MODEL CURRICULUM

FOR

POST SSC PROGRAMME

IN

DIPLOMA IN CHEMICAL 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
Credits :- Nil	
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 : **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
Credits :- 03	

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	2.1 Elasticity : Deforming force, Restoring force, Elastic and	03	06

GENERAL PROPERTIES OF MATTER	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 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,	03 04	06 08

	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.	04	08
Unit – 5 MODERN PHYSICS	**5.1 Photo electricity** Plank's hypothesis, properties of photons, photo electric effect, 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 03	08 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 : **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
Credits :- Nil	

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	06	14

	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 / 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,	04	10

	Asbestos, Cork. Mks: 04		
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 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	09	18
	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 : **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	
Credits :- Nil			
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	Marks
Unit -1 Chapter No.	**ALGEBRA** 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.	**01**	--
	1.2 PARTIAL FRACTION 1.2.1 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 1.3.1 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 1.3.3 Definition of a matrix of order m X n and types of	**12**	15

	matrices. 1.3.4 Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication. 1.3.5 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. 1.3.7 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.	**06**	**09**

	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. 3.2.4 Intersection of two lines. 3.2.5 Length of perpendicular from a point on the line and perpendicular distance between parallel lines.		
	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 : **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
Credits :- Nil	

Aim :- Nil

Objective :-

S.No	
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	Marks
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 grammar, structures and composition		Macmillan
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 : **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
Credits :- Nil	

Aim :- Nil

Objective :-

S.No	The student should be able to: -
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 2.3 To draw a hyperbola by: 2.3.1 Directrix and focus method	09

	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, epicycloid, 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	1. To develop ability to solve problems on geometrical constructions.	1. To develop ability to draw the geometrical constructions by computer.

dimensions 1.5 Draw one figure containing circle tangent, arc and dimensioning.		
2. Engineering curves & Loci of points - (1 Sheet) i) Three different curves are to be draw using any one method. ii) Draw locus of point on any one mechanism	1) To develop ability to differentiate between conic and curves. 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.	1. To develop ability to draw different types of curves.
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.	1. 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		New Age Publication

	and Graphics+ AutoCAD		
R. K. Dhawan	Engineering Drawing		S. Chand Co.
P. J. Shah	Engineering Drawing		---
K. R. Mohan	Engineering Graphics		Dhanpat Rai and Publication Co.

A) Video Cassettes / CD's

1. CD's prepared by MSBTE for Engineering Drawing

B) 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 : **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
Credits :- Nil	
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 Desktop	**3**

	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 : **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	
Credits :- Nil		
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 : **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
Credits :- Nil		
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 : **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
Credits :- Nil	

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 : **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
Credits :- Nil	

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:

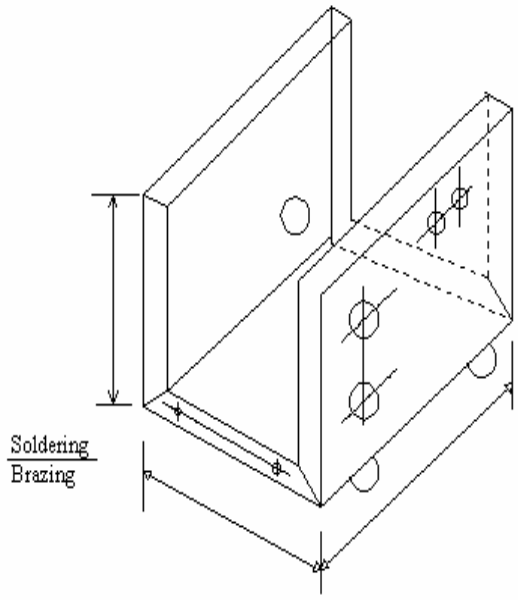
1. Ability to set tools, work piece, and machines for desired operations.
2. Ability to complete job as per job drawing in allotted time.
3. Ability to use safety equipment and follow safety procedures during operations.
4. Ability to inspect the job for confirming desired dimensions and shape.
5. Ability 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 rivetting. Such as Battery Eliminator Box or any other similar job

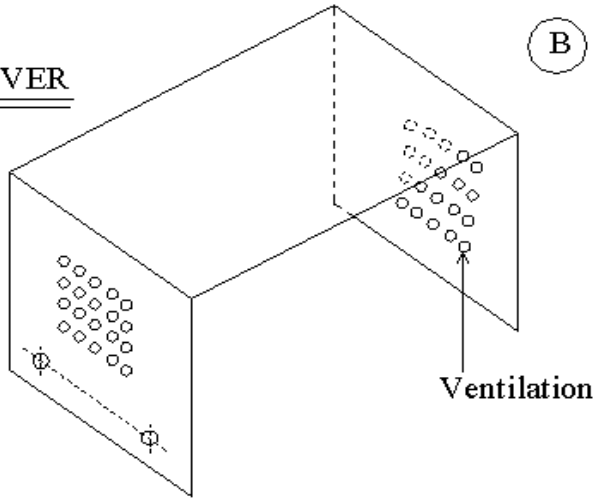
1) SHEET METAL WORK : BATTERY ELIMINATOR BOX

CHASSIS



A

COVER



MATERIAL : C R C A sheet 22/24 SWG

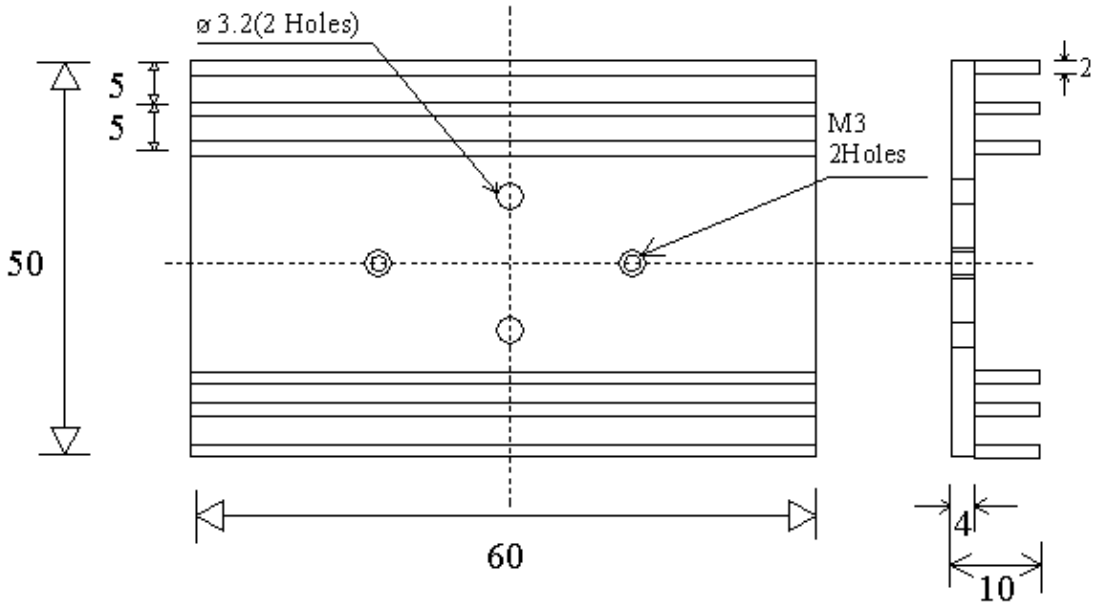
* TOOLS & EQUIPMENT:

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

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

18) Number Punch
19) Blow lamp
20) Soldering iron



2) Fitting Work: 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

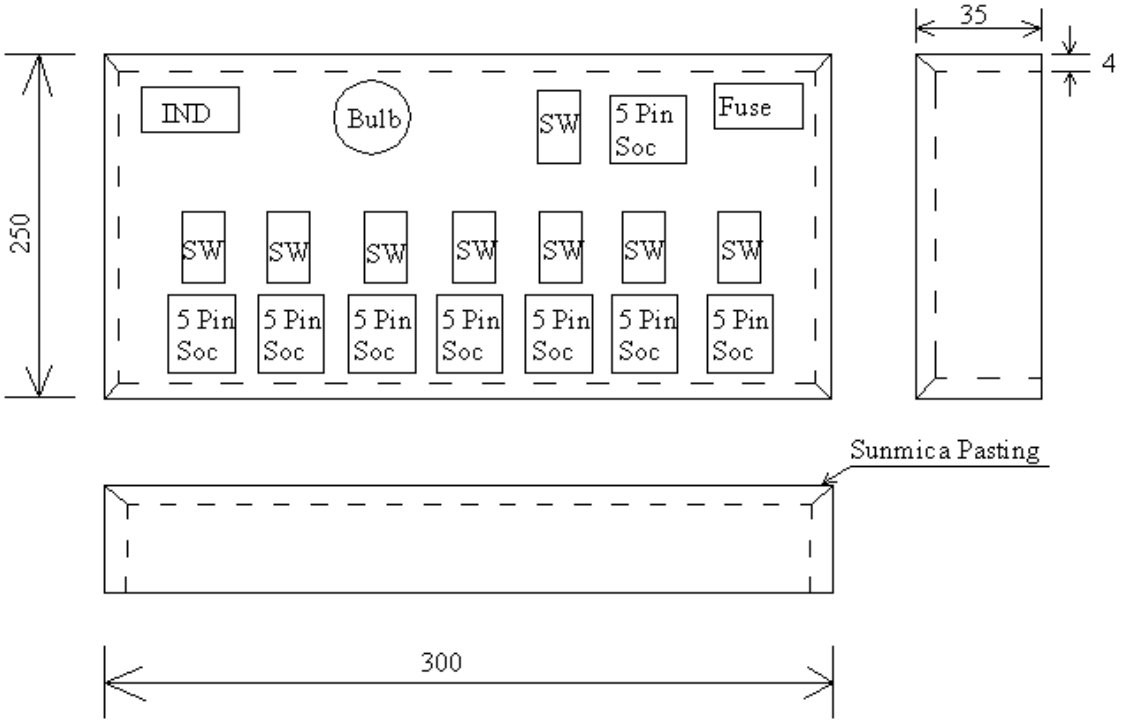
1) Steel Rule / Vernier caliper
2) Try square
3) Scriber
4) Bench Vice
5) Surface plate / with magnet block
6) Files, flat, square, Niddles
7) Marking Gauge
8) Marking Block / Height Gauge
9) Hacksaw frame
10) Center Punch
11) Hammer
12) Chisels Hat
13) Table Drill Machine (Bench)

SEQUENCE OF OPERATIONS

1) Marking
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

14) Drills
15) Tap & Tap wrenches
16) Number Punch

3) 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

SEQUENCE OF OPERATIONS

1) Measuring

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	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 : **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
Credits :- Nil	

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 : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 12 hrs/week		Mid Semester Exam: Marks	
Tutorial: 2 hrs/week		Assignment & Quiz: Marks	
Practical : 20 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
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			
S.No			

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,	02	08

	knowing the audience, structuring the message, selecting proper channels, minimizing barriers & facilitating feedback.		
Unit – 4	Non verbal- graphic communication: 4.1 Non- verbal codes: A- Kinesecs , B- Proxemics , C – Haptics 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	04	18
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			
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 : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 12 hrs/week		Mid Semester Exam: Marks	
Tutorial: 2 hrs/week		Assignment & Quiz: Marks	
Practical : 20 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
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) 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.	12	18

	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 Polytechnic		Pune Vidyarthi Griha Prakashan, 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 : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 12 hrs/week		Mid Semester Exam: Marks	
Tutorial: 2 hrs/week		Assignment & Quiz: Marks	
Practical : 20 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
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 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.	**12**	**15**

	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.	**08**	**10**

	centroid of composite figure. 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:** 5.1 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:

1) Verify law of polygon of forces
2) Verify law of moments
3) Verification of Lami's theorem
4) Forces in members of a jib crane.
5) Comparison of coefficient of friction of various pair of surfaces and
6) determination of angle of repose
7) Equilibrium of parallel forces – simply supported beam reactions.
8) 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 : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 12 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 20 hrs/week	End Semester Exam: Marks
Credits :- Nil	

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. 5.4 Section plane inclined to one reference plane and perpendicular to other.	03	10

Unit – 6	Developments of Surfaces. 6.1 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.
3. 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.
4. 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.
5. Section of solids Two problems on different solids. One problem, section plane inclined to HP and perpendicular to VP and in	1) To differentiate between true shape and apparent shape of section. 2) To interpret the positions of	1) To develop ability to draw sectional orthographic views of given solids, when it is cut by section plane in different

another problem, section plane inclined to VP and Perpendicular to HP. - (1 Sheet)	section plane with reference planes.	position with reference planes. 2) Ability to draw true shape of section.
6. Development of surfaces Any two problems on development of surfaces of different objects. - (1 Sheet)	1) Able to interpret the development of surfaces of different solids.	1) Ability to draw the development of surfaces of different objects in different shapes.
7. Free Hand Sketches Any six figures on different topics. - (1 Sheet)	1) 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 : **6 SEMESTERS**		Maximum Marks :
Teaching Scheme **C**		Examination Scheme
Theory : 12 hrs/week		Mid Semester Exam: Marks
Tutorial: 2 hrs/week		Assignment & Quiz: Marks
Practical : 20 hrs/week		End Semester Exam: Marks
Credits :- Nil		
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	Group Discussion : **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 : **6 SEMESTERS**	Maximum Marks :	
Teaching Scheme **C**	Examination Scheme	
Theory : 12 hrs/week	Mid Semester Exam: Marks	
Tutorial: 2 hrs/week	Assignment & Quiz: Marks	
Practical : 20 hrs/week	End Semester Exam: Marks	
Credits :- Nil		
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—	02

	Attitude, aptitude, assertiveness, self esteem, Confidence buildings. Concept of motivation.	
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 :- Nil

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 – (a) List down your daily activities. (b) Decide priorities to be given according to the urgency and importance of the activities. (c) 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 : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 12 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 20 hrs/week	End Semester Exam: Marks
Credits :- Nil	

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 Assignments/Tutorial :- Nil

Name of the Course : Mechanical Engineering Group (Applied Science (Mechanical))			
Course code: ME/PG/PT/AE/MH/FE		Semester : Second	
Duration : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 12 hrs/week		Mid Semester Exam: Marks	
Tutorial: 2 hrs/week		Assignment & Quiz: Marks	
Practical : 20 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
Aim :- Nil			
Objective :-			
S.No	The Student will be able to:		
1.	• Differentiate kinetic and kinematics and Solve 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	Marks
Unit -1 Unit -2	**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. 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	**14**	**15**

	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 Testing 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 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. 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

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, 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.	05	05

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 & Pour Point, Chemical Characteristics such as Acid Value or Neutralization Number, Emulsification, Saponification Value, Selection of Lubricants for Various Types of Machineries.	03	05
	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

Name of the Course : Mechanical Engineering and Technology (Development of Life Skills-II)	
Course code: ME / PG / PT / AE / FE / MI	Semester : THIRD
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 12 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 20 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :- Nil

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 : Theory		Hrs/week
Unit -1	**SOCIAL SKILLS** SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY.	**01**
Unit -2	Swot Analysis – Concept , How to make use of SWOT.	**01**
Unit - 3	**Inter personal Relation** Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	**02**
Unit – 4	**Problem Solving** **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	**02**

	II)Problem solving technique.(any one technique may be considered) 1) Trial and error, 2) Brain storming, 3) Lateral thinking	
Unit – 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**
Unit – 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**
Unit - 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**
Unit - 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:- Analyze 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	by Adair, J		Orient Longman

Solving			
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 Meditation	--		Sterling Publisher Pvt Ltd
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 : Diploma in Chemical Engineering (Industrial Chemistry)	
Course code: CH	Semester : Third
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 12 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 20 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• To develop the basic knowledge of organic compounds, their preparation, properties and uses.
2.	• Physical chemistry develops the understanding of physical principals of chemical systems.
3.	• It lays foundation for the understanding other chemical engineering subjects.

Objective :-

S.No	The student will be able to.
1.	• Write the reactions for given organic compounds.
2.	• Describe reaction for alkanes, alkenes.
3.	• Identify the properties of various organic compounds.
4.	• Compare principles of Langmuir and Freudlich isotherm.
5.	• Describe the mechanism of degree of freedom.

Pre-Requisite :-

S.No	
1.	• Valence bond theory, periodic table, third row elements, halogen elements,
2.	• Atomic and molecular orbital theory.
3.	• Some familiarity with general and organic chemistry concepts.

Contents		Hrs/week	Marks
Unit -1	Organic Chemistry Nomenclatures of organic compounds, functional groups.	05	08
Unit -2	2.1 Classification of organic compounds, aliphatic Compounds, closed chain compounds, unsaturated. - 2 2.2 Alkanes, alkenes, alkyans, cycloalkanes. - 2 2.3 Halogenations, saturated halogenation Reaction of alkenes, oxidation, halogenation, Nitration, pyrolysis, isomerisation, dehydrogenation, Structures and reactivity of alkanes, cyclo alkanes. – 8 2.4 Bayer's strain theory,modification of Bayer's theory. - 4	14	18

	2.5 Alkenes,preparation,properties and reactions, Action of ozone, hydrogenation, halogenation, action Of halogen acids, sulphuric acid, polymerization, uses of alkenes. - 4		
Unit - 3	3.1 Aromatic Compounds, alkyl halides, alchohol and phenols. - 2 3.2 Concept of aromacity, structure of benzene, properties of benzene, reactions of benzene, halogenation, hydrogenation, pyrolysis, - 6 3.3 Classification of alkyl halides, isomerism in alkyl halides, properties of alkyl halides, substitution reaction, elimination reaction, alcohols. - 6 3.4 Classification of alcohols, preparation, properties, reaction, phenols Classification, preparation, reaction. - 6	14	18
Unit – 4	Phase rule, Phase rule, phase, component, degrees of freedom, One component system.	05	08
Unit – 5	Adsorption Definition, nature of adsorption, types of adsorption, Langmuir adsorption isotherm, Freundlich adsorption Isotherm, application.	05	10
Unit - 6	Solutions and Indicators Ideal solution, non ideal solution, Azeotropic Mixture, and theory of indicators.	05	08
	TOTAL	48	70

PRACTICAL:

Skills to be developed:

Intellectual Skills: 1. Analysis of a given solution
2. To interpret the confirmative test

Motor Skills: 1. Observe chemical reactions
2. Observe readings like boiling point and melting point.
3. Handle the apparatus carefully.

LIST OF EXPERIMENTS:

To identify various organic compounds listed below:

1. Benzoic acid
2. Acidic acid
3. Aniline
4. Benzaldehyde
5. Chloroform
6. Naphthalene
7. Chlorobenzene
8. Alpha or Beta Naphthol
9. Urea
10. Thiourea
11. Nitrobenzene
12. To plot graph of adsorption of oxalic acid from solution on activated charcoal and examine the validity of Freundlich isotherm.

13. To plot a graph of adsorption of acetic acid on activated charcoal and verify Freundlich and Langmuir isotherm.
14. To construct a phase diagram for binary system, naphthalene and benzoic acid and find the melting and eutectic temperature.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Morrison and Boyd	Organic Chemistry		Allyn and Bacon,Universal bookstall,Boston
Bahl and Bahl	Organic Chemistry		S Chand and company
P.L Soni	Organic Chemistry		S Chand and company
Puri Sharma and Pathania	Physical Chemistry		S Nagin and company

Reference books :- Nil

Suggested List of Laboratory Experiments :-

S.No	
1	Preparation of Benzoic acid from Benz amide.
2	Preparation of Nitrobenzene from Benzene.

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Diploma in Chemical Engineering (Technology of Inorganic Chemicals)	
Course code: CH	Semester : Third
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 12 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 20 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• This subject will cover essential features of Chemical process industries regarding manufacture of various types of chemicals.
2.	• The subject gives the ideas about the parameters like temperature, pressure, concentration and catalyst which affect the yield of the product.

Objective :-

S.No	The students will be able to
1.	• Understand chemical reaction and chemical equilibrium.
2.	• Draw different types of flow sheet used in process industry.
3.	• State basic principles chemical industry.
4.	• Describe manufacturing process and engineering consideration of chemical processes

Pre-Requisite :-

S.No	
1.	• Fundamentals of chemical processes, inorganic and physical chemistry.
2.	• Introduction to the basic Process Equipment symbols.
3.	• Representation of block diagram for chemical synthesis process.

Contents		Hrs/week	Marks
Unit -1	Manufacturing process of Sulphuric Acid 1.1 Contact Process	04	06
Unit -2	Technology and processes involved in the commercial manufacture of the following chemicals. 2.1 Ammonia 2.2 Nitric acid 2.3 Urea 2.4 Ammonium Nitrate 2.5 Ammonium Sulphate 2.6 Ammonium Phosphate 2.7 Mixed Fertilizer	12	18

Unit - 3	Manufacturing process of phosphorus 3.1 Phosphorus 3.2 Phosphoric acid (Sulphuric and Hydrochloric acid Leaching 3.3 Single Super Phosphate 3.4 Triple Super Phosphate 3.5 Phosphorus Tri Chloride 3.6 Phosphorus Penta Chloride	12	18
	Chloro alkali industry. 4.1 Manufacturing process of Chlorine. 4.2 Manufacturing process of Caustic Soda. 4.3 Manufacturing process of Hydrochloric acid. 4.4 Manufacturing process of Soda ash.	08	10
	Fuel and Industrial Gases. 5.1 Manufacturing process of Oxygen 5.2 Manufacturing process of Nitrogen. 5.3 Manufacturing process of Hydrogen 5.4 Manufacturing process of Water Gas. 5.5 Manufacturing process of Producer Gas. 5.6 Manufacturing process of Carbon di oxide. 5.7 Manufacturing process of Acetelyne. Manufacturing process of cement 6.1 Gypsum 6.2 Plaster of Paris 6.3 Cement	08 04	11 07
	Total	48	70

Practical: Skills to be developed:

Intellectual Skills: 1. Analysis of a given solutions
2. Interpret the Purity of solutions.

Motor Skills : 1. Observe Chemical reactions
2. Measure the purity of solutions
3. Handle the apparatus carefully.

List of Experiments:

1. To find percentage purity of commercial Nitric Acid.
2. To find Nitrogen content in fertilizer (Ammonium Salt)
3. Analysis and testing of Sulphuric Acid.
4. To find Potassium Content in Ammonium Sulphate/ Ammonium Phosphate fertilizer.
5. To find percentage purity of commercial hydrochloric acid
6. To find percentage purity of Caustic Soda.

7. Analysis of cement
8. Analysis of soda ash (Percentage Purity)
9. Analysis of Potassium Permagnet.
10. Analysis of Hydrogen peroxide.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
M. Gopalrao and Marshal Sitting	Dryden's outlines of Chemical Technology		Affliated press pvt. Ltd.
Jorge Austin	Shreve's Chemical Process Industries		Tata Mc Graw Hill
P. H. Groggins	Unit process in organic synthesis		Tata Mc Graw Hill

Reference books :- Nil

Suggested List of Laboratory Experiments :-

S.No	
1	To synthesize laboratory grade soap by saponification of fats.

Suggested List of Assignments/Tutorial :-

S.No	
1	Group presentation explaining any manufacturing process learnt in the syllabus.
2	Assignment on various new techniques utilized in the market for the production of novelty chemicals.
3	Assignment on the use of green technology for reducing the pollution in industry.

Name of the Course : Diploma in Chemical Engineering (Stoichiometry)	
Course code: CH	Semester : Third
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 12 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 20 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• This subject equips the students with basic chemical engineering calculations. It is one of the core subjects.
2.	• In this subject students learn the fundamental concepts on which chemical engineering design is based.
3.	• This subject helps the student to prepare the material and enthalpy balance of a process. If also help them to calculate the quantity of material input and output of a process plant.

Objective :-

S.No	The student will be able to:
1.	• Find the contents and properties of given analyzed gas
2.	• Find out quantity of material input and outputs of various unit operation equipments.
3.	• Calculate material input and outputs of chemical reactions, to identify excess and limiting components.
4.	• Calculate the enthalpy associated with a reaction, also to calculate the quantities of utility required.

Pre-Requisite :-

S.No	
1.	• Basic mathematical calculations.
2.	• Balancing chemical reactions.
3.	• Basic thermodynamic approach.

Contents		Hrs/week	Marks
Unit -1	**Gases and gas mixture.** 1.1 Ideal gas law, Boyle's law, Charle's law, value of universal gas constant. 1.2 Vander Waal's equation. 1.3 Average molecular weight, density and composition (by weight and by mole) of gas mixture.	09	13
Unit -2	**Material Balance without Chemical Reaction**. 2.1 Steps for solving material balance problems. 2.2 Solving problems on various unit operations like drying, evaporation, crystallization, distillation, mixing, blending, absorption, extraction.	15	22
Unit - 3	**Material Balance with Chemical reaction**. 3.1 Limiting component, excess component, percent conversion, percent yield,	15	22

	percent excess		
	Energy Balance. 1.1 Units of heat, sensible heat, latent heat calculations. 1.2 Heat of formation by Hess's law, problems on the same. 1.3 Heat of reaction from specific heat data, heat of combustion, heat of formation data problems. 1.4 Adiabatic reaction and adiabatic reaction temperature.	09	13
	Total	48	70

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Stiochiometry	Bhatt. B. I & Vora. S. M		Mc Graw Hill Publication.
Basic principles & Calculations in Chemical Engineering	Himmelblau & David M		Pentice Hall of Publication.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	Assignment	Hours
1	Problems on Ideal Gas Law application.	03
2	Problems on average molecular weight and density of gas mixture	02
3	Problems material balance on mixing.	04
4	Problems on material balance on Distillation.	02
5	Problems on Material Balance on other operation.	04
6	Problems on % excess, % conversion, % yield in a Chemical Reaction.	02
7	Problems on calculating the % composition of product stream on mole basis and weight basis for a Chemical Reaction.	04
8	Problems on calculating the feed input.	02
9	Problems on calculating the Heat of the Reaction.	02
10	Problems on Heat of Formation.	02
11	Problems based on calculating by different method based Heat of Reaction for Cp values.	05
	Total	32

Name of the Course : Civil and Mechanical Engineering Group (Applied Mathematics)			
Course code: CE/AE/ME/PG/PT/MH/MI		Semester : Third	
Duration : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 12 hrs/week		Mid Semester Exam: Marks	
Tutorial: 2 hrs/week		Assignment & Quiz: Marks	
Practical : 20 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
Aim :- Nil			
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 :- Nil			
Contents : Theory (Name of Topic)		Hrs/week	Marks
Unit -1	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	18
Unit -2	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	10
Unit - 3	Differential Equation 2.1 Definition of differential equation, order and degree of differential	10	10

	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.		06
	Probability Distribution 3.1 Binomial distribution. 3.2 Poisson's distribution. 3.3 Normal distribution 3.4 Simple examples corresponding to production process.	08	10
	Total	48	70

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 : Diploma in Chemical Engineering (Mechanical Operation)			
Course code: CH		Semester : Third	
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	
Credits :- Nil			
Aim :-			
S. No			
1.	• This subject intends to equip the students with concepts & principles as well as construction of equipments used for handling Mechanical Operation in a Chemical plant.		
2.	• This subject gives ideas about principles of handling mixtures of solids & liquid & gases.		
3.	• This subject will help students for understanding principles for separation & purification techniques of solid, liquids & gases mixtures.		
Objective :-			
S. No	Student will be able to:		
1.	• Explain methods of size reduction and equipments working on those principles.		
2.	• Describe Various equipments used for size separation.		
3.	• Identify Various other physical properties used for purification solid-solid mixtures and equipments working on this principle.		
4.	• Describe Various method of purification of heterogeneous mixture of solid liquid, & equipments like filters, settlers, used for separation of solid liquid mixtures.		
5.	• Identify various types of agitators used for mixing solids-liquids mixtures, power calculation of the mixer.		
Pre-Requisite :-			
S.No			
1.	• Fundamentals of unit operations		
2.	• Basics of physics and laws		
Contents		Hrs/week	
Unit -1	1.1 Introduction to unit operations & their meanings Particularly for mechanical operation. 1.2 Specifics principle involved in mechanical Operation as Decantation filtration , Settling & Sedimentation, screening, flotation, mixing Size reduction. 1.3 Electro Mechanical Operation i) Magnetic separation ii) Electrostatics separation	06	04

	iii) Electro dialysis iv) Electro osmosis v) Electrophosis		
Unit -2	Size reduction of solids. 2.1 Theory & Principle involved in crushing & Grinding 2.2 Classification & Types of crushing & grinding Equipments & principle of their working. 2.3 Jaw Crusher 1) Black Type 2) Dodge Type and their relative advantages &disadvantages. 2.4 Roll Crusher, Hammer Mill ,Ball Mill Selection of crushing rolls derivation. 2.5 Derivation for critical speed of a Ball Mill	08	16
Unit - 3	Size Separation of solid 3.1 Introduction 3.2 Separation of solid by screening 3.3 Screens, Wire screens, screen effectiveness 3.4 Actual screen 3.5 Ideal screen 3.6 Screen Analysis 3.7 Screening Equipments a) Grizzilies b) Trommels c) Gyratory Screen d) Trommel & Trommel Arrangements e) Shaking and Vibrating Screen	06	14
Unit - 4	Methods of Separation of solids based on Specifics Properties 4.1 Size Separation by setting a) Gravity setting tank b) Cone Classification c) Cyclone 4.2 Mechanical Classifier 4.3 Hydraulic Classifier 4.4 Gig 4.5 Magnetic Separation 4.6 Electrostatic Separation 4.7 Flotation	10	08
Unit – 5	Filtration 5.1 Principle of filtration & factors which affect the rate of Filtration. 5.2 Filtration Equipments a) Sand Filter b) Plate & Frame Filter, c) Washing Type & d) Non washing type e) Continuous Rotary Filter 5.3 Derivation of rate equation for filtration & various Parameter involved in the rate equation. 5.4 Constant rate Filtration ,constant pressure filtration	10	12

	5.5 Centrifuges.		
Unit - 6	***Sedimentation*** 6.1 Definition of sedimentation , difference between sedimentation filtration, settling, & Centrifugation 6.2 Principle involved in sedimentation laboratory Settling test & its use in design of thickeners 6.3 Industrial methods of sedimentation Thickness.	04	08
Unit - 7	***Mixing*** 7.1 Definition 7.2 Mixing equipments , different types their & specific application. 7.3 Flow patterns in an agitated vessel 7.4 Study of mixer used for mixing a) Liquid b) Solids c) Viscous masses d) Pug mill 7.5 Study of power consumption of mixer.	04	08
	Total	48	70

PRACTICALS: Skills to be developed:

Intellectual Skills: 1) Interpretation of data.
2) Calculating efficiency.

Motor Skills: 1) Handling size reducing equipments.

LIST OF PRACTICAL:

1) To Determine Screen analysis of mixture obtained from a jaw crusher
2) To find out the Screen analysis from pulverizer.
3) To Determine Variation of size reduction in ball Mill by changing the residence time.
4) To find effectiveness of a screen.
5) To find out efficiency of froth flotation cell.
6) To Study the of rate of filtration for plate and frame filter.
7) To Study rate of filtration using vacuum filtration.

Batch sedimentation test of different concentration for calcium carbonate

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Walter L. Badger Julius T. Banchero	Introduction to Chemical Engineering		McGrawHill International 1984
McCabe, W.L.Smith, Harriott	Unit Operation of Chemical Engineering		McGraw Hill Inc 1993
S.K. Ghosal, S.K. Sanyal and S. Dutta	Introduction to Chemical Engineering		Tata McGraw Hill Publication, 1993

Reference books :- Nil			
Name of Authors	Titles of the Book	Edition	Name of the Publisher
J.M. Coulson, J. F. Richardson, J.R. Backhurst and J.H. Harker (Vol.2)	Chemical Engineering		Pergamon Press, 1993

Suggested List of Laboratory Experiments :-	
S. No	
1	To determine critical speed of a ball mill.
2	To determine efficiency of cyclone separator.
3	To find out crushing law of constant by using jaw crusher.

Suggested List of Assignments/Tutorial :-	
S.No	
1	Industrial visit to various industries where any of above mechanical operations is used. E.g. stone crusher, paint mill, cement industry, etc.
2	Report on industrial visits.

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 :	
Teaching Scheme	Examination Scheme	
Theory : hrs/week	Mid Semester Exam: Marks	
Tutorial: hrs/week	Assignment & Quiz: Marks	
Practical : hrs/week	End Semester Exam: Marks	
Credits :- Nil		

Aim :- Nil

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:- Nil		Hrs/week
	Activities	Hrs
Unit -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	
Unit -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	
Unit - 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 iv) Arrange any one training in the following areas : a) Yoga. B) Use of firefighting equipment and First aid Maintenance of Domestic appliances.	
Unit – 4	<u>Modular courses (Optional) :</u> 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.	
Unit - 5	**3-D Design using software** Computer screen, coordinate system and planes, definition of HP,VP, reference planes How to create them in $2^{nd}/3^{rd}$ 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.	
Text Books:- Nil		
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: CHEMICAL ENGINEERING

COURSE CODE : CH

DURATION OF COURSE : 6 SEMESTERS

SEMESTER: FOURTH SEMESTER **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	P	SESSIONSAL EXAM			ESE	PR	Oral #	TW @	
					TA	CT	Total					
1	Technology of Organic Chemicals	03	--	02	10	20	30	70	50	--	25	
2	Fluid Flow Operation	03	01	02	10	20	30	70	50	--	25	
3	Plant Utilities	02	--	02	10	20	30	70	--	--	25	
4	Mechanical Technology	03	--	--	10	20	30	70	--	--	--	
5	Electrical Engineering & Electronics	04	--	02	10	20	30	70	--	--	25	
6	Visual Basic 6.0	01	--	02	--	--	--	--	--	--	50	
7	Professional Practices-III	--	--	05	--	--	--	--	--	--	50	
	Total	16	01	15	50	**100**	**150**	**350**	100	--	200	

STUDENT CONTACT HOURS PER WEEK: **32 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 : 800

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 : Chemical Engineering Group (Professional Practices-III)		
Course code: CH		Semester : Fourth
Duration : **6 SEMESTERS**		Maximum Marks :
Teaching Scheme **C**		Examination Scheme
Theory : 16 hrs/week		Mid Semester Exam: Marks
Tutorial: 1 hrs/week		Assignment & Quiz: Marks
Practical : 15 hrs/week		End Semester Exam: Marks
Credits :- Nil		
Aim :-		
S.No		
1.	• Most of the diploma holders in industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.	
2.	• While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.	
3.	• The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.	
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 :-		
S.No		
1.	• Study of unit operation related to industry	
Activity		Hrs
01	Industrial Visit: Industrial visit be arranged and report of the same should be submitted by individual student to form part of work. Visit to any two of the Following : i. Petroleum ii. Petrochemical industry iii. To a mechanical workshop electroplating unit. iv. Pump manufacturing company v. Visit to Foundary & Factory to study Heating System. vi. Visit to Electroplating workshop.	35

02	Lectures: Lectures by professional/ Industrial expert /student Seminar based or information search to be organized from any THREE of the following areas: i. Electronics engineering from a chemical industry. ii. Electrical engineering from a chemical; industry. iii. Safety in petrochemical industry iv. Safety in a petroleum industry. v. Of a expert working on an oil rig.	14
03	Group Discussion: Student should discuss in a group of six to eight & write brief report on the same as a part of group discussion may monitered by faculty members. i. Recent trends in manufacture organic chemical ii. Working of a centrifugal pump in institute. iii. Flow measurement in open channels. iv. Discussion on CAD	13
04	Student Activity: The student group of 3 to 4 will perform any one of the following activity. i. Collect different types of pipe fitting. ii. Collect five samples of pipes of different material and specific application. iii. Collects five types of values and medium their specific application. iv. Electrical and electronics v. Collect transformer details in power home. vi. Collects information and specification about five electronics devices.	18
	Total	80
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 : Chemical Engineering Group (Visual Basic 6.0)		
Course code: CH		Semester : Fourth
Duration : **6 SEMESTERS**		Maximum Marks :
Teaching Scheme **C**		Examination Scheme
Theory : 16 hrs/week		Mid Semester Exam: Marks
Tutorial: 1 hrs/week		Assignment & Quiz: Marks
Practical : 15 hrs/week		End Semester Exam: Marks
Credits :- Nil		

Aim :-	
S.No	
1.	Visual Basic is the front end tool which is used for programming in applications like Microsoft office. VBA is used in creating Applications of types, including Active X controls, Client Applications, Internet Information, Server Application designer, Integrated visual database tools and Data Environment. ActiveX Data Objects (ADO) and the Dynamic HTML page designer. Concept of .NET Framework, Introduction to VB.NET

Objective :-	
S.No	The student will be able to
1.	• Students should understand the difference between procedure oriented language and object oriented language.
2.	• It revises the concept of events, methods.
3.	• They understand the procedure of working with validation.
4.	• They will learn about database connectivity.
5.	• They will be able to develop the VB program.
6.	• They will learn to develop a mini VB project by themselves..
7.	• Students will get an introduction to VB.net
8.	• They will be able to write a simple vb.net program

Pre-Requisite :-	
S.No	
1.	• Computer skills
2.	• Intellectual skills

Contents (Name of the Topic)		Hrs/week
Unit -1	**PLANNING THE DESIGN OF AN APPLICATION** 1.1 Using the Microsoft solution framework 1.1.1 Overview 1.1.2 Models 1.1.3 Design Phase 1.1.4 Role of developer 1.1.5 Logical design task 1.2 Designing a system architecture	02

	1.2.1 Understanding application structure 1.2.2 Single tire 1.2.3 Two tire 1.2.4 Multi tire	
Unit -2	**INTRODUCTION TO VB 6.0** 2.1 VB Environment 2.1.1 Menu Bar, Toolbars, Tool 2.1.2 Box 2.1.3 Project explorer 2.1.4 Properties window 2.1.5 Form designer 2.1.6 Form layout 2.2 VB The language 2.2.1 Variable , Constants 2.2.2 Arrays 2.2.3 Procedures, Functions 2.2.4 Control Flow Statements 2.2.5 Looping , nesting 2.3 Managing Forms 2.3.1 Form Basics 2.3.2 Form Events 2.3.3 Form Properties 2.3.4 Form Methods 2.4 Using ActiveX Controls 2.4.1 Working with Controls 2.4.2 Using Control Arrays 2.5 Managing Menus 2.5.1 Creating and modifying menu at Design time 2.5.2 Programming menu commands 2.5.3 Shortcut Keys 2.5.4 Menus at runtime 2.6 Drag & Drop operations 2.6.1 Drag mode property 2.6.2 Drag Drop & Drag Over Method 2.6.3 Mouse Conflicts 2.7 Managing Menus 2.7.1 Creating and modifying menu at Design time 2.7.2 Programming menu commands 2.7.3 Shortcut Keys 2.7.4 Menus at runtime 2.8 Drag & Drop operations 2.8.1 Drag mode property 2.8.2 Drag Drop & Drag Over Method 2.8.3 Mouse Conflicts	06

Unit - 3	3.1 Advanced Controls and Events 3.1.1 Common Dialog Box Controls, Toolbar image list, status bar, Rich text box.	02
Unit – 4	**USING DEBUGGING TOOLS** 4.1 Types of errors & debug menu 4.1.1 Types of errors 4.1.2 Debug menu 4.2 Testing the application 4.2.1 Immediate window 4.2.1 Using debug and local window 4.2.2 Setting watch expression 4.3 Implementing error handler 4.3.1 How VB Handles the runtime error 4.3.2 VB error handler 4.4 VB error handling options 4.4.1 How VB handles the runtime error 4.4.2 Disabling the error handler	02
Unit – 5	**Visual Basic and .NET Programming** 5.1 The Building Blocks of .NET 5.1.1 The .NET framework 5.1.2 .NET Enterprise Server 5.1.3 .NET Building block Services 5.1.4 Visual Studio.Net 5.2 Highlights of the .NET Framework 5.2.1 Common Language Runtime 5.2.2 Class Libraries 5.2.3 Language and Developer Tools 5.3 Visual Basic and .NET 5.3.1 Features of VB.NET 5.4 The VB.NET Language 5.5 The Structure of VB.NET Applications 5.6 Getting Started with VB.NET 5.6.1 WEB applications 5.6.2 Windows applications 5.6.3 Console applications	04
	Total	16

List of Practicals:

1. Demonstration of how VB Project works.
2. use of control flow statements in a VB application
3. Program based on case statement
4. How to use different control in a VB application.
5. How manage form properties for different application
6. Select & deselect operations using drag & drop operation
7. Program based on OLE control.

8. Design a Project using MDI form, common dialog control and rich text box.
9. Set database connectivity using Data controls
10. Creating the simple program based on Chemical Engineering using VB. Net.

Text Books:

Name of Authors	Titles of the Book	Edition	Year of publication	Name of the Publisher
MCSD	MCSC Training Guide	1st	Reprint	Techmedia Publication
Evangelous Petroutsos	Mastering Visual Basic 6.0	1st	Reprint	BPB Publication
IDG	VB 6.0 Programming Black Book	1st	Reprint	IDG Book India Pvt. Ltd.
Kevin Hoffman & Jeff Gabriel	Professional .Net Framework	1st	Reprint	Apress L.P. Shroff Publishers & Distributors Pvt. Ltd
Jesse Liberty	Learning Visual Basic .NET	1st	Reprint	O'Reilly

Reference books :- Nil

Suggested List of Laboratory Experiments :-

S.No	
1	Experimental data analysis using VB.6
2	Interpretation of statistical data of various experiments conducted in laboratory

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Chemical Engineering Group (Electrical Engineering & Electronics)	
Course code: CH	Semester : Fourth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 16 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 15 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• Automation is the key word in today's world. Most of the equipments used in the Chemical industry are automated by electronic devices.
2.	• Applied Electronics is a core technology subject which will help students to apply the use of electronic appliances in a chemical industry
3.	• The subject will focus on the basic semiconductor technology, their use in analog and digital circuits. It is a theoretical subject, which will enable the students to develop cognitive skills.

Objective :-

S.No	The student will be able to
1.	• Identify various semiconductor devices
2.	• Use semiconductor devices in analog and digital circuits.
3.	• Use basic electrical engineering knowledge for normal repairs and maintenance

Pre-Requisite :-

S.No	
1.	Basics of physics and laws

Contents		Hrs/ week	Marks
Unit -1	Basic Concepts & Principle Of Electrcal Engineering 1.1 Ohm's Law, Laws of Electromagnetic Induction 1.2 A.C. fundamental Concept of 1φ & 3φ AC Supply, P.F, Active & Reactive Power.	04	03
Unit -2	D-C Motors 1.1 D.C. Motors working Principle 1.2 Types of D.C. Motor 1.3 Characteristics & Applications.	06	04
Unit - 3	Transformer 1.1 Working Principle. 1.2 Construction. 1.3 Core type & Shell type transformer.	04	05

	1.4 EMF Equation. 1.5 Turn ratio, Current ratio & Voltage ratio. 1.6 Concept of Auto transformer & 3φ transformer.		
Unit – 4	A.C. Motors 1.1 Classification 1.2 3φ induction Motor-Principle, Construction, Types & Application. 1.3 1φ Induction Motors types & Applications. 1.4 Synchronous Motors Principle of Operation, Application.	06	07
Unit – 5	Electrical Drivers 1.1 Advantages of Electrical Drivers. 1.2 Classification 1.3 Selection of Drive. 1.4 Different Encloses & Methods of Mounting.	04	05
Unit – 6	Electrical Heating 1.1 Principle of Electrical Heating. 1.2 Resistance Heating, Induction Heating & di-electric Heating Principles. 1.3 Procedure to select furnace for Heating.	04	07
Unit - 7	Awareness about Electro Metallurgical System 1.1 Concept of Electrolysis & Electroplating 1.2 Electroextraction.	04	04
	TOTAL	32	35
Contents : Name of the Topic (Section –II – Applied Electronics)		Hrs/ week	Marks
Unit -1	Introduction To Electronics 1.1 Conductors, Semiconductors, Insulators. 1.2 Energy level diagram 1.3 Doping, P type & N types semiconductors 1.4 Active & Passive components 1.5 Resistors, inductors, capacitors- their symbol and their use only. 1.6 Diode PN junction diode- symbol, Construction, Working, Characteristics, Applications Zener diode - symbol, Construction, Working, Characteristics, Applications Light emitting diode - symbol, Construction, Working, Characteristics, Applications	08	07
Unit -2	**Power Supply** 2.1 Need for power supply. 2.2 Block diagram of a Power supply Rectifier – Half wave , Full wave Rectifier(centre tapped &	06	07

	Bridge Circuit diagram, Working, waveforms only Comparison on the basis of Circuit diagram, Working, waveforms only (No mathematical treatment) 2.3 Filter – Definition, & function (No Circuits)		
Unit -3	Transistors 3.1 TRANSISTOR- Symbol, types(PNP, NPN), Working. Applications(NO Configurations, Characteristics) 3.2 Transistor as an Amplifier 3.3 Single stage CE amplifier – Circuit, Working principle. 3.4 2 Stage RC coupled Amplifier- Circuit diagram & function of various components used. (No freq response & working)	06	07
Unit -4	Operational Amplifier 4.1 Operational Amplifier – Symbol, Ideal characteristics, Block diagram, Applications. 4.2 Inverting Amplifier, Non inverting Amplifier(Only circuits, No Derivations) , Relationship between input, output & circuit components. 4.3 Voltage follower circuit & its applications.	06	07
Unit -5	Digital Circuits 5.1 Digital signal. 5.2 Logic gates AND, OR, NOT, NAND, NOR gates- Symbol, logical expressions, Truth table. 5.3 Universal gates- NAND & NOR gates as universal gates. 5.4 Digital display- 7 segment display, LCD display – Working principle & Applications only. (handset to handset) 5.15 Block diagram of mobile phone system and its operation.	06	07
	TOTAL	32	35

Practicals:

Skills to be developed:

Intellectual Skills:

1. Select equipment such as motors, meters & components.
2. To interpret circuits.

Motor Skills:

1. draw circuits
2. measure various parameters accurately
3. Make connection

List of Practicals:

SECTION –I Electrical Technology

1 Identify different parts of D.C. Machine with their Functions.
2 Control Speed of D.C. shunt Motor below & above normal speed.
3 Determine Voltage & current ratio of transformer.

4 No load test on 1φ transformer.

5 Brake test on 3φ Induction motor & find efficiency & torques

SECTION-II – Applied Electronics

1. To Study the various laboratory equipments& measuring instruments like Power supply CRO, DMM.
2. To Study Diode Characteristics- Forward & Reverse characteristics.
3. To study Zener as a voltage regulator.
4. To study transistor as an amplifier- 2 stage RC coupled Amplifier.
5. Study of Logic gates.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
B.L. Theraja	Electrical Technology - Vol 1.1		Nirja Construction & Development Co Ltd
B.L. Theraja	Electrical Technology -		Nirja Construction & Development Co Ltd
H. Partab	Arts & Science of Uhllsation of Electrical Energy		--
Soni, Gupta, Bhatnagar	Electrical Power		--
J.B. Gupta	Electrical M/C		--
R.P JAIN	Moern Digital Electronics		--
Bhargava ,	Basic Electronics		--

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Chemical Engineering Group (Fluid Flow Operations)	
Course code: CH	Semester : Fourth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 16 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 15 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• The subject gives the knowledge of measurement of fluid flow and various fluid transportation machinery.
2.	• The knowledge gained by this subject is directly used in different subjects studied in Chemical Engineering.
3.	• The knowledge of this subject helps in installation of different fluid flow and fluid transportation machinery.

Objective :-

S.No	After studying the subject student will be able
1.	• To distinguish between different types of fluids.
2.	• To understand the concept of viscosity.
3.	• To Calculate flow rates.
4.	• To Calculate the power of pump required to do a certain pumping job.
5.	• To understand the principles behind different flow meters.
6.	• To be able to install and calculate the flow rate of fluid with different flow meters in closed pipe line.
7.	• To understand different flow control devices and to gain the knowledge of using different valves for different types of fluids and different flow situations.
8.	• To understand the principle and working of different fluid flow machinery.
9.	• To be able to install the fluid flow machinery in closed pipe lines.

Pre-Requisite :-

S.No	
1.	• Mathematical calculations
2.	• Unit operations used in industries

Contents		Hrs/week	
Unit -1	1.1 Properties of fluids 1.1.1 Density & viscosity (absolute & kinematic) 1.1.2 Vapor pressure & surface tension 1.1.3 Principle of Hydrostatic Equilibrium 1.1.4 Manometers- Types (U, Inclined, Differential), Equations,	04	08

	Uses *1.2 Types of fluids* 1.2.1 Ideal & Actual fluids, 1.2.2 Compressible & Incompressible Fluids 1.2.3 Newtonian & Non-Newtonian fluids including time dependent & time Independent fluids		
Unit -2	Flow of Fluids (Incompressible) 2.1 Equation of continuity, Calculation of mass flow rate, volumetric flow rate, average velocity & mass velocity 2.2 Bernoulli's equation for ideal fluid, actual fluid & with pump work done. Correction in Bernoulli's equation 2.3 Reynolds experiment & its significance in determining turbulent, laminar & transition regime. 2.4 Concept of Boundary layer, Boundary layer formation in straight tubes 2.5 Form friction & skin friction: Relationship between pressure drop, wall shear & shear stress 2.6 Laminar flow in circular pipe. Relationship between maximum & average velocity in laminar flow. The Hagen-Poiseuille equation. 2.7 Friction in pipe, Fanning's friction factor, the standard friction factor chart. Friction losses due to sudden 04 expansion/reductio of pipe & in pipefittings. Definition of equivalent length of pipe fittings. 2.8 Measurement of fluid flow with the help of flow meters 2.8.1 Venturimeter: Construction, Principle, Working, Coefficient of discharge, Calibration, Derivation for calculating the flow rates. 2.8.2 Orifice meter: Construction, Principle, Working, Coefficient of discharge, Calibration, Derivation for calculating the flow rates. 2.8.3 Rotameter: Construction, Principle, Working, Calibration. 2.8.4 Pitot tube: Construction, Principle, and Working. 2.9 Measurement of flow in open channels with help of notches (V- notch, square-notch)	20	32
Unit - 3	Pipe, fittings & valves 3.1 MOC 3.2 Standard sizes of pipes, wall thickness, Schedule number 3.3 Joints & fittings Gate valve, Globe valve, Ball valve, Needle valve, NRV, Butterfly valve, Diaphram Valve	04	10
Unit - 4	Transportation of Fluids 4.1 Pumps 4.1.1Centrifugal Pump: Parts of centrifugal pump, Working of Centrifugal pump, Performance of centrifugal pump (Characteristics of centrifugal pump), Characteristics curves, priming	20	20

	4.1.2 Developed Head, Cavitations, NPSH Priming. 4.1.3 Positive displacement reciprocating pumps based on pressure component & based on action of piston/plunger, their construction & working 4.1.4 Gear pump, its construction & working 4.1.5 Diaphragm pump, its utility, construction & working 4.2 Fans, blowers & compressors: 4.2.1 Fans & their applications 4.2.2 Blowers & Compressors, Reciprocating & centrifugal compressors Vacuum Pumps, jet ejectors, its working & application		
	Total	48	70

Practical:

Intellectual Skills

1. Observations and interpretation of data.
2. Calculations.
3. Analysis.

Motor Skills

1. Equipment handling
2. Performing

LISTS OF Practical:

1. Determination of coefficient of discharge of venturi meter & plot a calibration curve
2. Determination of coefficient of discharge of orifice meter & plot a calibration curve
3. To calibrate a rotameter for different liquids & plot the calibration curve.
4. To perform experiment on Bernoulli's Theorem and prove that the summation of pressure head, kinetic head and potential head is constant.
5. To perform Reynolds Experiment and determine the Reynolds number at the end of laminar region and beginning of turbulent region.
6. To determination of equivalent length of pipe fittings
7. To plot the characteristics curves of centrifugal pump
8. To determine the relationship between Fanning's friction factor & Reynolds Number
9. To measure the viscosity of different liquids (Ostwald's Viscometer or Redwood Viscometer)
10. To measure the flow rate of gases using flow meter.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
McCabe, Smith	Unit Operations of Chemical Engineering		McGraw Hill
Badger & Banchero	Introduction to Chemical Engineering		McGraw Hill
Richardson & Coulson	Chemical Engineering Volume-I		Pergamon Press

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Chemical Engineering Group (Mechanical Technology)			
Course code: CH		Semester : Fourth	
Duration : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 16 hrs/week		Mid Semester Exam: Marks	
Tutorial: 1 hrs/week		Assignment & Quiz: Marks	
Practical : 15 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
Aim :-			
S.No			
1.	• A student working in a Chemical Industry has to deal with many machines & Mechanical Operations.		
2.	• This subject deals with various metal joining processes and manufacturing techniques such as welding. Soldering brazing, Riveting, Bolting etc. Along with sheet metal froming like bending, rolling etc. & with manufacturing techniques the metal joining process in also Important.		
3.	• Familiarization with different Mechanical drives, used for power transmission in Chemical Industry.		
Objective :-			
S.No	The subject Students will be able to :		
1.	• Understand how the various parts are to be joined for different types of join		
2.	• Handle different tools required for joining the parts and fabricating sheet metal by different processes.		
Pre-Requisite :-			
S.No			
1.	Fundamentals of mechanical engineering		
Contents : Theory (Name of the Topic)		Hrs/ week	Marks
Unit -1	Belt, Rope & Chain Drives 1.3 Construction 1.4 Specification 1.5 Selection and application of flat belt, V-belt, rope & pulleys. 1.6 Open and cross belt drivers. 1.7 Length of belt. 1.8 Velocity ratio & slip. 1.9 Method of minimizing slip. 1.10 Chain drives Introduction. 1.11 Types of Chains. 1.12 Their selection and application.	08	08
Unit -2	Gear drives Introduction 2.5 Types of Gear	08	10

	Spur, Helical, Bevel, Sprial & worm gear. 2.6 Terminology and fields of applications. 2.7 Number of teeth and speed ratio. 2.8 Simple, Compound & epicyclic gear train. 2.9 Reverted gear train. 2.10 Selection and application of speed ratio. 2.11 Simple problem involving Calculation of speed ratio.		
Unit - 3	Key & Couplings 3.8 Alignment of shafts. 3.9 Function & types of keys, coupling 3.9.1 Rigid (Sleeve, Clamp or Compression and Flange) 3.9.2 Flexible (Bush type, Hook's joint & Oldham's)	04	08
Unit – 4	Bearings 4.8 Classification 4.9 Sliding contact bearing. 4.10 Solid Journal bearing. 4.11 Bashed bearing. 4.12 Split bearing & plummer block. 4.13 Thrust bearing (Step & Collar) 4.14 Kolling contact bearing.	04	08
Unit – 5	Seals 5.6 Static seals. 5.7 Dynamic seals. 5.8 Oil Seals. Mechanical seals & its Classification.	04	04
Unit - 6	Welding, Soldering & Brazing 6.1 Welding. 6.1.1 Introduction. 6.1.2 Types of welding Processes: Gas welding principles & Processes (Oxy-acetylene gas welding with equipment & techniques only.) Arc welding principles & processes like carbon arc, submerged arc & TIG & MIG, Resistance welding principle & processes like spot welding & seam welding. 6.1.3 Various types & application of welded joints. 6.1.4 Edge preparation for welding & prevention of distortion. 6.1.5 Basic weld symbols. 6.2 Soldering. 6.2.1 Introduction 6.2.2 Soft Soldering. 6.2.3 Hard soldering. 6.3 Brazing 6.3.1 Introduction 6.3.2 Types of Brazing. 6.3.3 Brazing Fluxes.	08	12

	6.3.4 Advantages of Brazing.		
Unit – 7	***Sheet Metal Work*** 7.5 Sheet Metals. 7.5.1 Ferrous & non Ferrous sheet Materials. 7.5.2 Composit sheet materials. 7.5.3 General properties of sheet metals. 7.5.4 Specification sheet metal gauge, hand tool's used.	04	05
Unit – 8	Bending & Rolling. 8.1 Term associated with bending. 8.2 V-bending & U-bending 8.3 Bending Techniques. 8.4 Bending disc. 8.5 Pipe & Conduit bending. 8.6 Manual & Power rolls. 8.7 Rolling Techniques. 8.8 Ring rolling & cone rolling.	04	08
Unit - 9	Rivetted and Bolted Joints. 9.1 Standard rivets & rivet heads. 9.1.1 Types of riveted joints. 9.2 Types of bolts. 9.2.1 High strength Friction grip bolts. 9.2.2 Application & Advantages. 9.2.3 Types of washer & other locking arrangement.	04	07
	Total	48	70

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Elements of Workshop Technology Vol – I-II	S.K. Hajara Choudhary A.K. Hajara Choudhary		Media Promoters and Publishers Pvt. Ltd.
Welding Technology	O.P Khanna		-
Theory of Machine	R.S. Khurmi		-
Theory of Machine	R.S. Khurmi		-

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Chemical Engineering (Plant Utilities)	
Course code: CH	Semester : Forth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 16 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 15 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• To study requirement of different utilities for the process plant, along with its generation and its effective utilization. Main utilities required for process plants are water, steam, air & refrigerants.
2.	• Steam & non- steam heating media are important for conversion of raw material to products in reactors & to elevate the temperature in the chemical processes.
3.	• Refrigeration is important to maintain the temperature in the process plant. Compressed air, process air is used in processes & instrument air is used in pneumatic devices & controls

Objective :-

S.No	The subject the student will be able to:
1.	• State the principles involved during water treatment, generation of steam and its uses, refrigeration cycles.
2.	• Describe the different equipments used to run the process plant with different utilities.
3.	• Acquire the knowledge for selection of different utilities.
4.	• Understand basic calculation involved in steam generation, psychometric operation and refrigeration

Pre-Requisite :-

S.No	
1.	• Fundamentals of chemical engineering
2.	• Fundamentals of unit processes
3.	• Knowledge of Basic utilities requirements

Contents		Hrs/week	Marks
Unit -1	Importance of utilities : 1.1 Sources of water, hard and soft water 2 1.2 Requisites of industrial water and its uses 1.3 Methods of water treatment 1.3.1 Chemical softening 1.3.2 Demineralization SS 1.4 Resins used for water softening 1.5 Reverse osmosis and membrane separation 1.6 Effects of impure boiler feed water & its treatments.	06	10

	1.6.1 Scale & sludge formation 1.6.2 Corrosion 1.6.3 Priming & foaming 1.6.4 Caustic embrittlement.		
Unit -2	Refrigeration : 2.1 Refrigeration cycles 2.2 Different methods of refrigeration used in industry 2.2.1 Vapour compression 2.2.2 Vapour absorption: Lithium bromide (eco-Friendly) 2.3 Different refrigerants 2.3.1 Monochlorodifluoro methane (R-22) 2.3.2 Chlorofluorocarbons (CFC-Free) 2.3.3 Secondary refrigerants: Brines 2.4 Simple calculation of C.O.P. Refrigerating effects.	07	16
Unit - 3	Steam and steam generation : 3.1 Properties of steam 3.2 Problems based on enthalpy calculation for wet steam, dry saturated steam, superheated steam 3.3 Types of steam generator / boilers: water tube & fire tube 3.3.1 Solid fuel fired boiler. 3.3.2 waste gas fired boiler. 3.3.3 Waste heat boiler. 3 3.4 Fluidized bed boiler. 3.4 Scaling, trouble shooting, preparing boiler for inspection 3.5 Steam traps, boiler mountings and accessories 3.6 Boiler Act	10	22
Unit – 4	Psychrometry : 4.1 Properties of Air-water vapours. 4.2 Use of humidity chart 4.3 Equipment used for humidification, dehumidification Evaporative cooling, spray ponds, cooling towers	06	14
Unit – 5	Air : 5.1 Use of Compressed air, process air and instrument air 5.2 Process of getting instrument air.	02	05
Unit - 6	Non steam heating system Thermic fluid heater, Downtherm heater 6.1 Temperature range 6.2 Principle, construction & working.	01	03
	Total	32	70

Practical :

Skills to be developed:

Intellectual skills:

1 Analysis of water.
2 Calculation of humidity & use of humidity chart.
3 Calculation heat load in cooling tower.

Motor skills: 1 Observation of pH
2 Handling of thermo pack or boiler
3 Handling of cooling tower.

Lists of Practials:

1. To determine the alkalinity of water
2. To determine the hardness of water.
3. To determine the variation in PH with ion exchange bed.
4. Determination of humidity and use of humidity chart
5. Boiler simulator.
6. Determination of outgoing temperature of water from any cooling tower.
7. Observing starting procedure of thermopack or boiler.
8. Draw & prepare the report of steam traps.
9. Observation of use of instrument air in pneumatic control valve

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
P. L. Balleney	Thermal Engineering		Khanna Publisher New Delhi
S.T. Powel	Industrial water treatment		McGraw Hill, Newyork
Chattopadhya	Boiler operations		Tata McGraw Hill, New Delhi
Perry R.H. Green D.W.	Perry's chemical Engineer's Handbook		McGraw Hill, Newyork
R.C. Patel C.J. Karmchandani	Elements of Heat Engines Vol – II,III		Acharya Book Depot. Vadodara
P .N .Ananthanarayan	Refrigeration & Air conditioning		Tata McGraw Hill
JAIN & JAIN	Industrial chemistry		-

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	Industrial visit for plant utilities and report writing.

Name of the Course : Chemical Engineering Group (Technology of Organic Chemicals)	
Course code: CH	Semester : Fourth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 16 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 15 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• To study manufacturing processes of various organic chemicals with their Kinetics.

Objective :-

S.No	After studying this subject student will be able.
1.	• To know about raw materials, properties, chemical reaction required for the manufacture of various chemicals.
2.	• To know manufacturing process of various chemicals.
3.	• To understand properties & uses of various chemicals included in the curriculum

Pre-Requisite :-

S.No	
1.	• Fundamentals of unit processes, mechanical operation.
2.	• Knowledge of process calculations, organic chemistry.
3.	• Knowledge of process equipment symbols.

Contents		Hrs/week	Marks
Unit -1	**Alcohol Based Industries.** 1.1- Manufacture of Alcohol by Corn and Molasses. 1.2- Acetic Acid. 1.3- Ethyl Acetate. 1.4- Butanol	06	12
Unit -2	**Paint Industry.** 2.1- Paints. 2.2- Varnishes. 2.3- Lacquers.	05	06
Unit - 3	**Oil ,soap & Detergents.** 3.1- Hydrogenation of Edible oil. 3.2- Manufacturing of Oil. 3.3- Manufacturing of Detergents. 3.4- Manufacturing of Soap.	08	14
Unit – 4	**Pulp and Paper Industry.** 4.1- Manufacturing of Pulp. 4.2- Manufacturing of Paper. 4.3- Manufacturing of Rayon.	05	10

Unit – 5	**Polymer/ Plastic Industry.** 5.1- Manufacturing of Poly Vinyl Chloride. 5.2- Polyethylene. 5.3- Polystyrene. 5.4- Polyester. 5.5- Plastic (Poly Carbonate) 5.6- Thermocol.	15	18
Unit – 6	**Phenol** 6.1 Introduction to various processes manufacturing of Phenol. 6.2 Cumene process 6.3 Toluene oxidation 6.4 Rasching process	09	10
	Total	48	70

Practical:

Skills to be developed:
Intellectual Skills:

1. To select suitable process of manufacturing.
2. To select proper process condition for getting maximum yield.

Motor Skill:

1. To work on manufacturing plant.
2. To set proper temperature and pressure conditions
3. To handle reactor.
4. To set controlling steps in manufacturing process.

List of Practicals:

1. Estimation of strength of glacial acetic acid.
2. Analysis of paint, thinner, pigment.
3. Determination of iodine value of oil.
4. Determination of saponification value of oil.
5. Determination of acid value of oil.
6. Analysis of soap(moisture content)
7. Calculation of hiding power of paint.
8. Determination of Aniline point.
9. Preparation of red oxide.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Dryden Outline of Chemical Technology	M. Gopala Rao		East West Publishers 1997, New Delhi.
Shreve Chemical Process Industries	George Austin		Mc Graw Hill Publication 1984, Auckland
Encyclopedia of Chemical	Kerk & Othmer		John Wiley and Sons 1981, New York

Technology			
Chemical Process Organic Synthesis	P. H. Groggins		Mc Graw Hill 1958, Auckland.
Handbook of Industrial Chemistry VOL. II	Davis. K. H		C.B.S Publication 2004, New Delhi
Faith, Kaynes and Clark's Industrial Chemistry	Frederick A, Cowerntreim & Marguerites K. Moran		John Wiley and Sons 1935, New York

Reference : en.wikipedia.org/wiki/organic-chemistry-72-k
www.onesmartclick.org

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	To draw different manufacturing process flow diagrams.
2	Seminar on any one manufacturing process.

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES
COURSE NAME: CHEMICAL ENGINEERING
COURSE CODE : CH
DURATION OF COURSE : 6 SEMESTERS
SEMESTER: FIFTH SCHEME : C

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	P	SESSIONSAL EXAM			ESE	PR	Oral #	TW @	
					TA	CT	Total					
1	Heat Transfer Operation	03	--	04	10	20	30	70	50	--	25	
2	Energy Management	02	--	02	10	20	30	70	--	--	25	
3	Chemical Reaction Engineering.	03	01	--	10	20	30	70	--	--	--	
4	Plant Safety and Maintenance	02	--	02	10	20	30	70	--	--	25	
5	Chemical Instrumentation and Process Control	02	--	02	10	20	30	70	50	--	25	
6	Industrial Project and Entrepreneurship Development	01	01	02	--	--	--	--	--	--	25	
7	Professional Practice -V	--	--	05	--	--	--	--	--	--	50	
	Total	13	02	17	50	100	150	350	100	--	175	

STUDENT CONTACT HOURS PER WEEK: **32 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 : 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 : Chemical Engineering Group (Heat Transfer Operation)	
Course code: CH	Semester : Fifth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• The subject gives the knowledge of measurement of fluid flow and various fluid transportation machinery.
2.	• The knowledge gained by this subject is directly used in different subjects studied in Chemical Engineering.
3.	• The knowledge of this subject helps in installation of different fluid flow and fluid transportation machinery.

Objective :-

S.No	The Student will be able to:
1.	• Calculate the amount of heat loss through flat wall, cylinder and sphere.
2.	• Study film coefficient, overall heat transfer coefficients.
3.	• Calculate the amount of radiation between the plates.
4.	• Compare and study construction, working and application of various types of heat transfer equipment.
5.	• Analyse an evaporator problem and to calculate the material and energy requirement of an evaporator.

Pre-Requisite :-

S.No	
1.	• Knowledge of fluid flow operations, mathematical calculations.
2.	• Knowledge of related unit operations, stoichiometry.
3.	• Knowledge of material science.

Contents		Hrs/week	Marks
Unit -1	**CONDUCTION** 1.1 Introduction- Modes of Heat Transfer (Conduction, Convection, Radiation) **2 Marks** 1.2 Fourier's Law, Steady state conduction, Conduction through Rectangular block, Compound resistances in Series, Problems**.** **4 Marks** 1.3 Conduction through cylinder, Sphere, concept of log mean radius for thick walled cylinders, Problems. **8 Marks** 1.4 Variation of Thermal conductivity with temperature, Problems. **4 Marks** 1.5 Critical Thickness of Insulation- Concept and Definition.	**10**	**18**
Unit -2	**CONVECTION.**	**14**	**30**

	2.1 Natural & Forced Convection. **2 Marks** 2.2 Definition of Film concept in heat transfer by convection Film coefficient and its comparison with Thermal Conductivity. 2.3 Derivation of Overall Heat Transfer coefficient from hot fluid to cold fluid through a metal wall. Effect of surface coefficient on overall heat transfer coefficient. **12 Marks** 2.4 Dimensional analysis for heat transfer for understanding the use of Reynolds number, Prandtl number, nusselt number and Grashoff number in calculating film coefficient. **8 Marks** 2.5 Calculating heat transfer in Laminar and Turbulent flow by Dittus Bolter & Sider Tatte Equation. 2.6 Co-current and Counter current Heat Exchanger. Their comparison and the concept of Log Mean temperature difference and its derivation, Problem. **6 Marks** 2.7 Significance of Heat transfer coefficient in boiling liquid and condensing vapors. Dropwise and Film wise condensation. **2 Marks**		
Unit - 3	**Radiation.** 3.1 Definition Kirchoff's law. Statement and equation of Plank's law. 3.2 Absorptivity, Reflectivity, Transmissivity, Black body, Gray body, body emissivity. 3.3 Radiation between two surfaces.	**03**	**04**
Unit – 4	**Heat Transfer Equipments** 4.1 Description with sketches and construction details of the following Heat Exchangers. a. Double pipe Heat Exchanger. **08 Marks** b. Shell & Tube – Multi pass. c. Plate type heat exchanges. d. Graphite block heat exchanges. e. Extended surface heat exchanges. f. Scrapped surface heat exchanges. 4.2 Advantages & disadvantages of multi pass heat exchangers. **04 Marks**	**10**	**12**
Unit - 5	**Evaporation.** 5.1 Evaporation as a Unit Operation, Comparison of Evaporation, Drying, Distillation. **02 Marks** 5.2 Properties that influences evaporation, capacity and economy of evaporator, Problems. Method to improve economy, feeding of multiple effect evaporator, mechanical recompression, thermal recompression. **06 Marks** 5.3 Material and Enthalpy balance for Single effect evaporator, Problems based on this topic. Detail study of construction and working of open pan evaporator, Horizontal tube evaporator. Vertical tube evaporator, long tube vertical evaporator, Forced circulation evaporator. **08 Marks**	**11**	**16**
	TOTAL	**48**	**80**

Practicals:
Skills to be developed:
Intellectual Skills:

a. To calculate the Physical property (thermal conductivity) of material.

b. To calculate the rate of heat flow through different materials.
c. To calculate the overall heat transfer coefficient.

Motor Skill:

a. To operate different types of heat exchange.
b. To control the operating parameters of heat exchange.

List of Practicals:

1. To find the thermal conductivity of material at different temperatures.
2. To calculate the rate of heat loss through composite wall.
3. To calculate the overall heat transfer coefficient for finned tube heat exchanges.
4. To calculate the overall heat transfer coefficient for shell and tube heat exchanges.
5. To calculate the overall heat transfer coefficient for double pipe heat exchanges.
6. To calculate the emissivity of a material.
7. To calculate heat transfer coefficient for natural and forced convection.
8. Measures various parameters controlled in a heat exchanger using process simulator.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Introduction to Chemical Engg.	Mr. Walter L. Badger & Mr. Julius T. Bachero		Mc Graw Hill International.
Unit Operations of Chemical Engineering.	Mc Cabe, W. L. Smith & Harriot.		Mc Graw Hill International.
Process Heat Transfer	Kern D.Q.		Mc Graw Hill International.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	Case study on any one heat transfer equipment.
2	Current review on heat transfer process.

Name of the Course : Chemical Engineering Group (Chemical Reaction Engineering)			
Course code: CH		Semester : Fifth	
Duration : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 13 hrs/week		Mid Semester Exam: Marks	
Tutorial: 2 hrs/week		Assignment & Quiz: Marks	
Practical : 17 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
Aim :-			
S.No			
1.	• This subject outlines the basic principles of kinetics. These principles which are useful in developing new concept and operating the plant.		
2.	• It enables the students to have an idea about the different types of reactors and it's design also gives knowledge about the importance of catalyst in various chemical processes in the industries.		
Objective :-			
S.No	After studying this subject student will be able.		
1.	• To know the laws of thermodynamics.		
2.	• To know about rate of chemical reaction.		
3.	• To understand various types of reactors.		
4.	• To know the fundamentals of reactor design		
Pre-Requisite :-			
S.No			
1.	• Knowledge of unit processes in chemical industry.		
2.	• Knowledge of thermodynamics, process calculations.		
3.	• Fundamentals of chemical engineering		
Contents		Hrs/ week	Marks
Unit -1	**Thermodynamics** 1.1 General basic terms used: Thermodynamics, System, Surrounding, State and path functions, Intensive Ant extensive properties, Cyclic process, equilibrium process, Heat and work as form of energy. 1.2 First law of Thermodynamics. 1.3 Second law of Thermodynamics. 1.4 Third law of Thermodynamics. 1.5 Concept of internal energy, enthalpy, entropy. 1.6 Calculation of entropy changes for ideal gas process. 1.7 Concept of free energy, Chemical potential.	**13**	**18**

	1.8 Feasibility of chemical reaction from free energy change. 1.9 Relation between Gibbs free energy change and equilibrium constant. 1.10 Relation between k_p, k_c and $k_{y.}$ 1.11 Van't Hoff equation, Variation of equilibrium constant with temperature at constant pressure. Variation of equilibrium constant with pressure at constant temperature. 1.12 Extent of reaction (Along with variation with temperature and pressure). No problem from thermodynamics.		
Unit -2	**Introduction to Chemical kinetics.** 2.1 Concept of rate of reaction, rate equation, rate constant, order of reaction, Molecularity of reaction, Chain reaction, Non chain reaction. **6 Marks** 2.2 Type of intermediate form in non chain reaction. 2.3 Single reaction multiple reaction, non-elementary reaction. 2.4 Theories of reaction rates constant. a. Arrhenius law & Problems based on it. b. From Thermodynamics. c. From Collision theory. d. From Transition state theory. **8 Marks** 2.5 Activation Energy.	**08**	**14**
Unit - 3	**Interpretation of batch reactor data.** 3.1 Concept of Batch reactor data, constant and variable volume reactions. 3.2 Analysis of total pressure data. 3.3 Integral and Differential method of analysis of batch reactor data. **08 Marks** 3.4 Integral method of analysis for irreversible unimolecular first order reaction, bimolecular second order reaction, n^{th} order, zero order and auto catalytic reaction. Problem based on zero order, first order and second order reactions. **6 Marks** 3.5 Half-life concept for the overall order of irreversible reactions and problem based on that. 3.6 Differential method- Partial analysis of rate equation and other methods. **4 Marks**	**13**	**18**
Unit - 4	**Introduction to reactor design.** 4.1 Types of reactors (Batch reactor, Continuous reactor, Plug flow reactor, Mixed flow reactor, Biological reactor, Fixed (packed) bed reactor, fluidized bed reactor. 4.2 Concept of space-time, space velocity and holding time. **6 Marks** 4.3 Performance equation for ideal batch reactor, mixed flow reactor and plug flow reactor for constant volume and	**12**	**16**

	variable volume irreversible first order reaction. Problems based on the above topic. 4.4 Size comparison of the reactors a. Batch reactors vs PFR (For first order reactions) b. PFR vs MFR (For first order irreversible reactions) and Problems based on the above topics. **5 Marks** 4.5 Multiple reactor systems. a. Equal size MFR in series. b. Different size MFR in series. (Finding final conversion for given system and finding the best system for achieving desired conversion.) - PFR in series. **5 Marks** - PFR in parallel. - PFR in parallel-series combination and problems based on that. - Reactors of different type in series and number of CSTR's.		
Unit - 5	**Catalysis.** 5.1 Definition, types and classification. 5.2 Preparation of catalyst, ingradients (Promotors, inhibitor, accelerator) 5.3 Catalyst Poisoning, regenerator. 5.4 Theories of catalysis- Adsorption. 5.5 Desired properties of catalyst.	**02**	**04**
	TOTAL	**48**	**70**

LIST OF ASSIGNMENTS

CHEMICAL REACTION ENGINERING

Contents		Hrs /week	Marks
Unit -1	Introduction to chemical kinetics Problems on Arrhenius law and activation energy.	02	
Unit -2	a) Problems on unimolecular first order reaction. b) Problems on bimolecular second order reaction. c) Problems on half life. d) Problems on zero order reaction.	01 02 02 01	
Unit -3	Introduction to reactor design (Find volume & conversion) a) Problems on batch reactor. b) Problem on Plug flow reactor. c) Problem on CSTR. d) Problems on multiple reactor (Find volume & conversion) 1) PFR in series – parallel combination. 2) MFR in series. 3) MFR – PFR series parallel combination.	 01 01 02 01 01 02	

	Total	16	

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Chemical Reaction Engineering	Octave Levenspiel		Wiley Eastern Ltd.
Chemical Engineering Kinetics	J. M. Smith		Mc Graw Hill Publication
Chemical Engineering Thermodymamics	J. M. Smith H. C. Vanness		Mc Graw Hill
Thermodynamic for Chemists	Samuel Glasstone		East Wet Pvt. Ltd.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	Determination of RTD of various types of reactors.
2	Determination of equilibrium data for product formation.

Name of the Course : Chemical Engineering Group (Energy Management)	
Course code: CH	Semester : Fifth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• Today's energy management challenges are much more dynamic than they were in the past. Industries are facing acute energy crisis. On one hand they are caught with scarcity of electric supply, and on the other, the ever increasing cost of energy.
2.	• Hence energy management is an essential and unavoidable activity in most of the industrial sector. The subject details with systematic energy management and energy audit.

Objective :-

S.No	The student will be able to
1.	• To understand the general energy scenario & various provisions of the Energy Conservation Act, 2001.
2.	• To perform basic effective energy audit report.
3.	• To prepare an effective energy audit report.
4.	• To judiciously select equipments from energy efficiency perspectives.
5.	• To identify the application of non-conventional & renewable energy the process
6.	• To understand the general energy scenario & various provisions of the Energy Conservation Act, 2001.

Pre-Requisite :-

S.No	
1.	• Knowledge of sources of energy.
2.	• Knowledge of various types of energy.

Contents		Hrs/week	Marks
Unit -1	**Energy Scenario** 1.1 Classification of Energy 1.2 Indian Energy Scenario 1.3 Energy Security? 1.4 Energy Conservation and it's importance. 1.5 Energy conservation Act, 2001.	**04**	**10**
Unit -2	**Basics of Energy** 2.1 Electrical basics-DC & AC current Electricity tariff load Management Power Factor (PF). 2.2 Thermal basics-fuels, Thermal Energy, Contents of Fuel, Heat Capacity, Heat Transfer, Units & Conservation	**04**	**08**

Unit - 3	**Energy Audit & Monitoring** 3.1 Types of Energy audit. 3.2 Understanding Energy Costs. 3.3 Benchmarking and Energy Performance. Energy monitoring & Targetting.	**08**	**18**
Unit – 4	**Energy Efficiency in Electrical & Thermal Utilites.** 4.1 Pumps & Pumping system. 4.2 Cooling towers 4.3 Fuel & Combustion. 4.4 Energy efficient Technologies.	**08**	**18**
Unit – 5	**Energy Performances Assessment** 5.1 Water pumps 5.2 Heat Exchangers..	**04**	**08**
Unit – 6	**Non-Conventional & Renawable Energy Sources.** 6.1 Solar Energy. 6.2 Wind Energy. 6.3 Bio Energy. 6.4 Hydro Energy. 6.5 Tidal & Ocean Energy.	**04**	**08**
	TOTAL	**32**	**70**

Practical:
Skills to be developed
Intellectual Skills:

- Ability to identify and select proper instruments for measuring parameter of importance.
- Ability to prepare energy audit report & present it.

Motor Skills:

- Ability to measure parameter of importance in electrical & non electrical system.
- Ability to acquire Hands-on experince.

Practicals:
Experiment/Assignment/Presentation:-

1) To measure the parameters of importance other than electrical such as temperature / Air & Gas flow / Liquid flow / revolutions per minute / noise & vibration / dust concentration etc.

2) To measure basic electrical parameters in AC & DC system – Voltage / Current / Power Factor / Active power / Apparent power / Energy consumption etc.

3) To Prepare preliminary audit report for any organization Considering following points.
   i) Energy Consumption in the Organization.
   ii) Scope of Saving.
   iii) Identify the mostly and the easiest areas of attention.
   iv) Identify immediate improvements/ saving etc.

4) To collect information for detailed audit report such as.
   i) Energy consumption by department, type of Energy.
   ii) Energy Cost and Tariff data.
   iii) Process and Material flow diagram.
   iv) Sources of Energy supply.
   v) Material balance data.
   vi) Capacity Utilisation etc.

5) To Prepare detailed Energy audit report for any Organisation.

6) Report Presentation with case studies on any one topic in Energy Management.

7) Visit to any industrial sector where energy Management Policy is Implements.

8) To Collect Information about Energy Management Policy of any 2 Companies using web source.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
--	Guide book for Nation Certification Examination for Energy Managers & Energy Auditors Book 1 to 4		Bureau of Energy Efficiency, New Delhi.
Robert L. Loftness	Energy Handbook		Non Nostrand Reinhold Compnay

Web Source

- **(i)** www.bp.com/centres/energy.
- **(ii)** www.epa.org
- **(iii)** www.calculator.org/properties.html
- **(iv)** www.eeca.govt.nz
- **(v)** www.energyusernews.com/
- **(vi)** www.bce-india.nic.in

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	Energy audit for various departments in institute.
2	Study on standards, norms, & rules of BEE, India.

Name of the Course : Chemical Engineering Group (Chemical Instrumentation & Process control)	
Course code: CH	Semester : Fifth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• Monitoring and control of processes is an important activity of Chemical Engineer. The subject deals with measurement principles of process parameters like temperature, pressure, level flow.
2.	• With knowledge of this subject student will be able to control the process parameter as per the desired value for the optimization of the process.

Objective :-

S.No	The students will be able:
1.	• To learn the operating principles, construction and working of temperature, pressure, level and flow measuring devices.
2.	• To select the most suitable measuring device based on its performance characteristics for specific measuring task.
3.	• To test, Calibrate, Maintain process control elements.
4.	• To know the use of Controllers, PLC & DCS in process Industry.

Pre-Requisite :-

S.No	
1.	• Knowledge of unit operations.
2.	• Knowledge of Mathematical calculations
3.	• Knowledge of basic electronics.

Contents		Hrs/week	Marks
Unit -1	Measurement Systems 1.1 Measurement and its aim 1.2 Measurement system element 1.3 Static characteristics Calibration, Accuracy, Precision, Repeatability, Drift, Sensitivity, Resolution, Dead zone, Static error. 1.4 Dynamic Characteristics Speed of response, fidelity,lag,Dynamic error.	02	04
Unit -2	Temperature 2.1 Temperature Scales 2.2 Methods of Temperature Measurement. 2.3 Expansion Thermometer	05	12

	2.4 Filled-system Thermometer 2.5 Electrical Temperature Instruments 2.6 Pyrometer		
Unit - 3	Pressure 3.1 Units of Pressure 3.2 Methods of Pressure Measurement 3.3 Manometers 3.4 Elastic Pressure Transducer 3.5 Force-balance Pressure Gauges 3.6 Electrical Pressure Transducer 3.7 Measurement of Vacuum.	05	10
Unit – 4	Level 4.1 Methods of Liquid level Measurement 4.2 Direct Methods: Sight Glass, Float, Displacer. 4.3 Indirect Methods: Pressure gauge, Air trap, Diaphragm box, Air purge, Radioactive, Ultrasonic, Capacitive. Solid level Measurement.	02	06
Unit – 5	Flow 5.1 Methods of flow Measurement 5.2 Inferential Flow Measurement: Variable head, Variable area, Magnetic meter, Turbine meter, Vortex meter, Ultrasonic flow meter. 5.3 Quantity Flow meter: Positive displacement meters, Nutating disc meters, Rotating vane meter, Lobed impeller meter. 5.4 Mass Flow meters: Gyroscopic Flowmeter, Thermal meter.	05	10
Unit - 6	**Process Control System & Controllers** 6.1 Open & closed loop system, cascade control system. 6.2 System input step, ramp, sinusoidal, pulse. 6.3 Control Action : On-Off, proportional integral, derivative. 6.4 Pneumatic Controllers. Electronic Controllers.	05	10
Unit – 7	**Control Valve** 7.1 Valve characteristics. 7.2 Valve types, Valve actuators, Valve positioners. 7.3 Valve selection and sizing.	04	08
Unit – 8	**Computer-Aided Measurement & Control System** 8.1 Elements of computer-aided measurement and control. 8.2 Computer aided process control Architecture. 8.3 Man-machine Interface (MMI). 8.4 Computer- aided process control hardware. 8.5 Programmable Logic controller (PLC) Architecture. 8.6 Distributed Control System (DCS) Architecture.	04	10
	TOTAL	32	70
PRACTICALS: Intellectual Skills:			

- To verify the principles, laws, using given measuring instruments under different conditions.
- To read and interpret the graph.
- To interpret the results from observations and calculations.

Motor Skills:

- Proper handling of measuring devices.
- 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.

Practicals/ Term Work:

1) Measurement of temperature using thermocouple or RTD or Thermistor and to find their characteristics.
2) Measurement of high temperature using radiation or Optical pyrometer.
3) Measurement of pressure using LVDT or Strain gauge transducer.
4) Calibration of pressure gauge using Dead Weight Tester.
5) Measurement of level using air purge or capacitance type level detector.
6) Measurement of flow using magnetic flow meter or Ultrasonic flow meter.
7) Determine the characteristics of ON- OFF or proportional or proportional integral or proportional derivative or proportional integral derivative controller.
8) Determine the characteristics of control valve
9) Practice plant operating skills like start up and shutdown of plant, analyze normal operating conditions, attend any malfunction operate the plant safely using DCS / PLC based process simulator on any two unit operations.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Industrial Instrumentation and control	S.K.Singh		Tata McGraw Hill publishing company Ltd
Instrumentation	Franklyn Kirk & Nicholas Rimboi		D.B.Taraporevala Sons & Co Private Ltd
Industrial control and Instrumentation	W. Bolten		Universities Press (India) Ltd
Process control	Peter Harriott		Tata McGraw Hill Publishing Company Ltd

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Chemical Engineering Group (Industrial Project and Entrepreneurship Development)	
Course code: CH	Semester : FIFTH
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• Globalization, liberalization & privatization along with revolution in Information Technology, have thrown up new opportunities that are transforming lives of the masses. Talented and enterprising personalities are exploring such opportunities & translating opportunities into business ventures such as- BPO, Contract Manufacturing, Trading, Service sectors etc.
2.	• The student community also needs to explore the emerging opportunities.It is therefore necessary to inculcate the entrepreneurial values during their educational tenure. This will help the younger generation in changing their attitude and take the challenging growth oriented tasks instead of waiting for white- collar jobs. The educational institutions should also demonstrate their uniqueness in the creation of enterprising personalities in their colleges.
3.	• This subject will help in developing the awareness and interest in entrepreneurship and create employment for others.

Objective :-

S.No	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.
4.	• Develop awareness about enterprise management.

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	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. 4). Develop awareness about enterprise management	
Contents : Theory (Name of the Topic)		Hrs/week
Unit -1	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
Unit -2	Information And Support Systems 2.1) Information Needed and Their Sources. Information related to project, Information related to 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
Unit - 3	Market Assessment 3.1) Marketing -Concept and Importance 3.2) Market Identification, Survey Key components 3.3) Market Assessment	02
Unit - 4	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	03

	6) Financial Ratios and Significance Business Account 4.2) Accounting Principles, Methodology 1) Book Keeping 2) Financial Statements 3) Concept of Audit,	
Unit – 5	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 Appraisal 1) Meaning and definition 2) Technical, Economic feasibility 3) Cost benefit Analysis	03
Unit - 6	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 5) Importance of Quality, Importance of testing 6.2) E-Commerce Concept and process 6.3) Global Entrepreneur	02
	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	J.B.Patel	EDI STUDY MATERIAL	

Prepare a Project Report	D.G.Allampally	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 Directory 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 Entrepreneurs	P.C.Jain		
Evaluation of Entrepreneurship Development Programmes	D.N.Awasthi , Jose Sebeastian		
The Seven Business Crisis & How to Beat Them.	V.G.Patel		
Entrepreneurship Development of Small Business Enterprises	Poornima M. Charantimath	Pearson Education, New Delhi	
Entrepreneurship Development	--	McGraw Hill Publication	
Entrepreneurship Theory and Practice	J.S. Saini B.S.Rathore	Wheeler Publisher New Delhi	
Entrepreneurship Development	--	TTTI, Bhopal / Chandigadh	

Video Cassettes

No	Subject	Source
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmadabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153
2	Assessing Entrepreneurial Competencies	

3	Business Opportunity Selection and Guidance	E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
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 :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	Assignments
1	Assess yourself-are you an entrepreneur?
2	Prepare project report and study its feasibility.

Name of the Course : Chemical Engineering Group (Plant Safety and Maintenance)	
Course code: CH	Semester : Fifth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• In the chemical process industry plant safety is important. Knowledge of plant safety is essential to prevent accidents and damages while working in plant.
2.	• Maintenance of plant and machinery is one of the most important aspects of process industry. This subject deals with safe practices, various types of maintenance and their significance.

Objective :-

S.No	The students will be able to:
1.	• Describe the safety procedures to be observed while working in a plant.
2.	• Identify types of hazards associated in a chemical process industry.
3.	• Prepare safety audit report & safety report.
4.	• Explain procedure for preventive maintenance, on-line maintenance, shut down maintenance.

Pre-Requisite :-

S.No	
1.	• Knowledge of unit operations processes in industry.
2.	• Basics of process control.
3.	• Knowledge Physical and chemical properties of fluids used in industries.

	Contents	Hrs/week	Marks
Unit -1	Plant Safety 1.1 Importance & objectives of safety 1.2 Safety in chemical industry 1.3 Criteria for setting & layout of chemical plant. 3.4 Instrumentation for safe plant operation.	04	06
Unit -2	Plant Hazards 2.1 Chemical hazards, Toxic hazards, Explosion hazards, Electrical hazards, Mechanical hazards, Radiation hazards, Noise hazards. 2.2 Control, precautions & prevention, Safety measures in plant.	05	10
Unit - 3	Personal Protective Equipment: 3.1 Respiratory equipment	03	08

	3.2 Non-respiratory equipments.		
Unit – 4	Fire Prevention 4.4 Classification of fires. 4.5 Causes of fire. 4.6 Prevention of fire: Portable extinguishers, Water systems, carbon-di-oxide systems, foam extinguisher system, dry chemical extinguisher systems.	03	08
Unit – 5	Storage & Transportation of chemicals 5.5 Different methods of storage 5.6 Characteristics of chemical with special reference to safe storage & handling of chemicals. 5.7 Layout of storage 5.8 Various modes of transport 5.9 Safety precautions in transportation of different types of chemicals.	05	10
Unit - 6	Safety Audit 6.1 Objective of safety audit 6.2 Procedure for safety auditing 6.3 Audit report, Safety report.	03	08
Unit - 7	Plant Maintenance 7.1 Concepts of maintenance 7.2 Preventive maintenance 7.3 ON-line Maintenance 7.4 Shut down Maintenance 7.5 Procedure for startup, Commissioning and shut down of plant.	09	20
	TOTAL	32	70

PRACTICALS:

Intellectual Skills

- Proper selection of personal protective devices, fire extinguishers, storage devices, Transportation system.
- Analyze the potential hazards & take corrective measures.
- Prepare plant layout based on safe plant operation.
- Prepare on-site & off site emergency plans, Fire Prevention check list.
- Prepare safety audit report, safety report.
- Prepare maintenance schedule.

Motor Skills

- Proper handling of personal protective devices, fire extinguishers.
- Adopt safe procedure while handling & storing chemicals.
- Ability to acquire hands-on experience in handling emergencies, trouble shooting of chemical plant problem.

Laboratory Experiments:

1) Demonstration and practice in the use of personal protective devices.
2) Demonstration and practice in the use of fire extinguishers.
3) Prepare plant setting and layout of chemical plant.

4) Prepare safety Audit report for a given plant.
5) Prepare fire prevention check list.
6) Prepare checklist of potential hazards in chemical plants.
7) Anaylse case studies of major Industrial disasters.
8) Prepare Preventive Maintenance chart for given equipment.
9) Prepare PERT-Chart for shutdown maintenance for given plant.
10) Fault finding and repairing of given equipment used in process plant.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Safe Handling of Hazardous Chemical	A.K. Rohatgi		J.K. Enterprises, Bombay
Safety & Accident prevention in Chemical operation	H.H Faucet & W.S. Wood		Interscience Publishers of Jhon Wiley & Sons, New York
Safety in Process Plant Design	G.L. Wells		John Wiley & Sons.
Industrial Safety Handbook	William & Handley		McGraw Hill
Plant Maintenance	S.S. Apte		Delhi Productivity Council
Maintenance Engineer's Handbook	C.L. Morrow		McGraw Hill

Video Cassettes / Posters on Safety:

1) Loss prevention Association of India Ltd.
   Warden House, Sir P.M. Road,
   Mumbai – 400 001
2) National Safety Council
   Plot No. 98A, Sector – 15,
   Industrial Area, CBD Belapur, Navi Mumbai – 400 614

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	Case study on standard rules of plant safety.

Name of the Course : Chemical Engineering Group (Professional Practices-V)	
Course code: CH	Semester : Fifth
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 13 hrs/week	Mid Semester Exam: Marks
Tutorial: 2 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :- Nil

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
Unit -1	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. Fabrication Industry involved in manufacturing Chemical Engineering equipments like Reaction kettle, HE, Tanks etc. ii. Petroleum industry to see Safety equipments. iii. Factory to see various instruments like Thermocouple, Flow measuring Devices, Level measuring Devices Level. iv. Chemical Industry for Studying various types of heat exchange equipments.	24
Unit -2	Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any of the following areas : viii) Industrial Engineer in a Chemical Industry. ix) Controllers used in a Chemical Industry. x) Safety Engineer a Chemical Industry. xi) E. T. P. plant in a Chemical Industry.	14
Unit - 3	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 : v) Collect 2 types of Pressure Gauges & 2 types of Vacuum Gauges. vi) Visit a Chemical factory & see Working of GLC.	32

	Total	**70**
Text Books:- Nil		
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: AUTOMIBILE ENGINEERING

COURSE CODE :AE

DURATION OF COURSE : 6 SEMESTERS

SEMESTER: SIXTH SEMESTER **SCHEME : C**

Sr.No.	SUBJECT	PERIODS			EVALUATION SCHEME							Credits
	THEORY	L	TU	P	SESSIONSAL EXAM			ESE	PR	Oral #	TW @	
					TA	CT	Total					
1	Management Ø	03	--	--	10	20	30	70	--	--	--	3
2	Automotive Electrical & Electronic Systems	03	--	02	10	20	30	70	--	25	25	4
3	Transport Management	03	01	--	10	20	30	70	--	--	25	3
4	Vehicle Maintenance	03	--	04	10	20	30	70	50	--	25	5
5	Elective II (Any One)											
	Alternate Energy Sources And Management $	03	--	02	10	20	30	70	--	--	25	4
	CAD -CAM And Automation $	03	--	02	10	20	30	70	--	--	25	4
	Automobile Air Conditioning	03	--	02	10	20	30	70	--	--	25	4
	Special Purpose Vehicles	--	--	02	10	20	30	70	--	--	25	**1**
	Industrial Project	--	--	06	--	--	--	--	--	50	50	**3**
	Professional Practices- VI (AE)	--	--	03	--	--	--	--	--	--	50	**2**
Total		14		17	50	**100**	**150**	**350**	50	75	200	25

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, 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 : DIPLOMA IN CHEMICAL ENGINEERING (INDUSTRIAL PROJECT)		
Course code: ME/MH/MI/AE/PG/PT/CH		Semester : SIXTH FOR ME/AE/PG/PT/CH AND SEVENTH FOR MH/MI
Duration : **6 SEMESTERS**		Maximum Marks :
Teaching Scheme **C**		Examination Scheme
Theory : 14 hrs/week		Mid Semester Exam: Marks
Tutorial: 1 hrs/week		Assignment & Quiz: Marks
Practical : 17 hrs/week		End Semester Exam: Marks
Credits :- Nil		

Aim :-	
S.No	
1.	• In practice the diploma technicians come across problems of varied nature. He/she will have to solve the problems involving drawings, designs, manufacturing, installation, testing and maintenance of machines.
2.	• In order to cultivate the systematic methodology for problem solving using acquired technical knowledge & skills, this particular subject is introduced. This subject will also help to enhance the generic skills & professional skills.
3.	

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.	• 7. Work effectively in team.

Pre-Requisite :-	
S.No	
1.	• Knowledge of all subjects covered in course.

*Contents (**Skills To Be Developed:**)*		Hrs/week
Unit -1 Intellectual Skills	▪ Design the related machine components & mechanism. ▪ Convert innovative or creative idea into reality. ▪ Understand & interpret drawings & mechanisms ▪ Select the viable, feasible & optimum alternative from	
Unit -2 Motors skills	• Use of skills learnt in workshop practical. • Assemble parts or components to form machine or mechanisms. • Classify & analyze the information collected. • 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

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 be 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, Compararative 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 be 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

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

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA IN CHEMICAL ENGINEERING (PROCESS SIMULATION)			
Course code: CH		Semester : SIXTH	
Duration : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 14 hrs/week		Mid Semester Exam: Marks	
Tutorial: 1 hrs/week		Assignment & Quiz: Marks	
Practical : 17 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
Aim :-			
S.No			
1.	• Most of the chemical process plant are operated and Controlled through Distributed Control System (DCS). It is necessary to train student on DCS process simulator where he will get first hand experience of process plant Operation and control.		
Objective :-			
S.No	Student will be able to:		
1.	• Understand process instrument controls.		
2.	• Get familiarized with the various chemical process.		
3.	• Get experience and exposure to set of typical upset And equipment malfunction.		
4.	• Learn and practice correct startup and shutdown Procedure.		
Pre-Requisite :- Nil			
S.No			
1.	• Knowledge of all unit processes and process controls.		
2.	• Knowledge of mathematical & process calculations.		
Contents : Theory			Hrs/week
Note- content of theory are to be taught in practical period.			
Unit -1	*Process Simulators* Need of simulators, Application simulators distributed controlled system-Dynamic Graphic (mimic), Bar graph, Trend and Alarm.		
Unit -2	*Process Simulator Software* Installation of software. Introduction of software feature using member, Toolbar, dilogbar, Toolbar, Status bar Scroll bar Title bar. Screens (Display), Mimics, bar graph, trend alarms, snapshots, back track, caution longing, connectivity between bar graph – mimics-trends-alarm exercise-loading, saving, delete, controlling the session – run freeze, quit etc. mal function, online holp, star up and shut down procedure.		
Unit - 3			
Contents : Practical			Hrs/week
Note :- Print of logs to be attached as term work.			

Unit -1	1) Practice correct startup and shutdown procedure of the plant. 2) Change the P, I, D values and process parameters and observe then change in trend, bar graphs and mimics. 3) The should attend the malfunction occurring in the plant then restoring to its design conditions. 4) The should practice the above exercise on any six process modules given below using process simulators. i) Binary distillation column for Benzene and Toluene. ii) Temperature and pressure control iii) Stirred tank reactor. iv) Filtration. v) Level and Flow in different type size vessels. vi) Three-element boiler control. vii) Level control in coupled tanks. viii) Pressure control in different sizes valve. ix) Catalytic reactor. x) Absorption xi) Superheated steam xii) Dryer xiii) Heat Exchanger xiv) Multi component distillation column	

Text Books:

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	Study of simulation software based various computer languages.

Name of the Course : DIPLOMA IN CHEMICAL ENGINEERING (PROFESSIONAL PRACTICES-VI)	
Course code: CH	Semester : SIXTH
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 14 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.
2.	• While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.
3.	• The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

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
Unit -1	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 : v) To see working of a Distillation Column. vi) E. T. P. of a chemical industry. vii) To visit a sugar industry. viii) To visit a food or pharmaceutical industries. ***ix) H. R. department of a chemical industry.***	08
Unit -2	*Lectures by Professional / Industrial Expert / Student Seminars based on information search to be organized from any of the following areas:* xii) Energy auditor. xiii) Management.	08

	xiv) Enterpriser. xv) Recent trands in Distillation. xvi) Pollution control board offical.	
Unit - 3	Group Discussion : 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 - v) Steam distillation. vi) Azeotropic Distillation. vii) Interview techniques. viii) Non-convential and energy sources.	08
Unit - 4	**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 five different types of crystalline chemical with their purification. ii) Different types of packing material used in packed towers. iii) Energy audit for chemical engineering department. 1) Mass transfer lab. 2) Heat transfer lab. iv) Collect information are distillation from internal. v) Various universities for higher education. vi) Various job avenue for a student diploma.	08
	Total	32
Text Books:		
Reference books :- Nil		
Suggested List of Laboratory Experiments :- Nil		
Suggested List of Assignments/Tutorial :- Nil		

Name of the Course : DIPLOMA IN CHEMICAL ENGINEERING (BIOPROCESS ENGINEERING (ELECTIVE))	
Course code: CH	Semester : SIXTH
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 14 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• Biotechnology is a declared thrust area besides IT for economic growth of our country. Bioprocess engineering is very essential for agriculture-based economy for maximum output from limited resources of the agricultural sector.
2.	• This subject is introduced to increase employability of Chemical Engineering students in biotechnology field.

Objective :-

S.No	Students will be able to
1.	• Understand basic terminology and biotechnology principles.
2.	• Apply knowledge of Unit Operations and Unit Processes of Chemical Engineering to bioprocess industry.
3.	• Use processes carried out in bioreactor.
4.	• Apply knowledge of bioprocess engineering.

Pre-Requisite :-

S.No	
1.	• Knowledge of biology.
2.	• Fundamentals of chemical engineering.

Contents : Name of the Topic		Hrs/ week	Marks
Unit -1	General reaction kinetics for biological system.(08 Marks) • Enzyme Kinetics • Michaleis-Menten kinetics • Determination of enzyme kinetic constants • Kinetics of enzyme deactivation. Immobilization of enzymes and cells. (04 Marks) Kinetics of Microbial growth. (04 Marks) Death rate kinetics (04 Marks)	06	16
Unit -2	Stoichiometry • Thermodynamics of bio system • Material and energy balances (Problems)	06	08

Unit - 3	Sterilization Design, preparation and sterilization of media. Air sterilization.	10	08
Unit – 4	Bioreactor Bioreactor Configuration. Practical consideration for bioreactor configuration. Monitoring and control of bioreactors. Ideal Reactor operation. Scale up of bioreactor systems.	08	10
Unit – 5	Diffusion • Role of diffusion in bio processing. • Oxygen uptake in cell culture. (04 Marks) • Oxygen transfer in fermenters. (04 Marks) • Measuring dissolved oxygen concentration. (04 Marks) • Mass transfer correlation. Measurement of K_La. (04 Marks)	10	14
Unit – 6	Bio separation • Down stream processing and bio separation. (08 Marks) • Waste water treatments. (08 Marks)	08	14
	Total	48	70

PRACTICAL:

Intellectual Skills:

1. Observations
2. Cultivation of micro organisms
3. Analysis of growth
4. Aseptic Conditions

Motor Skills

1. Equipment handling
2. Preparation of aseptic conditions

LIST OF PRACTICALS:

1. Preparation and Sterilization of Media.
2. Microscopic Examination of different groups of Micro-organisms.
3. Growth and enumeration of Micro-organisms.
4. Aseptic Techniques.
5. Assay of enzyme activity and specific activity.
6. Kinetic analysis of an enzyme catalyzed reaction.
7. Determination of K_La and dissolved oxygen.
8. Study of fermentation processes and controls.
9. Immobiliztion of enzymes and whole cells.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Ghose T.K	Bioprocess Computations in Biotechnology		Eiils Horwood Ltd
Bailey Jams E. and Oils D.F.	Biochemical Engineering Fundamental		McGraw Hill Book Co.
Pauline M. Doran	Bioprocess Engineering Principles		Academic Press Limited, London
Aiba, Arthur E. Humphery and Nancy F. Millis	Biochemical Engineering		University of Tokyo Press.

Reference books :- Nil	
Suggested List of Laboratory Experiments :- Nil	
Suggested List of Assignments/Tutorial :-	
S.No	
1	Draw anyone flow sheet for bioprocess

Name of the Course : DIPLOMA IN CHEMICAL ENGINEERING (CHEMICAL ENGINEERING DRAWING)	
Course code: CH	Semester : SIXTH
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 14 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• To understand the different types of symbols & Chemical process drawing with respective to equipments which are used in Chemical Industry. In addition, assembly drawing of major plant equipment.
2.	• To understand the orientation of equipment and process.

Objective :-

S.No	The student will be able
1.	• To draw and explain the symbol as per IS code.
2.	• Prepare PFD, ULD & PI Diagram as per the process.
3.	• Prepare specification for different Chemical Equipments.
4.	• Prepare equipment layout & Tank farm Drawing.
5.	• Prepare PFD on CAD.

Pre-Requisite :-

S.No	
1.	• Basics of process flow equipment symbols.
2.	• Knowledge equipment operating conditions.

Contents : Name of the Topic		Hrs/week
Unit -1	Process Instrumentation Symbols.	01
Unit -2	Valves: Sectional views of: Gate valve, Globe valve, Ball valve, Check valve, (Swing & lift check valve), Diaphragm valve, safety valve (Spring Loaded / Rams bottom).	05
Unit - 3	Pipe Joints. 3.1 Threaded, flanged and other joints 3.2 Bend (Short & Long) 3.3 Elbow 3.4 Tee 3.5 Nipple 3.6 Socket, Reducing socket 3.7 Union Joint	02

	3.8 Plug 3.9 Flanges. Blind, C.I., Slip on, welded Neck, Hub type, Hap type Screwed type. 3.10 Socket and spigot joint. 3.11 Hydraulic joint. 3.12 Expansion joints loop and Corrugated.	
Unit – 4	Supports for pipe and vessels. 4.1 Hanger 4.2 Roller 4.3 Yard piping support. 4.4 Vessel support. Vertical vessel, Leg, Skirt, Bracket, lug support. Horizontal vessel saddle type.	03
Unit – 5	Fabrication Drawing. 5.1 Shell and tube heat exchanger. 5.2 Batch Reactor. 5.3 Horizontal storage tank. 5.4 Short tube Vertical Evaporator 5.5 Types of Packing. 5.6 Types of distributor: Weir type and spider type. 5.7 Liquid redistributor. 5.8 Grid bar support plate. 5.9 Types of Heads.	05
Unit – 6	Specification Sheet. 6.1 Centrifugal Pump. 6.2 Reciprocating pump. 6.3 Batch reactor. 6.4 Shell and tube heat Exchanger.	04
Unit – 7	7.1 Process flow sheeting (ULD & PFD) 7.2 Piping and Instrumentation Diagram of Chemical processes. 7.3 Equipment Layout 7.4 Tank Form	10
Unit – 8	Revision of CAD & Process flow Diagram on CAD.	02
	TOTAL	32

Practical:

Notes : 1) Students should be use A3 size sketch book for class work.
2) Use Approximately 570mm×380mm size drawing sheet for term work.

List of Practicals	Skill to be Developed	
	Intellectual Skills	Motor Skills
1) VALVES, Two sheet comparison of the above topic to be drawn	To develop ability to learn different type of valve	To developed the ability to drown the sectional view
2) Two sheet on all pipe joints	To developed ability to identify different types of pipe joint flanges.	To developed ability of different types of pipe joint

3) One sheet on support for pipe & vessels	To developed learn support for pipe &vessels	--
4) Two sheet on fabrication drawing	To developed ability to identify the different types of chemical equipment	To developed the ability draw the sectional view
5) One sheet on preparation of any one from the topic, chapter 06 specification	To drown prepare the details of the equipment	To learn details construction of the equipment.
6) Two sheet on topic 7.1 & 7.2 one sheet on topic 7.2 one sheet on topic (7.3 7.4 combined)	To developed ability between PFD, ULD & P & I diagram	--
7) One sheet on CAD w.r.t. to topic 7.1	To develop ability to learn CAD	To draw PFD on computer.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Process Equipment Design	M.V. Joshi V.V. Mahajan		1997 Mac Milan India Ltd. New Delhi
Process Design of Equipments	Dr. S.D. Dawande		1999 Central Techno publication Nagpur
Chemical Process Equipment	Sranley M. Walas		1988 Butter worth Publishers Reed Publishing Inc (USA) Boston.
A First Year Engineering Drawing	A.C. Parkinson		1995 A.H. Wheeler & Co. Allahabad
Machine Drawing	N.D. Bhatt		1986 Charottar Publishing House Anand (Gujrat)

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA IN CHEMICAL ENGINEERING (ENVIRONMENTAL TECHNOLOGY)	
Course code: CH	Semester : SIXTH
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 14 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• To understand the different pollution problems and their controlling methods related with air pollution, water pollution, automobile exhaust, waste water treatment, solid waste management as well as ISO 14001.

Objective :-

S.No	The subject student will be able
1.	• To understand the pollution problem.
2.	• To know the effects of different pollutants in the environment.
3.	• To learn different equipments used to control the pollution.
4.	• To understand basic design calculation.
5.	• To understand the norms of ISO 14001.

Pre-Requisite :-

S.No	
1.	• Knowledge of different sources of pollution.
2.	• Knowledge of effects of pollution.
3.	• Fundamentals of chemical engineering.

Contents : Theory (Name of the Topic)		Hrs/week	
Unit -1	**Air Pollution** 1.0 Introduction. 1.1 Air Pollutants. 1.2 Natural sources of air pollution. 1.3 Man made sources of air pollution. 1.4 Effect of air pollution on health, animals and material. 1.5 Principle of air sampling, particulate and gaseous sample collection methods. 1.6 Controlling methods. 1.6.1 Gravity Settling Chamber. 1.6.2 Cyclone separator. 1.6.3 Fabric Filter. 1.6.4 Wet Scrubber.	**12**	**18**

	1.6.5 Electrostatic Precipitator. 1.6.6 Absorption, Adsorption and incineration.		
Unit -2	**Water Pollution.** 2.1 Introduction. 2.2 Role of Pollution Control Board. 2.3 Different Sampling Methods. 2.4 Different Physical Treatment methods, 2.5 Different Chemical Treatment Methods. 2.6 Different Biological Treatment Methods.	**10**	**14**
Unit - 3	**Solid Waste Management.** 1.1 Solid Waste Characteristics. 1.2 Solid Waste Collection. 1.3 Solid Waste Processing. 1.4 Reuse, Recycle and Recovery. 1.5 Disposal. (Biomedical)	**08**	**12**
Unit – 4	**Waste Water Treatment** 4.1 Introduction. 4.2 Preliminary Treatment. 4.3 Primary Treatment 4.4 Secondary (Biological) Treatment. 4.4.1 Trickling Filters. 4.4.2 Activated Sludge Treatment. 4.5 Sludge Management. 4.6 Sludge Characteristics 4.7 Sludge Treatment. 4.7.1 Sludge Thickening. 4.7.2 Sludge Digestion. 4.7.3 Sludge Dewatering. 4.7.4 Sludge Disposal.	**12**	**18**
Unit - 5	**Environmental Audit & ISO – 14000** 5.1 Need of Environmental Audit. 5.2 Procedure for Environmental Audit. 5.3 Advantages of Environmental Audit. 5.4 Need of ISO 14001. 5.5 Business benefits of ISO 14000.	**06**	**08**
	TOTAL	**48**	**70**

Practical:

Skills to be Developed:

Intellectual skills:

1) To identify different pollution in atmosphere.
2) To decide pollution control methods.
3) To classify different solid waste.
4) To select proper method for disposal of solid waste.

5) To design simple parameter for waste water treatment.

Motor skills:

1) To work on effluent treatment plant.
2) To prepare audit report.
3) To set procedure for ISO-14000.
4) To handle different pollution controlling equipment.

List of Practicals:

1) To estimate the concentration of H_2S and CS_2 in work room by modified gas analyser.
2) Determination of COD of the given effluent sample.
3) To measure the suspended particles in liquid by turbidity?
4) To estimate chloride content of given water sample.
5) To determine BOD of given sample.
6) Determination of acidity / alkalinity in given effluent sample.
7) Determination of total solids , total suspended solids , total dissolved solids in given effluent sample.
8) Prepare an environment audit report for any process industry.

Estimation of suspended particulate in matter , in air by high volume sampler

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Dr. P. K. Khatolitya	Environmental Pollution.- 2004		C. Chand & Company Ltd. New Delhi- 55.
Mr. P. A.Vesilind	Introduction to Environmental Engineering.- 1997		PWS Publishing Company, Boston.
Jerry Natheson	Basic environmental Technology.- 2002		New Delhi Prentice- Hall of India Pvt. Ltd.
G. N. Pandey & G. C. Carney	Environmental Engineering- 1989		Tata Mc GrawHill, New Delhi.
Dr. H. S. Bhatia	Text Book of Environmental Pollution and Control.- 1998		New Delhi Galgotia Publication.
Mr. S. S. Dara.	A Text Book of Environmental Chemistry and Pollution Control.- 1991		S. Chand & Company Ltd. New Delhi.
S. S. Rao	Environmental Pollution control		Wiky Eastern Ltd. New Delhi
Mr. D. K. Asthana & Mrs. Meera Asthana.	Environmental Problem and Solution.- 2001		S. Chand & Company Ltd. New Delhi.
Mr. S. P. Mahajan.	Pollution Control in Process Industries.-		Tata Mc GrawHill, New Delhi.

	1985		
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :-			
S.No			
1	Statistical study of any one type of industry.		

Name of the Course : DIPLOMA IN CHEMICAL ENGINEERING (FOOD PROCESSING & ENGINEERING (ELECTIVE))	
Course code: CH	Semester : SIXTH
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 14 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :-

S.No	
1.	• Food processing is very essential for agriculture-based economy for value addition of the agricultural produce. This subject is introduced to increase employability of Chemical Engineering students in food processing field.
2.	• Biotechnology & food processing is a declared thrust area besides for economic growth of our country

Objective :-

S.No	The student will be able to:
1.	• To make students aware of food processing operations.
2.	• To make students aware of Unit Operations and Unit Processes of chemical engineering applied to food processing industry.
3.	• To understand manufacturing processes of different value added food products.
4.	• To know aseptic conditions to be maintained in food processing industry.

Pre-Requisite :-

S.No	
1.	• Knowledge of microbiology, biochemistry, bioseparation.
2.	• Knowledge of unit processes

Contents : Theory (Name of the Topic)		Hrs/week	
Unit -1	Overview of Food Chemistry. Food Constituents: Carbohydrates, Protein, Lipids, Enzymes and water. Vitamins and Minerals. Food Additives.	08	07
Unit -2	Classification and terminology of microorganisms. Nutritional requirement of microorganisms. Growth of microorganisms. Factors affecting growth and inhibition of microorganisms in food.	08	07
Unit - 3	Spoilage and associated chemical / physical changes in food. Basic principles and unit operations in food processing and preservation. Food preservation by high temperature, low temperature, dehydration, evaporation, chemicals, irradiation. Food Packaging.	08	14
Unit – 4	Process technology of Fruits and Vegetables : Unit operations in processing and canning of fruit and vegetables and their products. Technology of Juice and Beverages, Jams, Jellies, Marmalade,	08	14

	tomato products, pickles and chutneys. Process Technology of Milk and Milk Products : Processing, storage and distribution of milk and milk products. Standards for milk and milk products.		
Unit – 5	Process Technology of Cereals and Legumes : Process technology of milling of cereals and legumes. By product of Milling Industry. Processing of Malt. Process technology of Baked Goods : Manufacturing of bread, biscuits, cookies and cakes. Quality control in finished product.	08	14
Unit – 6	Process Technology of Alcoholic Beverages: Types of alcoholic beverages, Raw material, fermentation and processing of alcoholic beverages. Process technology of chocolate and confectionary : Manufacture of chocolates. Types of confectionary products. Production of sugar based and Indian confection.	08	14
	TOTAL	48	70

List of Practicals:

1. Quantitative determination of carbohydrate, protein and ascorbic acid.
2. Analysis of food materials and food products.
3. Enzymes kinetics study. Culturing of microorganisms. Counting of microorganisms.
4. Growth curve experiments.
5. Processing of fruit and vegetables products like juice, Jams, Jellies.
6. Processing of Marmalade, tomato products, pickles and chutneys
7. Preparation of bakery products like bread, biscuits, cakes.
8. Preparation of confectionary products like soft and hard-boiled candies, fruit candies, chikki etc.
9. Preparation of dairy products

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
L.H. Meyer	Food Chemistry		Van Nostrand Reinhold co., New York
Owen R. Fennema	Principles of Food Science, Part I – Food Chemistry		Marcel Dekker Inc, New York
Owen R. Fennema	Principles of Food Preservation, Part II		Marcel Dekker Inc, New York
Giridharilal and Sidappa	Preservation of Fruits and Vegetables		Indian Council of Agricultural Research, New Delhi.
--	Food Industry		IIT, Madras
E.E. Conn and P.K. Stumpf Food	Outlines of Biochemistry		Tata McGraw Hill publishing Co., New Delhi.

Microbiology: W.C. Frazier			
British J. and Grosphicrree	The Manufacturer of Biscuits, Cakes and Wafers		Sir Isaac Pitman & Sons Ltd. London.
E.B. Jackson and Less R	Sugar confectioner and Chocolate Manufacturer		Leonard Hill Books 24 Market Square Alyesburry.
Lampert I.M.	Modern Dairy Products		Eurasia Publishing House, Ramnagar, New Delhi.
Newlander J.A. and Artherton H.V.	The Chemistry and Testing of Dairy Products		Olsen Publishing Co. Milwalie Wisconsin.
David Pearson	Chemical Analysis of Foods		JDA Churchil, London.
Ranganna S.	Manual of Analysis of Fruits and Vegetables Products		McGraw Hill publishing Co., New Delhi.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

S.No	
1	Industrial visit to food industry and report writing.

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/EDEI/CV/FE/IU/MH/MI	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/CD/ED/EI/ CV/FE/IU/ AND SEVENTH FOR MH / MI
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 14 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	
Aim :- Nil	
Objective :- Nil	
Pre-Requisite :- Nil	

Contents : Theory (Name of the Topics)		Hrs/week	Marks
Unit -1	Overview Of Business 1.1. Types of Business • Service • Manufacturing • Trade 1.2. Industrial sectors Introduction to • Engineering industry • 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	---
Unit -2	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	07	11

	• Controlling		
Unit - 3	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	11
Unit - 4	Human Resource Management 4.1 Personnel Management • Introduction • Definition • Functions 4.2 Staffing • Introduction to HR Planning • 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	08	14
Unit - 5	Financial Management 5.1. Financial Management- Objectives & Functions 5.2. Capital Generation & Management	08	14

	• 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		
Unit - 6	Materials Management 6.1. Inventory Management (No Numericals) • 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
Unit - 7	Project Management (No Numericals) 7.1 Project Management • Introduction & Meaning • Introduction to CPM & PERT Technique • 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	08	07
	TOTAL	48	

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 IN CHEMICAL ENGINEERING (MASS TRANSFER OPERATION)			
Course code: CH		Semester : SIXTH	
Duration : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 14 hrs/week		Mid Semester Exam: Marks	
Tutorial: 1 hrs/week		Assignment & Quiz: Marks	
Practical : 17 hrs/week		End Semester Exam: Marks	
Credits :- Nil			
Aim :- Nil			
Objective :-			
S.No	After studying the subject student will be able.		
1.	• To identify principles of diffusion.		
2.	• To analyze distillation column and to solve problems on distillation.		
3.	• To do material balance for gas absorption columns.		
4.	• To identify various extraction equipments and to compare extraction and distillation,		
5.	• To solve the problems on Drying & to operate various drying equipments.		
6.	• To operate various crystallization equipments.		
Pre-Requisite :- Nil			
Contents : Theory (Name of the Topic)		Hrs/week	Marks
Unit -1	**Diffusion.** 1.1 Definition, Ficks Law, Flux equation, Molecular diffusion in gases, Steady state diffusion of A through non diffusing B, Steady state equimolar counter diffusion. Problems. 1.2 Analogy between mass transfer and heat transfer, film theory, surface renewal theory, penetration theory, equilibrium.	**05**	**08**
Unit -2	**Distillation**. 2.1Concept of distillation, Gibbs phase rule, concept of degree of freedom, boiling point diagram, change of pressure on boiling point diagram. 2.2 Vapour liquid equilibrium diagram. Henry's Law, Raoults Law. Determination of vapor composition by above laws. 2.3 Volatility, Relative volatility, Derivation to calculate vapour composition and liquid composition Problems. 2.4 Methods of distillation, Differential distillation, Rayleigh's equation, problems, Flash distillation, material balance, Problems . 2.5 Rectification, Fractionating column, material balance, Mc Cabe Theile method. Lewis Sorrel method, problems. 2.6 Feed plate, feed line, q line, effect of feed conditions on slope of q line. 2.7 Reflux ratio, total reflux ratio, minimum reflux ratio, relative advantages and dis-advantages on operating and capital cost.	**16**	**22**

	Optimum reflux ratio. 2.8 Batch distillation, Azeotropic distillation, steam distillation- Equipment for distillation, plate column, Bubble cap plate, sieve plate, and valve plate, down comers, weir, packed columns.		
Unit - 3	**Absorption.** 3.1 Concept of Gas Absorption, comparison with distillation, selection criteria for solvent. 3.2 Concept of equilibrium, minimum liquid-gas ratio, material balance Concept of HETP. 3.3 Hydrodynamics of packed column. Loading and flooding of packed columns. 3.4 Gas absorption equipments- mechanically agitated vessel, packed columns, types of packing, channeling in packed columns.	**06**	**08**
Unit – 4	**Extraction.** 4.1 Concept of Extraction liquid-liquid extraction comparison between distillation and extraction, distribution coefficient, triangular diagram. 4.2 Extraction equipments mixer settler, spray column, rotating disc contactor, pulse column.	**06**	**08**
Unit - 5	**Drying.** 5.1 Concepts & general principles, equilibrium Rate of drying curve, time of drying, Problems based on above topic. 5.2 Drying equipments- Tray drier, Rotary drier, Drum drier, Spray drier, fluidized bed drier, Pneumatic drier, applications.	**08**	**14**
Unit - 6	**Crystallization**. a. Concept of crystallization, saturation, super saturation, solubility curves b. Method of super saturation, Mier's super saturation theory. c. Crystallization equipments- Agitated tank crystalliser, vacuum crystalliser, Oslo (cooler and evaporative) crystalliser.	**07**	**10**
	TOTAL	**48**	**70**

Practical:

Intellectual Skills:

1. To compare different types of distillation.
2. To design a fractionating column.
3. To select suitable solvent for extraction.
4. To compare the effect of dry and wet packing on pressure drop.

Motor Skills:

2. To operate different distillation columns.
3. To operate different types of dryers.
4. To control operating parameters of distillation column.

List of Practicals:

1. To verify Rayleigh's equation by simple distillation.

2. To calculate HETP by carrying out distillations in a packed column at total reflux.
3. To calculate the pressure drop of a given packed column for wet and dry packing.
4. To find out distribution coefficient for liquid - liquid mixture.
5. To plot binodal curve for ternary system.
6. To plot drying rate curves.
7. To plot the solubility curve while heating and cooling.
8. Control of distillation column on simulutor.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Mr. Walter L. Badger & Mr. Julius T. Bachero	Introduction to Chemical Engineering		Mc Graw Hill International
Mc Cabe, W. L. Smith & Harriot.	Unit Operations of Chemical Engineering.		Mc Graw Hill International
Treybal	Mass Transfer Operations		Mc Graw Hill International

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPLOMA IN CHEMICAL ENGINEERING (SUGAR TECHNOLOGY (ELECTIVE))	
Course code: CH	Semester : SIXTH
Duration : **6 SEMESTERS**	Maximum Marks :
Teaching Scheme **C**	Examination Scheme
Theory : 14 hrs/week	Mid Semester Exam: Marks
Tutorial: 1 hrs/week	Assignment & Quiz: Marks
Practical : 17 hrs/week	End Semester Exam: Marks
Credits :- Nil	

Aim :- Nil

Objective :-

S.No	The students should be able to:
1.	• Know position of Maharashtra in Sugar scenario of India.
2.	• Know Unit processes of Chemical Engg used in Sugar Industry
3.	• Know Renewable Agro based feedstock and Chemicals based on molasses and ethanol.

Pre-Requisite :- Nil

Contents : Theory (Name of the Topic)		Hrs/week	Marks
Unit -1	Introduction 1.1Sugarcane producing states in India 1.2 Cultivating factors affecting sugarcane quality 1.3 Harvesting	03	04
Unit -2	Manufacture of Sugar 2.1 Chemical composition of juice, methods of polarization (04Marks) 2.2 Extraction of juice, Brix curve (04 Marks) 2.3 Juice treatment (08 Marks) • Screening • General constituents of juice from immature cane • Process of treatment – Defication, Sulphitation • Ion exchange 2.4 Multiple effect evaporation (12 Marks) • Working of evaporators • Evaporators- Forward, Backward, Mixed feed • Falling film evaporators • Cleaning of evaporators- Methods 2.5 Crystallization (08 Marks) • Principle of crystallization • Types of crystallizer and their working • Crystallization calculations	15	30
Unit - 3	Cane sugar Refining 3.1 Affination, clarification/defecation (8 Marks) 3.2 pH adjustment (4 Marks) 3.3 Decolonization- char filtration (4 Marks)	12	14

Unit – 4	Byproducts of sugar Industry 4.1 Use of Bagassee [Processes of Biogas, Bio manure, Pulp & paper, Particle board, as fuel, Bagassee ash] (8 Marks) 4.2 Composition & uses of Molasses [Fermentation, abs. Alcohol, rectified spirit & cattle feed] (4 Marks) 4.3 Ethanol as a fuel- properties & advantages (4 Marks) 4.4 Sugar based Industries [Processes of Confectionary, sugar candies, Indian sweets, sugar cubes]- (8 marks)	18	22
	Total	48	70

Practicals:

Skills to be developed:

Intellectual Skills: 1) Interpret test results.
2) Follow systemic procedure for handling chemicals.

Motor Skills: 1) To handle equipments/instruments.
2) To observe physical phenomenon.

List of Practicals:

1. Determination of Brix & Purity of juice
2. Determination of moisture present in white sugar
3. Determination of grade & color of white sugar
4. Determination of SO_2 content in white sugar
5. Determination of phosphate content of juice
6. Determination of CO_2 % in limestone
7. Determination of active CaO in lime
8. Determination of true sucrose of gur
9. Determination of ash% of gur
10. Determination of viscosity of sucrose solution & molasses

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
N.C. Verma	System of Technical Control		STA of India, New Delhi
P.Hoing	Principle of Cane Sugar Technology		Elesevier Publisher Co. London
K.C.Banerjee	Cane sugar factory control		M.L.Kakar,Hazratganj,Lucknow
J.H.Payne	Sugarcane factory analytical control		Elesevier Publisher Co. London
Jenkens	Introduction to sugarcane technology		Elesevier Publisher Co. London

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : DIPMLOMA IN CHEMICAL ENGINEERING (PETROCHEMICAL TECHNOLOGY (ELECTIVE))			
Course code: **CH**		Semester : SIXTH	
Duration : **6 SEMESTERS**		Maximum Marks :	
Teaching Scheme **C**		Examination Scheme	
Theory : 14 hrs/week		Mid Semester Exam: Marks	
Tutorial: 1 hrs/week		Assignment & Quiz: Marks	
Practical : 17 hrs/week		End Semester Exam: Marks	
Credit:- Nil			
Aim :- Nil			
Objective :-			
S.No	Student should be able to:		
1.	• Describe refinery operations.		
2.	• Know manufacturing of different petroleum end products from crude oil.		
3.	• Identify various hazards in petrochemical industry.		
4.	• State safety precautions to be taken in petrochemical industries.		
Pre-Requisite:- Nil			
Contents : Theory (Name of the Topic)		Hrs/week	Marks
Unit -1	Introduction to Petroleum Refining: 1.1 Indian Refineries, Their location and capacity 1.2 Global crude oil producers, 1.3 Characteristics of crude, Composition, constituents of crude oil	08	08
Unit -2	***Refining:*** 2.1 Process of Refining of crude oil to obtain various fractions (8 Marks) 2.2 Unit operations used in separation processes- Fractionation, Vacuum Distillation (4 Marks) 2.3 List of Hydrocarbons/ fractions obtained, their Boiling Ranges and their uses (4 Marks)	10	14
Unit - 3	Unit Processes in Refineries: Flow charts, Reactions, Description 3.1 Hydrogenation, Cracking, Alkylation, Polymerisation, (10 Marks) 3.2 Hydrocracking, Isomerisatiopn, Reforming, Esterifiaction & Hydration. (10 Marks) 3.3 Waste Treatment (8 Marks)	12	24
Unit – 4	C_1 to C_4 Hydrocarbons: (4 Marks each) 4.1 C_1 Hydrocarbons, Petrochemicals from C_1 4.2 C_2 Hydrocarbons, Petrochemicals from C_2 4.3 C_3 Hydrocarbons, Petrochemicals from C_3 4.4 C_4 Hydrocarbons, Petrochemicals from C_4 4.5 Aromatic Fractions	10	16
Unit - 5	Hazard & Safety (4 Marks each) 5.1 Hazards in Petrochemical Industry	08	08

	5.2 Safety in Petrochemical Industry		
	TOTAL	48	70

Practical:

Skills to be developed:

Intellectual Skills:

1) Interpret test results
2) Follow systemic procedure for handling chemicals

Motor Skills:

1) To handle equipments/instruments
2) To observe physical phenomenon

List of Practicals:-

1. Determination of Aniline Point.
2. Determination of Fire Point, Flash Point.
3. Determination of calorific value.
4. Determination of viscosity index.
5. Preparation of Ethyl Acetate by Esterification.
6. Preparation of PF Resin.
7. Preparation of Biodiesel by Trans esterification.
8. ASTM, TVP Distillation.
9. Determination of Drop Point.
10. Determination of Pour Point.

Text Books:

Name of Authors	Titles of the Book	Edition	Name of the Publisher
M. Gopala Rao, M. Sittig,	Dryden's Outlines of Chemical Tech		East West Press
George Austin	Shreve's Chemical Process Industries		Mc Graw Hill Publication
Peter Wiseman	Petrochemicals		John Willey & Sons
Bhaskar Rao	Petrochemicals		--

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil