**06**	**08**
04	Surface Transportation Equipment 4.1 Construction, function, working of trackless equipment such as hand operated trucks, powered trucks, tractors, AGV- Automatic Guided vehicle, industrial Trailers. 4.2 Construction, function, working of cross handling equipment such as winches, capstans, Turntables, Transfer tables, monorail conveyors.	**08**	**10**
05	Components of material handling systems 5.1 Flexible hoisting appliances such as welded load chains, roller chains, hemp ropes, steel wire ropes, fastening methods of wire & chains, eye bolts ,lifting tackles lifting & rigging practices. 5.2 Load handling attachments. a)Various types of hooks-forged, triangular eye hooks, appliances for suspending hooks, b) Crane grab for unit & piece loads c) Electric lifting magnet, vacuum lifter. d) Grabbing attachment for loose materials e) Crane attachment for handling liquids / molten metals 5.3 : Arresting gear & Brakes. a) Arresting gear – construction & working b) Construction & use of electromagnetic shoe brakes Thruster operated shoe brakes, control brakes.	**08**	**10**
06	Mechanism used in material handling equipment 6.1 Steady state motion, starting & stopping of motion in following mechanisms. Hoisting mechanism - Lifting Mechanism - Traveling Mechanism - Slewing Mechanism **- Rope & chain operated Cross- Traverse Mechanism.**	**06**	**10**
07	Selection of material handling equipment Factors affecting choice of material handling equipment such as type of loads, hourly capacity of the unit, direction & length of travel, methods of stocking at initial, final & intermediate points, nature of production process involved, specific load conditions & economics of material handling system.	**04**	**08**
	Total	**48**	**70**
Practical: Skills to be developed:			

Intellectual Skills

2- Understand the working principle of equipment/devices.
3- Identify & name major component of material handling device.
4- Understand role of material handling equipment in the industrial process.
5- Understand & appreciate safety instrumentation for equipment.

Motors skills

1) Identify & select the material handling devices for a given application.
2) Operate the working model of material handling equipment.
3) Ability to implement preventive maintenance schedule of material handling devices.

List of Practical:

1) Study & demonstration of any one type of conveyor – belt, Screw, pneumatic, hydraulic.

2) Study and demonstration of any one type of crane (working model or actual).

3) Study and demonstration of fork lift truck (using electric drive or diesel engine) Or hoisting equipment.

4) Study of preventive maintenance schedule of any one major material handling equipment using operation manual.

5) Visit to coal handling plant of thermal power plant or cement industry to observe working of different types of bulk material handling devices (at least three equipments). Write report of the visit.

OR

Visit to steel industry or automobile manufacturing unit or sugar industry to observe different types of roller conveyors, Bucket elevators, overhead cranes load handling attachments, electric lifting magnet (at least 3 equipments). Write report of the visit

List of Practice Oriented Projects:

Note: Select any one mini project from following and submit report of the same (min. 5 pages)

1. Collect and write detail specifications of any two major material handling devices.

2. Collect and write information about manufacturer, Cost, Capacity range, availability, application of any one material handling equipment from the following.

   a) Hoisting equipment.
   b) Conveying equipment.
   c) Surface transportation equipment.

3. Collect photographs of ten different types of cranes used in industries. Write name and specific utility of each.

4. Collect photographs of ten different types of conveyers used in industries. Write name and specific utility of

each

5. Write name of material handling devices and their utility after visiting any big industry near by area
6. Using internet collects and writes information about six major manufacturer of material handling equipment
7. Write report about testing of overhead crane for its lifting capacity.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N. Rundenko	Material handling equipment		Peace Publisher, Moscow
M. P. Alexandrov	Material handling equipment		MIR Publisher, Moscow
Y. I. Oberman	Material handling		MIR Publisher, Moscow
R. B. Chowdary & G. R. N. Tagore	Material handling equipment		Khanna Publisher, Delhi
Allegri T. H.	Material handling (Principles & Practice)		CBS Publisher, Delhi
Apple j. M	Plant layout & materials handling		JohnWiley Publishers.
Bolz and others	Material handling Hand book		--
Daylas R. W. Pergaman, Berlin	Encyclopedia of materials handling		--
Immer J. R.	Material handling		Mc Graw Hill, New York
Parameswaran M. A.	Material handling equipment		C.D.C. in Mechanical Engg., I.I.T., Chennai

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Roy V. Wright, John G. Little, Robert C. Augur	Material Handling Cyclopedia		Kessinger Publishing
Matthew P. Stephens	Manufacturing facilities design and material handling		

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (PRODUCTION TECHNOLOGY)	
Course code: ME/MH/MI/PG/PT	**Semester : SIXTH FOR ME/PG/PT AND SEVENTH FOR MH/MI**
Duration :	**Maximum Marks :**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : hrs/week	End Semester Exam: Marks
Credit:	

Aim :-

S.No	
1.	To study the techniques for improvement in productivity of the people and equipment. to plan the production schedule accordingly organize material supply for the manufacturing activities. To minimize the direct and indirect cost by optimizing the use of resources available. To learn accounting process, inventory control and process planning. Modern manufacturing system employ techniques such as JIT, TPM , FMS, 5'S', kaizen which should be known to the technician.
.	

Objective :-

S.No	Students will be able to;
1.	• Understand importance of productivity and factors for improvement of productivity.
2.	• Know different production systems and modern trends in manufacturing systems.
3.	• Find the break even point for manufacturing a product.
4.	• Prepare / modify layout of production system.
5.	• Select suitable material handling devices and plant facilities.
6.	• Prepare process plan and specify toolings for it.
7.	• Prepare process chart for analysis of existing process.
8.	• Use pert & cpm techniques for scheduling and controlling the manufacturing activities.
9.	• Apply techniques of method study and work measurement for improvement of existing manufacturing methods.
10.	• Find the economic order quantity (eoq) for given situation.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Production System** **Production -** Definition , Types of production systems **Productivity -** Importance , Measurement of Productivity , Techniques of improving productivity	**06**	**06**

	Elements of cost- Fixed cost, Variable Cost. Break even analysis, Calculation of Break even point.		
02	**Plant location, Plant layout and Material Handling** **Plant Location -** Importance of Site Selection, Factors affecting Site Selection, Government Policies, and relaxation for Backward Areas. **Plant Layout -** Objectives, types, design principles, characteristics of Plant Layout, Symptoms of Bad Plant Layout. Group technology , Cellular layout, **Material handling –** Need, Principles and Types of material handling devices – conveyors , Hoist & cranes , forklift truck, trolleys, Pipes, Automated Guided Vehicles (AGV's) Selection of Material Handling systems and Devices.	**08**	**08**
03	**Process Planning** Planning of Processes from raw material to finished product, Factors affecting Process Planning, Deciding sequence of operations, Operation Sheet, Combined operations, Determination of Inspection Stages. Selection of Machine Techniques of assembly planning, Types of assembly. Plant Capacity, Machine Capacity, Plant Efficiency. Numerical not to be asked,	**08**	**08**
04	**Production Planning and Control** Routing, Sequencing [n job 2 machines], Scheduling, Dispatching, Meaning of Control, Progressive Control, Gantt chart. Concept of Line balancing,	**05**	**06**
05	**Work Study** **Method Study-** Objectives, Procedure, Selection of work. Recording Techniques - Process Charts – Outline process chart, Flow process chart, Two Hand process chart, Multiple activity chart, Flow diagram, String diagram, Travel chart. **Micro motion study-**Critical Examination, Principles of Motion Economy. Concept of ergonomics and workplace layout. **Work Measurement -** Objectives, procedure , Time Study, Time Study Equipments. Stop Watch Time Study, Standard Time, Work Sampling, Analytical Estimating, Predetermined Motion Time Study, Allowances, Calculation of Standard Time, Concept of Merit Rating.	**14**	**14**
06	**Inventory Control** Methods of Inventory Management, Inventory Cost relationship, Deciding Economic Batch Quantity, EOQ Model, Calculation of EOQ, Concepts of discounts. Introduction of Material Requirement Planning, Stores Function – Storage systems – One bin , Two bin system, Material issue request (MIR), bin card.	**09**	**12**
07	**Jigs and Fixtures** Introduction. Difference between jig and fixture Different components of Jig/ fixture 3-2-1 principle of location. Types of locators and clamping devices. General principles of jig/fixture design. Types of jigs and fixtures**.**	**06**	**06**

08	**Modern Trends** Just In Time manufacturing – Pull and push types of manufacturing systems, Waste reduction, 5'S', inventory reduction, single piece production systems. Concept of continuous improvement (Kaizen) – DMIAC cycle, Brain storming. Poka Yoke. Concept of Rapid Prototyping Concept of Flexible manufacturing system	**08**	**10**
	Total	**64**	**70**

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
L.C. Jhamb	Industrial Management		Everest
James C. Rigs	Production System, Planning, Analysis & Control		N.Y.Wiley & Sons
O.P. Khanna	Industrial Engineering and Management		Dhanpat Rai & Sons
ILO	Work Study		ILO Geneva
P. H. Joshi	Jigs & Fixtures		--
P.C. Sharma	Production Engineering		--
Kempster	Introduction to Jigs and Fixtures Design		--
Baffna , Sarin	Modern Production and Operations Management		--
Terry Wireman	Total productive maintenance		Industrial press inc.
Taiichi ohno	Toyota production system		Productivity Press

Reference books :Nil

Suggested List of Laboratory Experiments : - Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (**PROFESSIONAL PRACTICES - VI**)		
Course code: ME/MH/MI/PG/PT		**Semester :** SIXTH FOR ME/PG/PT AND SEVENTH FOR MH/MI
Duration :		**Maximum Marks : 50**
Teaching Scheme		**Examination Scheme**
Theory : hrs/week		Mid Semester Exam: Marks
Tutorial: hrs/week		Assignment & Quiz: Marks
Practical : 4 hrs/week		End Semester Exam: Marks
Credit: 2		
Aim :-		
S.No		
1.	To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.	
Objective :-		
S.No	Student will be able to:	
1.	• Acquire information from different sources.	
2.	• Prepare notes for given topic.	
3.	• Present given topic in a seminar.	
4.	• Interact with peers to share thoughts.	
5.	• Prepare a report on industrial visit, expert lecture.	
Pre-Requisite:-Nil		
Contents		Hrs/week

Serial No.	Activities	Hours
01	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. **Two** industrial visits may be arranged in the following areas / industries to observe - Material Handling System, quality control charts / production record / layout flow systems / Facilities / Hydraulic & pneumatic systems / Working of Boilers and steam engineering applications. i) Auto / Electronic equipment manufacturing industry. ii) Cement / Sugar / Chemical / Textile / Steel rolling mills / extrusion industries. iii) Material handling in mines or ports. iv) Earth Moving Equipment Maintenance Shop.	**17**
02	*Lectures by Professional / Industrial Expert be organized from any of the following areas (four lectures of two hour duration) student shall submit the report on each lecture:* a) Battery and its charging system b) Electronic ignition system c) micro processor based instrumentation in Automobiles d) Earth moving machines. e) Tractors f) Excavators. g) Fork lift truck. h) Road- roller. i) Automated Guided Vehicles (AGV) j) Career opportunities in Service stations, Marketing, Surveyor, Insurance, R&D, call centers, CAD, NDT, Railways, Defense, Aeronautics, Marine, Software development, Information Technology k) Continuing education / Open university Programs, l) Air compressor technology 2) Tribological Aspects in automobiles / machine tools	**15**
03	**Group Discussion : (Two topics)** The students shall discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic for group discussions may be selected by the faculty members. Some of the suggested topics are i) Solar Vehicles / Electric Vehicles. ii) Auto Vehicles – Comparison. iii) Two stroke versus four stroke engines iv) Recycling of plastics and other waste material v) Attributes of product design vi) Creativity and innovativeness vii) Energy conservation in institutes viii) Value engineering ix) Revolution in communication technology x) Pneumatic tools and equipments xi) Wear mechanisms	**10**
	Student Activities : **The students in a group of 3 to 4 will perform ANY THREE of the following activities (other similar activities to be considered), and write a report as a part of term work.** **Activity :** i) Collecting internal communication forms. ii) Collecting Failure data for automobile / machines / equipments. iii) Study of Hydraulic system for any one application like – dumpers, Earth moving equipment, Auto service station.	**16**

	iv) Survey of oils used for hydraulic circuits – specifications, properties, costs, manufacturers names etc. v) Study any one type of CNC machining center and prepare report on tooling and tool holding devices vi) Using finite element method analyse stresses in a cantilever beam. Write all the steps involved with brief description. vii) For a given job write a sequence of operations performed by automated manufacturing system. Draw a block diagram of control system to perform above operations viii) Survey of types of bearings involving information about construction working principles, mounting, lubrication, materials, advantages, limitations and cost. ix) Prepare a trouble shooting chart for any refrigeration system and suggest remedial measures to avoid failures x) For a drilling or milling operations on a simple machine component, draw a jig or fixtures showing various features like locating clamping, fool proofing etc. xi) Compare non traditional methods on the basis of working principles, accuracy , MRR, Applications and limitations a) EBM b) PAM C)AJM d)WJM Xii) For a given job involving 3 to 4 operations suggest to prepare a report	
05	**Seminar :-** Seminar on any advanced technical topic to be presented by individual student in a batch of 20 students. A separate topic be selected by an individual student	**12**
	Total	**70**

Text Books:- Nil

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA IN MECHANICAL ENGINEERING (REFRIGERATION AND AIR CONDITIONING (ELECTIVE-II))	
Course code: ME/MH/MI	**Semester : SIXTH FOR ME AND SEVENTH FOR MH/MI**
Duration :	**Maximum Marks : 125**
Teaching Scheme	**Examination Scheme**
Theory : 3 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 4	

Aim :-

S.No	
1.	To study the processes, equipments, systems of Refrigeration and Air Conditioning with their functioning, maintenance, repairs and measures to meet the challenges of the near future in this area. The Knowledge of Thermal Engineering and Power Engineering is a prerequisite for this subject

Objective :-

S.No	The student should be able to: -
1.	• Describe types, working principles and construction of Refrigeration and Air Conditioning systems.
2.	• Calculate performance of refrigeration and air conditioning system.
3.	• Use various charts and tables used in refrigeration and air conditioning.
4.	• Enlist properties of refrigerants, their applications and effects on environment.
5.	• Identify various components and controls used in refrigeration and air conditioning.
6.	• Describe various air conditioning systems and their applications.
7.	• Estimate cooling and heating loads.
8.	• Identify and describe different components of air distribution system.

Pre-Requisite:-Nil

Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Basics of Refrigeration** 1.1 Definition of refrigeration. 1.2 Necessity of refrigeration 1.3 Methods of refrigeration:- Ice refrigeration Refrigeration by expansion of air Refrigeration by throttling of gas Vapour refrigeration system Steam jet refrigeration system	**06**	**08**

	Non conventional methods of refrigeration like Vortex tube, Pulse tube refrigeration, solar refrigeration 1.4 Concept of heat engine, heat pump and refrigerator. 1.5 Unit of refrigeration, C.O.P. and refrigerating effect. 1.6 Major application areas of R.A.C. like domestic, commercial and industrial.		
02	**Refrigeration Cycles** 2.1 Reversed Carnot Cycle and its representation on PV and TS diagram. 2.2 Air Refrigeration Cycles: - - Bell Coleman air refrigerator, it's representation on PV and TS diagram, types and applications like air craft refrigeration using simple air cooling system.. - (Simple numerical on Reversed Carnot cycle.) 2.3 Vapour Compression Cycle (V.C.C): - - principle, components, Representation on P-H and T-S diagram, effects of wet compression, dry compression, calculation of COP, Effect of superheating, under cooling, suction pressure and discharge pressure, Actual V.C.C., (simple numerical), Methods of improving COP (no description). - Introduction to multistage V.C.C., its necessity, advantages. 2.4 Vapour Absorption system : - - Principle, components and working of aqua- ammonia system (simple & practical) Li-Br Absorption System Electrolux Refrigeration System, Desirable properties of Refrigerant and absorbent used in Vapour Absorption System. Comparison of above Refrigeration Cycles.	**10**	**14**
03	**Refrigerants** 3.1 Classification of refrigerants. 3.2 Desirable properties of refrigerants. 3.3 Nomenclature of refrigerants. 3.4 Selection of refrigerant for specific applications. 3.5 Concept of Green House Effect, Ozone depletion, Global warming. 3.6 Eco-friendly refrigerants like R-134a, hydrocarbon refrigerants etc.	**04**	**06**
04	**Equipment selection** 4.1 Components of Vapour Compression Refrigeration System 4.1.1 Compressors: - Classification, Construction and working of open type, hermetic, centrifugal, rotary, screw and scroll compressor and their applications. 4.1.2 Condensers: - Classification, description of air cooled and water cooled condensers, comparison and applications - Evaporative condensers. 4.1.3 Expansion devices:	**10**	**14**

	- Types: - Capillary tube, automatic, thermostatic and their applications 4.1.4 Evaporators and chillers: - - Classification of evaporators Construction and working of Bare tube, Plate surface, finned, shell and tube, flooded and dry expansion evaporator - Capacity of evaporator and their applications - Classification of chillers - Construction and working of dry expansion Chillers and flooded chillers and their applications. 4.2 Selection criteria for Vapour compression refrigeration system components for the following applications: Water coolers, ice plants, cold storage, domestic refrigerator		
05	**Psychrometry** 5.1 Definition and necessity of air conditioning. 5.2 Properties of Air, Dalton's law of partial pressure 5.3 Psychrometric chart 5.4 Psychrometric processes, Bypass Factor, ADP, concept of SHF, RSHF, ERSHF, GSHF 5.5 Adiabatic mixing of Air streams 5.6 Simple numerical using Psychrometric chart 5.7 Equipments used for Air- conditioning like humidifier, dehumidifier, filter, heating and cooling coils.	**06**	**08**
06	**Comfort conditions and cooling load calculations** 6.1 Thermal exchange of body with environment 6.2 Factors affecting human comfort 6.3 Effective temp. and comfort chart 6.4 Components of cooling load- sensible heat gain and latent heat gain sources	**04**	**06**
07	**Air- conditioning systems** 7.1 Classification of A.C. systems 7.2 Industrial and commercial A.C. systems 7.3 Summer, winter and year round A.C. systems 7.4 Central and unitary A.C. systems 7.5 Application areas of A.C. systems	**04**	**08**
08	**Air distribution systems** 8.1 Duct systems: - - Closed perimeter system, extended plenum system, radial duct system, duct materials, requirement of duct materials, losses in ducts 8.2 Fans and Blowers: - - Types, working of fans and blowers 8.3 Air distribution outlets: - - Supply outlets, return outlets, grills, diffusers 8.4 Insulation: - - Purpose, properties of insulating material, types of insulating materials, methods of applying insulation.	**04**	**06**
	Total	**48**	**70**
Practical:			

Skills to be developed:

Intellectual skills:

1. Identify various components of refrigeration and air conditioning equipment
2. Analyse cooling load based on application.
3. Interpret psychometric chart to find various properties of air.
4. Observe working of test rigs and calculate coefficient of performance.

Motor skills:

1. Handle various tools used for refrigeration and air conditioning plant maintenance
2. Use of temperature, pressure, energy measuring devices
3. Draw the layout of central Air conditioning plant
4. Perform cooling load calculations for different air conditioning applications
5. Select and use of different types of insulating material and setting procedures for applying insulations

List of Practical:

1. Trial on water cooler test rig.
2. Trial on ice plant test rig.
3. Visit to cold storage
4. Demonstration of domestic refrigerator in View of construction, operation and controls used.
5. Demonstration of various controls like L.P./H.P. cut outs, thermostat, overload protector, solenoid valve used in RAC.
6. Identification of components of 'hermetically sealed compressor'.
7. Visit to repair and maintenance workshop in view of use of various tools and charging procedure.
8. Cooling load calculations for cabin, classrooms, laboratory, canteen and dairy plant, milk storage, small freezers (minimum one).
9. Trial on A.C. test rig.
10. Visit to central A.C. plant in view of ducting system, insulation system and Air distribution system (e.g. frozen food industry/ice- cream industry/mushroom plants/textile industries).
11. Trouble shooting of domestic refrigerator/window air- Conditioner.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
R.S.Khurmi	Refrigeration and Air Conditioning		S.Chand and Co
Arrora and Domkundwar	Refrigeration and Air Conditioning		Dhanpat Rai and Sons
Manohar Prasad	Refrigeration and Air Conditioning		New Age Publications
P.N.Ananthanarayanan	Refrigeration and Air Conditioning		Tata McGraw Hill
Roy Dossat	Principles of Refrigeration		Pearson Education
Edwin P. Anderson	Commercial Refrigeration		Taraporevala Sons & Co

2. IS/International Codes/Publications:

a) ISHRAE handbooks
b) Manohar Prasad: Refrigeration and Air Conditioning hand book, New Age Publications.

Reference books :

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Ahmadul Ameen	Refrigeration and Air Conditioning		Prentice Hall-India
C.P.Arora	Refrigeration and Air Conditioning		Tata McGraw Hill

Suggested List of Laboratory Experiments : Nil

Suggested List of Assignments/Tutorial : Nil
