

STATE BOARD OF TECHNICAL EDUCATION

SIKKIM



SYLLABUS
FOR
FIRST YEAR DIPLOMA
COMMON TO ALL COURSES
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STUDY, EVALUATION AND CREDITS DETAILS

SL. NO.	CODE	COURSE	STUDY SCHEME				EVALUATION SCHEME				TOTAL MARKS	CREDIT
			Pre-requisite	CONTACT HRS / WEEK			THEORY		PRACTICAL			
				L	T	P	EA (Max Marks)	PA (Max Marks)	EA (Max Marks)	PA (Max Marks)		
1	BS101	Mathematics-I		2	1	0	60	40	0	0	100	3
2	BS103	Applied Physics		2	1	0	60	40	0	0	100	3
3	BS104	Applied Chemistry		2	1	0	60	40	0	0	100	3
4	BS102	Mathematics-II	BS101	2	1	0	60	40	0	0	100	3
5	AU102	Environmental Science		2	0	0	60	40	0	0	100	GRADE
6	ES103	Introduction to IT Systems		2	0	0	60	40	0	0	100	2
7	ES105	Engineering Mechanics		2	1	0	60	40	0	0	100	3
8	ES108	Basic Mechanical Engineering		2	1	0	60	40	0	0	100	3
9	HS101	Communication Skills in English		2	0	0	60	40	0	0	100	2
10	ES104	Fundamentals of Electrical & Electronics Engineering		2	1	0	60	40	0	0	100	3
11	HS102	Sports and Yoga		0	0	2	0	0	40	60	100	1
12	ES101	Engineering Graphics		0	0	4	0	0	40	60	100	2
13	BS105	Applied Physics Lab		0	0	2	0	0	40	60	100	1
14	BS106	Applied Chemistry Lab		0	0	2	0	0	40	60	100	1
15	ES106	Introduction to IT Systems Lab		0	0	2	0	0	40	60	100	1.5
16	ES102	Engineering Workshop Practice-I		0	0	4	0	0	40	60	100	2
17	HS103	Communication Skills in English Lab		0	0	2	0	0	40	60	100	1
18	ES109	Engineering Workshop Practice-II/ Microproject		0	0	4	0	0	40	60	100	2
19	ES107	Fundamentals of Electrical & Electronics Engineering Lab		0	0	3	0	0	40	60	100	1.5

Grand Total	20	7	26	600	400	360	540	1900	38
<p>Student contact hours per week: 30 hrs</p> <p>Theory & Practical periods of 60 minutes each</p> <p>Abbreviations: L – Lecture, T – Tutorials, P – Practical, EA – End semester Assessment 60 marks, PA – Progressive Assessment (Class Tests 50 marks, File 10 marks, Attendance 10 marks) scaled down to 40 marks</p> <p>Total Marks: 1900</p> <p>Minimum pass marks is 40% for theory and 40% for practical subjects. All assessment to be done as per prevailing norms of curriculum implementation and assessment.</p>									

Subject Title:	MATHEMATICS – I	Credit:	03
Subject Code:	BS101	Semester:	FIRST
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	01 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.

RATIONALE/AIM: Mathematics is the backbone of all areas of Engineering and technology education irrespective of branches of engineering or technology they study, it is the fundamental tool for analyzing and solving engineering problems, it is essential that a student of technology and engineering need study of relevant theories and principles of mathematics to enable them to understand better the basic concept of advance courses of the curriculum. With the above view in mind, the necessary content details for the course of Mathematics-I are derived. In Mathematics I the contents like Logarithm, permutation and combination, statistics, complex number, trigonometry and differentiation is kept. It is presumed that this course content will provide a satisfactory foundation for technical applications, which technicians/ engineers supposed to come across in the field of studies. It will help to enhance the skill of analyzing and solving engineering problems.

COURSE OUTCOME: After successful completion of the course, students will be able to:

1. Convert a complex no from Cartesian to polar and vice-versa.
2. Solve simple problems of binomial involving any index
3. Solve problems involving trigonometric function and values
4. Find the probability of sum of random variable
5. Find the central tendencies of tabulated data.
6. Find nth derivative of a given function.

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>ADVANCE ALGEBRA:</p> <p>1.1. Binomial Theorem 1.1.1. Fundamental principle of counting. 1.1.2. Permutation as an arrangement, Combination as selection 1.1.3. Meaning of $n!$ (<i>factorial n</i>), ${}^n P_r$ and ${}^n C_r$ 1.1.4. Problems involving ${}^n P_r$ and ${}^n C_r$ 1.1.5. Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form); Binomial theorem for negative integer (expansion without proof) 1st and 2nd binomial approximation with engineering problems.</p> <p>1.2. Complex Numbers 1.2.1 Definition of complex numbers, real and imaginary part of complex number, argand diagram. 1.2.2. Definition of conjugate complex, equality of complex number, addition and subtraction of two complex numbers, multiplication and division of complex numbers 1.2.3. Express any complex number in $a+ib$ form, 1.2.4. Modulus and argument of complex number 1.2.5. Polar form of complex number, conversion from polar to Cartesian from Cartesian to polar form 1.2.6. Exponential form of complex number, conversion from exponential to Cartesian and from Cartesian to exponential form</p>	12 Hrs	25 Marks
2.	TRIGONOMETRY:	15 Hrs.	30 Marks

	<p>2.1. Measurement of an Angle: Definition of an Angle, Units of measurement angle, Radian, Degree, Relationship between degree and radian.</p> <p>2.2. Trigonometric ratio. <i>sinθ, cosθ, tanθ their reciprocal etc</i></p> <p>2.3. Trigonometric identities $\sin^2 x + \cos^2 x = 1$, $1 + \tan^2 x = \sec^2 x$, $1 + \cot^2 x = \operatorname{cosec}^2 x$ etc. Problems on Trigonometric identities.</p> <p>2.4 Standard angles $0^\circ, 30^\circ \left(\frac{\pi}{6}\right), 45^\circ \left(\frac{\pi}{4}\right), 60^\circ \left(\frac{\pi}{3}\right), 90^\circ \left(\frac{\pi}{2}\right)$,</p> <p>2.5 Trigonometric ratios of allied angles $90 \pm \theta, 180 \pm \theta, 270 \pm \theta, 360 \pm \theta$,</p> <p>2.6 Compound angles formulae: $\sin(A \pm B)$, $\cos(A \pm B)$</p> <p>2.7 Transformation Formulae trigonometric angle. From product to sum or difference $\sin A \cdot \cos B, \cos A \cdot \sin B, \cos A \cdot \cos B, \sin A \cdot \sin B$ From Sum or Difference product $\sin C \pm \sin D, \cos C \pm \cos D$ etc</p> <p>2.8 Multiple and Sub-multiple angles: a) Deducing the expansion for multiple angle $\sin 2A, \cos 2A, \tan 2A, \sin 3A, \cos 3A, \tan 3A$ etc. b) Deducing the expansion for sub multiple angle $\sin \frac{A}{2}, \cos \frac{A}{2}, \tan \frac{A}{2}, \sin \frac{A}{3}, \cos \frac{A}{3}, \tan \frac{A}{3}$ etc. simple problems.</p>		
3.	<p>STATISTICS & PROBABILITY :</p> <p>3.1 Measures of central tendency :Mean, Median, mode</p> <p>3.2 Probability: random experiments and event, events and their probability, calculation of probability using combinatorics (permutations and combinations, event relations, additive law of probability, additive law of probability for mutually exclusive events, additive law of probability for mutually exclusive events.</p>	06 Hrs.	20 marks
4.	<p>LIMITS AND DIFFERENTIATION:</p> <p>4.1. Limits</p> <p>4.1.1. Limit: definition of limit, difference between $f(a)$ and $\lim_{x \rightarrow a} f(x)$, limit of different types of functions</p> <p>4.2. DIFFERENTIAL CALCULUS</p> <p>4.2.1 Derivative formulae</p> <p>4.2.2 Derivative of sum, difference.</p> <p>4.2.3 Differentiation of function of a function (Chain rule)</p> <p>4.2.4 Product</p> <p>4.2.5 Quotient rule of differentiation.</p> <p>4.2.6 Logarithmic differentiation,</p> <p>4.2.7 Differentiation of implicit functions</p> <p>4.2.8 Derivative of functions expressed in parametric form</p> <p>4.2.9 Second order Derivatives application of Differential Calculus</p>	12 Hrs.	25 Marks
	Sessionals		
TOTAL		45 Hrs.	100
<p>Textbooks:</p> <ul style="list-style-type: none"> Applied mathematics for Polytechnic by H.K.Dass, CBS publishers and Distributor Applied mathematics –I & II R.D.Sharma Dhanpat Rai Publication NCERT mathematics Class XI and XII, NCERT Institutional Study Material Online Resource: 			

www.khanacademy.org
www.sosmath.org
www.arcademics.com
<http://tutorial.math.lamar.edu>
<http://patrickimt.com>

Subject Title:	APPLIED PHYSICS	Credit:	03
Subject Code:	BS103	Semester:	FIRST/SECOND
Lecture Hrs. / week:	02 Hrs	Tutorials Hrs. / week:	01 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.

RATIONALE/AIM: Physics is a foundation of all core technology subjects. Study of physics is essential for Diploma holders in Engineering and Technology to develop in them proper understanding of physical phenomenon, scientific temper and engineering aptitude. Curriculum of applied physics includes fundamental concept used in industrial application. So physics is taught in the 1st year of all Engineering disciplines.

COURSE OUTCOME: After successful completion of the course, students will be able to:

1. Identify physical quantities, select their units for use in engineering solutions.
2. Describe various physical properties of matter.
3. Differentiate between Heat and Light waves.
4. Describe total internal reflection and its application.
5. Express importance of nanoscience and nanotechnology and impact of nanotechnology

SUBJECT CONTENTS

Chap. No.	NAME OF CHAPTER/TOPIC	HOURS ALLOTTED	MARKS ALLOTTED
1.	UNITS & DIMENSIONS 1.1 Physical Quantities: Fundamental and derived, Units and systems of units (FPS, CGS and SI units). 1.2 Dimensions and dimensional formulae of physical quantities. FORCE 1.3 Scalar and Vector quantities: Examples, representation of vector, types of vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Resolution of a Vector. 1.4 Force as a vector quantity, moment, couple. PROPERTIES of MATTER. 1.5 Elasticity: Definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve. 1.6 Pressure: Definition, units. 1.7 Surface Tension: concept, units, cohesive and adhesive forces. 1.8 Viscosity and Coefficient of Viscosity: Terminal velocity, Stoke's law. 1.9 Hydrodynamics: Fluid motion, stream line and turbulent flow..	15 Hrs.	34 Marks
2	GRAVITY and GRAVITATION 2.1 Newton's laws of gravitation, Newton's gravitational constant G and its SI unit, Acceleration due to gravity (g) and its relation with "G", Variation of g with altitude and latitude (deduction not required), Difference between mass and weight. HEAT and THERMOMETRY	15 Hrs.	33 Marks

	<p>2.2 Heat: Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), specific heats.</p> <p>2.3 Temperature: Scales of temperature and their relationship, Types of Thermometers (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer, Pyrometer) and their uses.</p> <p>ELECTROSTATICS</p> <p>2.4 Coulombs law, unit of charge, Electric field, Electric flux, Electric potential and potential difference.</p> <p>2.5 Gauss law: Application of Gauss law</p> <p>MAGNETISM</p> <p>2.6 Types of magnetic materials: dia, para and ferromagnetic with their properties.</p> <p>2.7 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization.</p>		
3.	<p>WAVE MOTION</p> <p>3.1 Waves: Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship. Sound and light waves and their properties.</p> <p>OPTICS</p> <p>3.2 Ray Optics: Basic optical laws; reflection and refraction, refractive index. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fibre.</p> <p>MODERN PHYSICS</p> <p>3.3 Nanoscience: Introduction, nanoparticles and nanomaterials, properties at nanoscale.</p>	15 Hrs.	33 Marks
		45 Hrs.	
<p>Textbooks:</p> <ol style="list-style-type: none"> 1. Physics Std XI (NCERT) 2. Physics Std XII (NCERT) <p>Reference Books:</p> <ul style="list-style-type: none"> • Modern Approach to Physics Part I & II By Dilip Sharma, N. G. Chakroborty & K. N . Sharma. • Basic Applied Physics By R. K. Gaur 			

Subject Title:	Applied Chemistry	Credit:	03
Subject Code:	BS104	Semester:	FIRST/SECOND
Lecture Hrs. / week:	2	Tutorials Hrs. / week:	01 Hrs.
End semester Assessment Theory:	70 Marks.	Progressive Assessment Theory:	30 Marks.
<p>RATIONALE/AIM: There are numerous materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. Successful completion of this course content will enable technicians to understand, ascertain and analyse and properties of natural raw materials required for producing economical and eco-friendly finished products.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Solve various engineering problems applying the basic knowledge of atomic structure and chemical bonding. 2. Use relevant water treatment method to solve domestic and industrial problems. 3. Solve the engineering problems using knowledge of engineering materials and properties. 4. Use relevant fuel and lubricants for domestic and industrial applications 5. Solve the engineering problems using concept of Electrochemistry and corrosion. 6. Answer basic queries related to chemistry encountered in day to day activities. 			
SUBJECT CONTENTS			
UNIT I – TOTAL MARKS – 50			
Chap. No.	NAME OF CHAPTER/TOPIC	HOURS ALLOTTED	MARKS ALLOTTED
1.	<p>ATOMIC STRUCTURE AND CHEMICAL BONDING:</p> <p>1.1 Rutherford model of atom, Bohr's theory, Quantum numbers – orbital concept. Shapes of s and p orbitals, Pauli's exclusion principle, electronic configuration.</p> <p>1.2 Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond (H₂, HF), hydrogen bonding</p>	04 Hrs	12 Marks
2.	<p>WATER IN INDUSTRIES:</p> <p>2.1 Classification of soft and hard water based on soap test, salts causing water hardness. Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc),</p> <p>2.2 Water softening techniques – soda lime process, zeolite process and ion exchange process.</p> <p>2.3 Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.</p>	04 Hrs	11 Marks
3.	<p>Metals and alloys:</p> <p>3.1 Natural occurrence of metals – minerals, ores of iron, aluminium and copper, metallurgy – brief account of general principles of metallurgy.</p> <p>3.2 Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.</p>	05 Hrs	12 Marks

	3.3 General chemical composition, composition based applications of some common alloys (elementary idea only details omitted)		
4.	CORROSION: 4.1 Definition, types of corrosion (chemical and electrochemical), H ₂ liberation and O ₂ absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion. 4.2 External corrosion preventive measures: metal coatings, using organic inhibitors.	03 Hrs	08 Marks
5.	ENGINEERING MATERIALS: 5.1 Port land cement and hardening, Glasses Refractory and Composite materials. 5.2 Polymers –monomer, homo and co polymers, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, polythene, nylon-6,6 ,Teflon and Bakelite), rubber and vulcanization of rubber.	03 Hrs	12 Marks
6.	SOLUTIONS: 6.1 Idea of solute, solvent and solution, methods to express the concentration of solution- molarity ($M = \text{mole per litre}$), ppm, mass percentage, volume percentage and mole fraction, numerical problems based on concentration of solution 6.2 Vapour pressure of solution, boiling and freezing point of solution.	02 Hrs	08 Marks
7.	ELECTRO-CHEMISTRY: 7.1 Electronic concept of oxidation, reduction and redox reactions. 7.2 Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems. Industrial Application of Electrolysis – Electro-metallurgy , Electroplating, Electrolytic refining. 7.3 Application of redox reactions in electrochemical cells – primary cells – dry cell, Secondary cell - commercially used lead storage battery, fuel and Solar cells.	04 Hrs	14 Marks
8.	CHEMISTRY OF FUELS AND LUBRICANTS: 8.1 Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), 8.2 Proximate analysis of coal petrol and diesel - fuel rating (octane and cetane numbers), 8.3 Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas. 8.4 Lubrication – function and characteristic properties of good lubricant, classification with examples,physical properties (viscosity , oiliness, flash and fire point and chemical	05 Hrs	16 Marks

	properties (coke number, total acid number, iodine value) of lubricants.		
	Sessionals		
	TOTAL	30 Hours	100
<p>Textbooks:</p> <ul style="list-style-type: none"> • C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011. • Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2015. <p>Reference Books:</p> <ul style="list-style-type: none"> • Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014. • Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013. 			

Subject Title:	MATHEMATICS – II	Credit:	03
Subject Code:	BS102	Semester:	SECOND
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	01 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.

RATIONALE/AIM: Mathematics is the backbone of all areas of Engineering and technology education irrespective of branches of engineering or technology they study, it is the fundamental tool for analyzing and solving engineering problems, it is essential that a student of technology and engineering need study of relevant theories and principles of mathematics to enable them to understand better the basic concept of advance courses of the curriculum. With the above view in mind, the necessary content details for the course of Mathematics-I are derived. In Mathematics – II the contents like Matrix, Partial fraction, integration and differential Equation is kept. It is presumed that this course content will provide a satisfactory foundation for technical applications, which technicians/ engineers supposed to come across in the field of studies. It will help to enhance the skill of analyzing and solving engineering problems.

COURSE OUTCOME: After successful completion of the course, students will be able to:

1. Solve simultaneous linear equation using determinant
2. Find Inverse of a given non-singular matrix
3. Integrate given function using appropriate method.
4. Evaluate definite integral
5. Solve first order Differential Equation.
6. Find different parameter of conics.

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>DETERMINANT AND MATRICES:</p> <p>1.1 Determinant</p> <p>1.1.1 Definition of determinant, order of determinant, expansion of determinant.</p> <p>1.1.2 Minors and cofactor different, methods of expansion.</p> <p>1.1.3 Properties of determinant (without proof).</p> <p>1.1.4 Application of determinant to solve simultaneous equations(Cramer's Rule) for 2nd and third order</p> <p>1.2 Matrices</p> <p>1.2.1. Definition of matrices, order of matrix, types of matrices e.g. row matrix, column matrix, square matrix, diagonal matrix.</p> <p>1.2.2. Equality of matrices, addition and subtraction of matrices of matrices, scalar multiplication of matrices</p> <p>1.2.3. Product of matrices, $AB \neq BA$</p> <p>1.2.4. Adjoint of matrix, Inverse of a matrix.</p>	10 Hrs	25 Marks

- Applied mathematics for Polytechnic by H.K.Dass, CBS publishers and Distributor
- Applied mathematics –I & II R.D.Sharma Dhanpat Rai Publication
- NCERT mathematics Class XI and XII, NCERT
- Institutional Study Material
- Online Resource:
 - www.khanacademy.org
 - www.sosmath.org
 - www.arcademics.com
 - <http://tutorial.math.lamar.edu>
 - <http://patrickjmt.com>
 - www.3blue1brown.com
 - www.nios.gov.in

Subject Title:	ENVIRONMENTAL SCIENCE	Credit:	00
Subject Code:	AU102	Semester:	FIRST/SECOND
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	00 Hrs.
Practical Hrs. / week:	00 Hrs.	Total Hrs. / semester:	30 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.
End semester Assessment Practical:	00 Marks.	Progressive Assessment Practical:	00 Marks.

RATIONALE/AIM: Technicians working in industries or elsewhere essentially require the knowledge of environmental science so as to enable them to work and produce most efficient, economical and eco-friendly finished products.

COURSE OUTCOME: After successful completion of the course, students will be able to: -

1. Solve various engineering problems applying ecosystem to produce eco – friendly products.
2. Use relevant air and noise control method to solve domestic and industrial problems.
3. Use relevant water and soil control method to solve domestic and industrial problems.
4. To recognize relevant energy sources required for domestic and industrial applications.
5. Solve local solid and e-waste problems.

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	ECOSYSTEM: 1.1 Structure of ecosystem, Biotic & Abiotic components 1.2 Food chain and food web 1.3 Aquatic (Lentic and Lotic) and terrestrial ecosystem 1.4 Carbon, Nitrogen, Sulphur, Phosphorus cycle. 1.5 Global warming -Causes, effects, process, Green House Effect, Ozone depletion	04 Hrs.	
2.	AIR AND, NOISE POLLUTION: 2.1 Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler) 2.2 Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator) 2.3 Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler 2.4 Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000	05 Hrs.	
3.	WATER AND SOIL POLLUTION: 3.1 Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation 3.2 Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis). 3.3 Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.	07 Hrs.	

4.	RENEWABLE SOURCES OF ENERGY: 4.1 Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills. 4.2 Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas. 4.3 Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy. 4.4 New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy	08 Hrs.	
5.	SOLID WASTE MANAGEMENT, ISO 14000 & ENVIRONMENTAL MANAGEMENT: 5.1 Solid waste generation- Sources and characteristics of : Municipal solid waste, E- waste, biomedical waste. 5.2 Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries. 5.3 Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste 5.4 Air quality act 2004, air pollution control act 1981 and water pollution and control act1996. Structure and role of Central and state pollution control board. 5.5 Concept of Carbon Credit, Carbon Footprint. 5.6 Environmental management in fabrication industry. 5.7 ISO14000: Implementation in industries, Benefits.	06 Hrs.	
Sessionals			
TOTAL		30 Hours.	
Textbooks: <ul style="list-style-type: none"> • S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House, New Delhi • C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011. • O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi • Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X. • Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New Delhi, 1988, ISBN: 0-07- 451871-8. Open-source software and website address: <ul style="list-style-type: none"> • www.eco-prayer.org • www.teriin.org • www.cpcp.nic.in 4) www.cpcp.gov.in • www.indiaenvironmentportal.org.in 			

- www.whatis.techtarget.com
- www.sustainabledevelopment.un.org

Subject Title:	INTRODUCTION TO IT SYSTEMS	Credit:	02
Subject Code:	ES103	Semester:	FIRST/SECOND
Lecture Hrs. / week:	02 Hrs.	Total Hrs. / semester:	30 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.
<p>RATIONALE/AIM: This course is intended to make new students comfortable with computing environment - Learning basic computer skills, Learning basic application software tools, Understanding Computer Hardware, Cyber security awareness.</p>			
<p>COURSE OUTCOME: At the end of the course, student will be able to :</p> <ol style="list-style-type: none"> 1. Comfortably work on computer. 2. Installation process and configure operating system. 3. Write documents, create worksheets, prepare presentations, protect information 4. Protect computers from basic abuses/attacks. 5. Configure IP address and LAN settings. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>BASIC INTERNET SKILLS:</p> <p>1.1 History of Internet 1.2 How internet works 1.3 Understanding browser 1.4 Efficient use of search engines 1.5 Awareness about Digital India portals (state and national portals) and college portals. 1.6 General understanding of various computer hardware components – CPU, Memory, Display, Keyboard, Mouse, HDD and other Peripheral Devices</p>	4 Hrs.	20 Marks
2.	<p>COMPUTER NETWORKING AND CABLING:</p> <p>2.1 Local Area Networks (LAN) 2.2 Internetworking & Devices: Router, switch. 2.3 Ports and connectors: Serial port, Parallel Port, HDMI port, USB port, RJ45. 2.4 Client Server Systems 2.5 Transmission media: Fiber, Twisted pair, wireless. 2.6 Cabling and crimping: Cross over, Straight through, Crimping. 2.7 Addressing: IP addressing</p>	4 Hrs.	20 Marks
3.	<p>COMPUTER SOFTWARE AND CONCEPTS:</p> <p>3.1 Introduction to computer Software 3.1.1 What is Computer Software? 3.1.2 Different Categories of S/W. 3.1.3 Software and Programming Concepts. 3.2 System Software 3.2.1 Introduction 3.2.2 Types – OS (MS Windows, Linux, MAC) 3.2.3 OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.</p>	06 Hrs.	20 Marks

	3.3 Application Software 3.3.1 Introduction 3.3.2 Types – Word Processing, Image Processing, Spreadsheets 3.4 Utility Software 3.5 Open Source Software Vs Proprietary Software		
4.	WEB DESIGNING: 4.1 HTML, CSS, JavaScript, making basic personal webpage	04 Hrs.	10 Marks
5.	OFFICE TOOLS: 5.1 Office Tools (UNIX) basic features, application: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress. 5.2 Office Tools(MS Windows) basic features, application: MS Word, MS Excel, MS Power point.	04 Hrs.	10 Marks
6	COMPUTER PROGRAMMING AND LANGUAGES: 6.1 Basic Overview of Programs - 6.1.1 Introduction 6.1.2 Problem Solving Tools 6.1.3 Program Control Structures 6.1.4 Generations of Computer Languages 6.1.5 Program Methodology 6.2 Flow Charts & Algorithms 6.2.1 Introduction 6.2.2 Basics Of Flow Charts 6.2.3 Basics of Algorithms 6.2.4 Examples and Applications	06 Hrs.	10 Marks
7	SECURITY 7.1 Information security 7.2 Computer security 7.3 Computer Virus & Antivirus	02 Hrs.	10 Marks
	Sessionals		
TOTAL		30 Hours	100 Marks
Textbooks: <ul style="list-style-type: none"> • R.S. Salaria, Computer Fundamentals, Khanna Publishing House • Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House • Online Resources, Linux man pages, Wikipedia • Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and • Shell programming, by Mokhtar Ebrahim, Andrew Mallett 			

Subject Title:	ENGINEERING MECHANICS	Credit:	03
Subject Code:	ES106	Semester:	FIRST/SECOND
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	01 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.
<p>RATIONALE/AIM: The course is designed to introduce to the trainee to the world of mechanics and to use this knowledge for solving engineering problems related to mechanics. The emphasis is given on understanding forces and their resolution as applicable to various engineering branches of study. The trainee will learn the difference between static and dynamic systems and their applications.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 7. To understand mechanics, force system and resolve the forces acting on a particle. 8. To analyze and calculate the equilibrium of body under system of forces. 9. Find the centroid and centre of gravity of various components in engineering systems. 10. To know the fundamental law of machine and their applications to various engineering problems. 11. To understand and apply principles of friction for various useful purposes. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>INTRODUCTION TO BASIC OF MECHANICS AND FORCE SYSTEM:</p> <p>1.1 Introduction to engineering mechanics 1.2 Statics, dynamics, kinematics and kinetics 1.3 Force-definition, unit, representation as Vector and Bow's notation, characteristic and effect of a force, Principle of Transmissibility of force, system of force system and its classification 1.4 Composition of a force- Resultant of force, Parallelogram law, Triangle law, Polygon law of forces 1.5 Resolution of a force -orthogonal components of a force</p>	10 Hrs.	25 Marks
2.	<p>EQUILIBIRIUM:</p> <p>2.1 Equilibrium-definition, types and conditions of equilibrium and equilibrant 2.2 Lami's Theorem – statement and explanation, Application for various engineering problems. 2.3 Free body diagram and its construction 2.4 Analytical and graphical method of analyzing coplanar forces. 2.5 Moment, moment of a couple 2.6 Varignon's theorem of moments 2.7 Equivalent couples, addition of couple</p>	10 Hrs.	25 Marks
3.	<p>FRICTION:</p> <p>3.1 Definition and types of friction 3.2 Laws of friction 3.3 Applications- bodies on horizontal plane, inclined plane 3.4 Limiting angle of friction, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction.</p>	07 Hrs.	25 Marks

4.	CENTROID AND CENTRE OF GRAVITY: 4.1 Definition of Centre of gravity, Centroid, Axis of reference, Symmetrical and Unsymmetrical section, methods of finding C.G. 4.2 Centroid by geometrical considerations of plane figures. 4.3 C.G. of symmetrical, unsymmetrical sections. 4.4 Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere) 4.5 Centre of Gravity of sections with Cut out Holes.	08 Hrs.	20 Marks
5.	SIMPLE LIFTING MACHINES: (NO DERIVATIONS, SIMPLE NUMERICAL PROBLEMS): 5.1 Introduction, Simple lifting Machine, Compound Machine, Lifting Machine, Mechanical Advantage, Input & Output of a Machine, Efficiency of a Machine, Ideal Machine, Velocity Ratio. 5.2 Relation Between Efficiency, Mechanical Advantage and Velocity Ratio of a Lifting Machine. 5.3 Reversibility of a Machine, Condition for the Reversibility of a Machine, Self-locking Machine, Friction in a Machine, Law of a Machine, Maximum Mechanical Advantage of a Lifting Machine, Maximum Efficiency of a Lifting Machine.	10 Hrs.	25 Marks
	Sessionals		
TOTAL		45 Hours	
Textbooks:			
<ul style="list-style-type: none"> • Engineering Mechanics By R.S. Khurmi & N. Khurmi (S. Chand Publications) • Engineering Mechanics By Dr. R. K. Bansal (Laxmi Publication Pvt. Ltd.) • Engineering Mechanics By S.S. Bhavikatti (New Age Publications) • Engineering Mechanics By Dutta & Bhattacharya (Bhagabati Publications) • Engineering Mechanics By R. Kumaravelan 			
Reference Books:			
<ul style="list-style-type: none"> • Mechanics For Engineers Statics By Beer F.P & Johnson Jr. E.R (Tmh International Book Company) • Engineering Mechanics Statics And Dynamics By Irving H. Shames (Prentice Hall Of India Pvt.Ltd) 			

Subject Title:	BASICS OF MECHANICAL ENGINEERING	Credit:	03
Subject Code:	ES108	Semester:	
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	01 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.

RATIONALE/OUTCOME: Mechanical Engineering cannot stand alone without the study of Basic Mechanical Engineering. The basic Mechanical Equipment is very important to recognize by its name and its specification. This subject provides the facility for the study of basic knowledge of the tools, machine and their application. Care has been taken so that the study of this subject will help to understand and correlate with other subject of Mechanical Engineering.

COURSE OUTCOME: After successful completion of the course, students will be able to:

1. To understand basic materials, its composition and its mechanical properties.
2. To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's.
3. To understand welding machine and its joints, sheet metal work and its operation process.
4. To understand the various types of machines and boiler its operation process.
5. To understand I.C. Engine, differentiate between Diesel and Petrol engine, two-stroke and Four stroke Engine.

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	MATERIALS: 1.1 Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels and their applications. 1.2 Mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, Tensile test 1.3 Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Hardness and Impact testing of materials, BHN etc.	09 Hrs.	20 Marks
2.	FITTING AND MEASUREMENT: 2.1 Introduction to different fitting tools like Hammer, files, hacksaw, and measuring tools. explanation of different operations like chipping, filing, drilling, tapping, sawing, cutting etc. 2.2 Measurement: Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar and Combination set.	09 Hrs.	20 Marks
3.	WELDING AND SHEET METAL WORKING: 3.1 Definitions of different welding tools / machines. 3.2 Explanations on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding. 3.3 Sheet Metal Working- Different sheet metal tools / machines. 3.4 Different types of sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting.	09 Hrs.	20 Marks
4.	MACHINES AND STEAM BOILERS:	09 Hrs.	20 Marks

	4.1 Machines: Introduction to lathe, Milling, Drilling, Shaper, Planer etc, Its types and operations. 4.2 Steam Boilers-Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of different mountings and accessories.		
5.	INTERNAL COMBUSTION ENGINES: 5.1 Introduction, Classification, Engine details 5.2 Four-stroke/ two-stroke cycle 5.3 Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies.	09 Hrs.	20 Marks
	Sessionals		
TOTAL		45 Hours.	100 Marks
Textbooks: <ul style="list-style-type: none"> • Elements Of Workshop Technology, Vol I & Vol II By S.K Hajra Chowdhary, Bose, Roy (Media Promoters And Publishes Limited) • Basic Mechanical Engineering By Ts Rajan (New Age International Publishers) • Basic Mechanical Engineering By Basant Agrawal & C.M.Agrawal • Handbook On Mechanical Engineering By R.K. Singal Reference Books: <ul style="list-style-type: none"> • Workshop Technology By R S Khurmi • Basic Mechanical Engineering By Sadhu Singh 			

Subject Title:	COMMUNICATION SKILLS IN ENGLISH	Credit:	02
Subject Code:	HS101	Semester:	FIRST/SECOND
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	00 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.
<p>RATIONALE/AIM: In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic and communicative competencies of Engineering students. The focus would be on the skills development in the areas of vocabulary, grammar, reading and writing and speaking confidently. The focus in this syllabus is on skill development, fostering ideas and practice of English language skills</p> <p>This course is designed to provide the trainee with the knowledge and skills necessary to meet with confidence, the writing tasks, speaking tasks; he/she will face in business and industry. Emphasis is placed on basic speaking skills and the structure of the basic write-ups. Grammar, spelling and punctuation are reinforced in the correction and evaluation of written and oral assignments.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Use English Language effectively in written forms. 2. Comprehend the given texts and speech to respond appropriately. 3. Communicate confidently in formal and informal contexts. 4. Develop listening capacity for easy interpretation of contents 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>INTRODUCTION TO COMMUNICATION:</p> <p>1.1 Need for effective communication 1.2 Communication Cycle, 1.3 Levels of communication 1.4 General and Technical Communication. 1.5 Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).</p>	06 Hrs.	
2.	<p>BARRIERS TO EFFECTIVE COMMUNICATION:</p> <p>2.1 Miscommunication, Noise, Types of barriers 2.2 Communication across Culture, case Studies and Overcoming measures</p>	03 Hrs.	
3.	<p>SPEAKING SKILLS AND PROFESSIONAL EXCELLENCE:</p> <p>3.1 Body Language, Forms of Non-verbal communication 3.2 Presentation Skills: 4Ps (Planning, Preparation, Practice, Presentation), Outlining;, Effective use of A/V aids and Modes of Delivery 3.3 Interview skills: Common Interview Questions, What Employers Want, Phone interview, closing the interview. 3.4 Conflict management. Effectively disagreeing and holding crucial conversations for resolving conflict. 3.5 Netiquette 3.6 Principles of public speaking</p>	09 Hrs.	

4.	LISTENING AND READING SKILLS: 4.1 Hearing Vs listening, process of listening, types 4.2 Barriers to Listening, Qualities of a Good Listener and Active Vs Passive Listening 4.3 Giving instruction 4.4 Reading for comprehension; To develop ability to guess meanings of words from the context and grasp by means of Skimming and Scanning the text	05 Hrs.	
5.	WRITING SKILLS: 5.1 Paragraph writing; Coherence and cohesiveness., Description, Note Making 5.2 Formal and informal letter writing; job applications, Resume, letters of complaint and adjustment, orders and enquiry letters. 5.3 Describing graphs using expressions of comparison In order to improve the proficiency 5.4 Technical Reports; Introduction – Characteristics of a Report – Categories of Reports –Formats- Prewriting – Structure of Reports (Manuscript Format) - Types of Reports - Writing the Report.	07 Hrs.	
	Sessionals		
TOTAL		30 Hours	
<p>Textbooks:</p> <ul style="list-style-type: none"> • Communication Skills By Dr. Meenakshi Raman &Dr. Sangeeta Sharma (Oxford University Press) • Business Correspondance & Report Writing By R.C Sharma & Krishna Mohan (TMH Publications) <p>Reference Books:</p> <ul style="list-style-type: none"> • Effective Technical Communication By Rizvi, M. Ashraf (Tmh Publications) • English For Engineering Students By G.V.L.N Sharma • Examine Your English By Margaret M. Maison (Orient Longman) • Developing Communication Skills By Mohan Krishna & Meera Banerji (Macmillan Publications) 			

Subject Title:	FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING	Credit:	03
Subject Code:	ES104	Semester:	FIRST/SECOND
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	01 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.
<p>RATIONALE/AIM: The course is designed to provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. To understand active and passive components. 2. To understand digital system. 3. To understand electrical and magnetic circuits. 4. To understand AC circuit, transformer & DC generator. 5. To understand and analyse DC laws. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>OVERVIEW OF ELECTRONIC COMPONENTS & SIGNALS:</p> <p>1.1 Passive components types, characteristics and its application 1.2 Active components types, characteristics and its application 1.3 Signals- AC/DC, Voltage/Current, Periodic/Non periodic signal 1.4 Average, RMS, peak values 1.5 Different types of signal waveform 1.6 Ideal Voltage & Current source, non-Ideal Voltage & Current source, 1.7 Independent voltage & Current source, Dependant voltage & current source</p>	10 Hrs.	20 Marks
2.	<p>OVERVIEW OF DIGITAL ELECTRONICS:</p> <p>2.1 Introduction to digital system 2.2 Difference between digital and analog systems 2.3 Types of number systems (binary, decimal, octal & hexadecimal) 2.4 Introduction to Boolean Algebra-Boolean variable, Rules and Laws 2.5 Logic Gates-NOT, AND, OR, NAND, NOR, XOR and XNOR 2.6 Symbol and truth table for all logic gates</p>	08 Hrs.	20 Marks
3.	<p>ELECTRIC AND MAGNETIC CIRCUITS:</p> <p>3.1 EMF, Current, Potential Difference, Power and Energy 3.2 M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve 3.3 Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law 3.4 Dynamically induced emf, Statically induced emf 3.5 Equations of self and mutual inductance 3.6 Analogy between electric and magnetic circuits.</p>	08 Hrs.	20 Marks

4.	A.C. CIRCUITS: 4.1 Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor 4.2 Mathematical and phasor representation of alternating emf and current 4.3 Voltage and Current relationship in Star and Delta connections 4.4 A.C in resistors, inductors and capacitors 4.5 A.C in R-L series, R-C series, R-L-C series and parallel circuits 4.6 Power in A. C. Circuits, power triangle. 4.7 Transformer-General construction, type of transformers and its application. 4.8 DC Generator/Motor-General construction and principal of operation and its application.	11 Hrs.	25 Marks
5.	DC LAWS AND THEOREMS: 5.1 Series and Parallel Circuits 5.2 Ohm's Law with examples 5.3 Kirchhoff's Voltage & Current Law with examples 5.4 Superposition Law with examples 5.5 Thevenin's Theorem with examples	08 Hrs.	15 Marks
	Sessionals		
TOTAL		45 Hours	
Textbooks: <ul style="list-style-type: none"> • Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi • Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi • Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014 Reference Books: <ul style="list-style-type: none"> • Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House • Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5 • Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239 			

Subject Title:	SPORTS AND YOGA	Credit:	02
Subject Code:	HS103	Semester:	FIRST/SECOND
Practical Hrs. / week:	02 Hrs.	Total Hrs. / semester:	30 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
RATIONALE/AIM:			
COURSE OUTCOME: After successful completion of the course, students will be able to: -			
<ol style="list-style-type: none"> To make the students understand the importance of sound health and fitness principles as they relate to better health. To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness. To create a safe, progressive, methodical and efficient activity based plan to enhance improvement and minimize risk of injury. To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	INTRODUCTION TO PHYSICAL EDUCATION, PHYSICAL FITNESS, WELLNESS & LIFESTYLE: 1.1 Meaning & definition of Physical Education, Aims & Objectives of Physical Education, Changing trends in Physical Education 1.2 Meaning & Importance of Physical Fitness & Wellness, Components of Physical fitness, Components of Health-related fitness, Components of wellness, Preventing Health Threats through Lifestyle Change, Concept of Positive Lifestyle	04 Hrs.	
2.	FUNDAMENTALS OF ANATOMY & PHYSIOLOGY IN PHYSICAL EDUCATION, SPORTS AND YOGA: 2.1 Define Anatomy, Physiology & Its Importance 2.2 Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)	02 Hrs.	
3.	KINESIOLOGY, BIOMECHANICS & SPORTS: 3.1 Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports 3.2 Newton's Law of Motion & its application in sports. 3.3 Friction and its effects in Sports	02 Hrs.	
4.	POSTURES, YOGA & LIFESTYLE: 4.1 Meaning and Concept of Postures, Causes of Bad Posture., Advantages & disadvantages of weight training, Concept & advantages of Correct Posture, Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis. o Corrective Measures for Postural Deformities. 4.2 Meaning & Importance of Yoga, Elements of Yoga, Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas, Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana), Relaxation Techniques for improving concentration - Yog-nidra 4.3 Asanas as preventive measures, Hypertension: Tadasana, Vajrasana, Pavanuktasana, Ardha Chakrasana, Bhujangasana, Sharasana, Obesity: Procedure,	10 Hrs.	

	Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana, Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana. Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana, Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.		
5.	TRAINING, PSYCHOLOGY & SPORTS: 5.1 Meaning of Training, Warming up and limbering down, Skill, Technique & Style 5.2 Definition & Importance of Psychology in Physical Edu. & Sports, Problems & Their Management, 5.3 Emotion: Concept, Type & Controlling of emotions, Meaning, Concept & Types of Aggressions in Sports, Psychological benefits of exercise, Anxiety & Fear and its effects on Sports Performance, Motivation, its type & techniques, Understanding Stress & Coping Strategies.	06 Hrs.	
6.	DOPING AND SPORTS MEDICINE: 6.1 Meaning and Concept of Doping 6.2 Prohibited Substances & Methods 6.3 Side Effects of Prohibited Substances 6.4 First Aid – Definition, Aims & Objectives. 6.5 Sports injuries: Classification, Causes & Prevention. 6.6 Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries	04 Hrs	
7.	SPORTS / GAMES: 7.1 Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. o History of the Game/Sport. o Latest General Rules of the Game/Sport. o Specifications of Play Fields and Related Sports Equipment. o Important Tournaments and Venues. o Sports Personalities. o Proper Sports Gear and its Importance	02 Hrs	
	Sessionals		
	TOTAL	30 Hours.	
Textbooks:			
<ul style="list-style-type: none"> • Modern Trends And Physical Education By Prof. Ajmer Singh. • Light On Yoga By B.K.S. Iyengar. • Health And Physical Education – NCERT (11th And 12th Classes) 			

Subject Title:	ENGINEERING GRAPHICS	Credit:	02
Subject Code:	ES101	Semester:	FIRST/SECOND
Practical Hrs. / week:	04 Hrs.	Total Hrs. / semester:	60 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
RATIONALE/AIM: The trainee is introduced to basic of engineering drawing where they draw different tools using different drawing methods. Visualisation of three dimensional objects and isometric projections are also learned.			
COURSE OUTCOME: After successful completion of the course, students will be able to: <ol style="list-style-type: none"> 1. Recognize and use drafting equipments 2. Demonstrate knowledge of various rules dimensions and use of proper lines 3. Construct various geometrical figures like polygon, ellipse, parabola cycloid and involutes of circle 4. Develop orthographic and isometric projection of solids on planes 5. Demonstrate the selection of cutting plane and construct sectional views based on it 6. To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	INTRODUCTION TO ENGINEERING DRAWING: <ol style="list-style-type: none"> 1.1 Introduction - need for engineering drawing, standards adopted in drawing like SI, ASME, specifications of standard drawing sheets & layout 1.2 Drawing equipments - drawing boards, T-Square, set squares, protractors, their uses & care, Mini Drafter – advantages, method of handling, instrument box & its use, grades of pencils & their use 1.3 Metric scales-scale ratios and their adoption 1.4 Title block (ATTC Standard) 1.5 Engineering script- recommended size of letters & numbers used in drawing according to I.S. recommended vertical & sloping letters & numerical practice 	04 Hrs.	
2.	LINES, DIMENSIONING AND TOLERANCE: <ol style="list-style-type: none"> 2.1 Types of lines and their uses 2.2 Notation of dimensioning and dimension line 2.3 Rules for dimensioning 2.4 Extension line, leaders, arrowheads, notes, place up of dimensions 2.5 Chain, parallel & combined dimensioning, aligned system & unidirectional system of dimensioning 2.6 Method of dimensioning diameters, radii, chords, arcs & angles 2.7 Dimensioning practice 	04 Hrs.	
3.	GEOMETRICAL CONSTRUCTION: <ol style="list-style-type: none"> 3.1 Construction of polygon - square, pentagon, hexagon, heptagon (using any method) 3.2 Construction of ellipse - any method 3.3 Construction of parabola - any method 3.4 Construction of cycloids and involutes of a circle 	08 Hrs.	
4.	ORTHOGRAPHIC PROJECTION:	10 Hrs.	

	<p>4.1 Four quadrants, principle planes, projections, objections, profile plane, designation of view</p> <p>4.2 First angle projection - explanation of the various views front, top, side views, bottom view</p> <p>4.3 Third angle projection- explanation of the various views front, top, side views</p> <p>4.4 Projection of solids on all planes/views (minimum of 12 exercises to be completed)</p>		
5.	<p>SECTIONAL VIEW:</p> <p>5.1 Need for drawing sectional view, explanation of cutting plane and its representation, types of sections</p> <p>5.2 Practice on drawing sectional views (minimum of 10 exercises to be completed)</p>	08 Hrs.	
6.	<p>ISOMETRIC PROJECTION:</p> <p>6.1 Isometric projection of regular objects like cube, prism, pyramids, cone, cylinder and sphere</p> <p>6.2 Isometric projection of solids (minimum of 6 exercises to be completed)</p>	10 Hrs.	
7.	<p>FREE HAND SKETCHES:</p> <p>7.1 Free hand sketches of nuts, bolts, rivets, threads, split pin, foundation bolts, keys and couplings (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching)</p>	04 Hrs.	
8.	<p>COMPUTER AIDED DRAFTING:</p> <p>8.1 Computer Aided Drafting: concept, Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon.</p> <p>8.2 Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, PolyLine. Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates. Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers. Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions</p> <p>8.3 Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.</p>	12 Hrs.	
	Sessionals		
TOTAL		60 Hours	
<p>Textbooks:</p> <ul style="list-style-type: none"> • Engineering Drawing By Dr. K.Venugopal (New Age International Publication) • Engineering Drawing By N.D Bhatt (Charotar Publications) <p>Reference Books:</p> <ul style="list-style-type: none"> • Technical Drawing By K.V Natarajan • Essentials Of Engineering Drawing And Graphics Using Autocad By Jeyapoovan, T. (Vikas Publishing Housepvt. Ltd) • Technical Drawing By S.S Mani And Rajagopal 			

Subject Title:	APPLIED PHYSICS LAB	Credit:	01
Subject Code:	BS105	Semester:	FIRST/SECOND
Practical Hrs. / week:	02 Hrs.	Total Hrs. / semester:	30 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: The study of engineering concepts of Physics will enable to establish a sound basis in the understanding of engineering subjects where the emphasis will be on the application of these concepts. A good foundation in Physics will help the trainee to cope up with continuity of sequence necessary for logical development of engineering subjects.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to: -</p> <ol style="list-style-type: none"> 1. To select right kind of measuring tools for determining dimensions of physical quantities. 2. To understand the reflection, refractive Index of material. 3. To determine force constant of spring body. 4. To understand the velocity of sound. 5. To understand magnetic characteristics of a magnet. 			
LIST OF EXPERIMENTS TO BE PERFORMED			
SL. NO.	LABORATORY EXPERIMENTS	TIME ALLOCATED	
1.	Use of Vernier Calipers for the measurement of given object		
2.	Use of Micrometer, Screw Gauge for the measurement of dimensions of given object		
3.	To determine the thickness/Radius of curvature of the glass strip/bowl using Spherometer		
4.	To determine the value of acceleration due to gravity (g) of a place with Simple Pendulum.		
5.	To verify the Laws of Reflection of Light using Plane Mirror		
6.	To find the Refractive Index of material of Glass Block by Pin method		
7.	To find the refractive Index of material of Glass Prism by Minimum Deviation Method		
8.	To determine Spring Constant and to verify Hooke's Law		
9.	To measure the velocity of sound in a resonance tube.		
10.	To draw the Magnetic Lines of Force of a Bar Magnet		
	Sessionals		
	End Semester Exams		
TOTAL		30 Hours.	
Textbooks: MANUAL FOR PHYSICS LAB			

Subject Title:	APPLIED CHEMISTRY LAB	Credit:	3
Subject Code:	BS106	Semester:	FIRST/SECOND
Practical Hrs. / week:	2	Total Hrs. / semester:	30 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: There are numerous number of materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. This course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to: -</p> <ol style="list-style-type: none"> 6. Understand and assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution. 7. Qualitatively analyse the engineering materials and understand their properties and applications. 8. Choose fuel and lubricants suitable for economical industrial processing to obtain eco-friendly finished products. 9. Understand corrosion and develop economical prevention techniques. 10. Understand the classification and general properties of engineering materials such as metals, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding. 11. Ascertain construction, mechanism and efficiency of electrochemical cells, solar cells and fuel cells 			
LIST OF EXPERIMENTS TO BE PERFORMED			
SL. NO.	LABORATORY EXPERIMENTS	TIME ALLOCATED	
1.	Preparation of standard solution of oxalic acid or potassium permanganate.		
2.	Volumetric estimation of total acid number (TAN) of given oil.		
3.	Standardization of KMnO ₄ solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by KMnO ₄ solution OR Determination of flash and fire point of lubricating oil using Able's flash point apparatus		
4.	To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.		
5.	Volumetric estimation of Alkalinity of given water sample using 0.01M sulphuric acid.		
6.	Construction and measurement of EMF of electro-chemical cell (Daniel cell).		
7.	To determine the amount of dissolved oxygen in given sample of water using standard sodium thiosulphate solution		
8.	Iodometric estimation of copper in the copper pyrite ore.		
9.	Determination of the Iron content in given cement sample using colorimeter OR Determination of calorific value of solid or liquid fuel using bomb calorimeter		
10.	To study different types of chemical reactions that include noticeable change (color change, precipitate etc)		
	Sessionals		
	End Semester Exams		
TOTAL		30 Hours.	
Textbooks: MANUAL FOR PHYSICS LAB			

Subject Title:	INTRODUCTION TO IT SYSTEMS LAB	Credit:	1.5
Subject Code:	ES108	Semester:	FIRST/SECOND
Practical Hrs. / week:	03 Hrs.	Tutorials Hrs. / week:	00 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: This Lab course is intended to practice whatever is taught in theory class of 'Introduction of IT Systems' and become proficient in using computing environment - basic computer skills, basic application software tools, Computer Hardware, computer security features, etc.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. At the end of the course student will be able to 2. comfortably work on computer. 3. install and configure operating system. 4. write documents, create worksheets, prepare presentations, protect information 5. protect computers from basic abuses/attacks. 6. configure IP address and LAN settings. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS		
1.	Browser features, browsing, using various search engines, writing search queries.		
2.	Visit various e-governance/Digital India portals, understand their features, services offered.		
3.	Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognise various ports/interfaces and related cables, etc.		
4.	Design a LAN using topology diagram and assign ip address to all nodes.		
5.	Explore installation procedures for Linux and Windows operating system on identified lab machines.		
6.	Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.		
7.	Practice HTML commands, try them with various values, make your own Webpage.		
8.	Explore features of Open Office tools and MS office tools, create documents using these features, do it multiple times.		
9.	Explore security features of Operating Systems and Tools, try using them and see what happens.		
10.	Demonstrate programming skills using C.		
	Sessionals		
		TOTAL	45 Hours
<p>Reference Books:</p> <ul style="list-style-type: none"> • R.S. Salaria, Computer Fundamentals, Khanna Publishing House. • Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and • IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, • CISC Press, Pearson Education. 			

- PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014

Subject Title:	ENGINEERING WORKSHOP PRACTICE - I	Credit:	02
Subject Code:	ES103	Semester:	FIRST/SECOND
Practical Hrs. / week:	04 Hrs.	Total Hrs. / semester:	60 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: This course emphasizes on the importance of knowledge of various machining process by using different tools in various workshop machines. This encourages the trainees to understand the workshop process better in order to develop themselves into capable supervisors for various production process required for optimizing maximum utilization of resources and results.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to: -</p> <ol style="list-style-type: none"> 1. Follow proper safety procedures 2. Read and interpret job drawings 3. Select and use various marking, measuring, holding, striking, cutting tools & equipments in fitting shop 4. Operate bench drilling machine: drill, counter sink, counter bore and tap holes 5. Select proper welding rods and fluxes and weld 6. Produce jobs as per specified dimensions 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>SAFETY:</p> <p>1.1 Introduction</p> <p>1.2 Safety precautions and safety equipments</p>	02 Hrs.	
2.	<p>FITTING SHOP PRACTICE (Filing, Hacksawing, measuring and marking, letter and number punching):</p> <p>2.1 To be practiced on U- Channel</p> <p>2.2 Use of Various Hand tools- Vice, files, hammer, chisel, hacksaw, straight edge, Try-square, scribe, centre punch, dot punch, steel rule, introduction to Vernier and Height gauge</p> <p>2.3 Different fitting operation like filing, marking, hacksawing, letter and number punching.</p>	18 Hrs.	
3.	<p>DRILL PLATE:</p> <p>3.1 Filing on a flat workpiece for reference in three sides</p> <p>3.2 Filing on a flat workpiece to maintain the given dimensions</p> <p>3.3 Various marking, measuring, cutting, holding and striking tools</p> <p>3.4 Use of drilling machine, to drill and ream holes using different diameter drill bits and reamers</p> <p>3.5 Tapping to produce internal threads in drilled holes.</p>	20 Hrs.	
4.	<p>ANGLE GAUGE:</p> <p>4.1 Holding the job in the bench vice</p> <p>4.2 Measuring the required length</p> <p>4.3 Cutting the material keeping some allowance with a Hacksaw</p> <p>4.4 Maintaining the external dimensions.</p> <p>4.5 Marking on the Surface plate with a Height Gauge</p> <p>4.6 Marking centre punch for locating the centres of the holes to be drilled</p>	10 Hrs.	

	4.7 Holding the job in a drilling vice and drill in the drilling machine 4.8 Filing and maintain the angles.		
5.	WELDING PRACTICE: 5.1 Introduction 5.2 Safety precautions in welding safety equipments and its use in welding processes 5.3 Types of welding - ARC welding, Gas welding, Gas Cutting 5.4 Welding of similar materials, selection of welding rod material, size of welding rod and work piece 5.5 Different types of flame 5.6 Types of welded joints : Butt, Lap, Corner, Edge & Tee joints 5.7 Tag welding	10 Hrs.	
	Sessionals		
TOTAL		60 Hours.	
Textbooks:			
<ul style="list-style-type: none"> • MANUAL FOR WORKSHOP - I 			

Subject Title:	COMMUNICATION SKILLS IN ENGLISH LAB (FOR ATTC)	Credit:	01
Subject Code:	HS105	Semester:	FIRST/SECOND
Practical Hrs. / week:	02 Hrs.	Total Hrs. / semester:	30 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: This course is designed to provide the trainee with the knowledge and skills necessary to meet with confidence in speaking tasks that he/she will face in business and industry. Emphasis is placed on basic speaking skills like conversation skills, presentation skills and interview skills.</p> <p>The activities in the lab sessions are in association and use of the language lab by 'Spears Language Lab'.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Use English Language effectively in written forms. 2. Comprehend the given texts and respond appropriately. 3. Communicate confidently in formal and informal contexts. 4. Develop listening capacity for easy interpretation of contents 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>EXERCISES TO BE PERFORMED WITH RESPECT TO FUNDAMENTALS:</p> <p>1.1 Common grammar mistakes 1.2 Foundation English I,II,III 1.3 Building Blocks of English I,II,III</p>	05 Hrs.	
2.	<p>SPEAKING SKILLS EXERCISES:</p> <p>2.1 Voice and accent training, professional English I,II 2.2 Fluent English I,II,III 2.3 Basic English I,II,III 2.4 Art of Effective Communication 2.5 Vocabulary builde 2.6 Presentations</p>	09 Hrs.	
3.	<p>EXERCISES ON WRITING SKILLS:</p> <p>3.1 Critical thinking 3.2 Creative thinking 3.3 Resume and cover letter writing 3.4 Comprehensions 3.5 Reports writing</p>	06 Hrs.	
4.	<p>LISTENING SKILLS EXERCISES:</p> <p>4.1 Listening activities like stories, poems, passages, discussions, Seminars etc 4.2 Fill in the blanks based on listening activity 4.3 Summarizations based on listening activity</p>	04 Hrs.	

5.	Professional skills exercises: 5.1 Group Discussions 5.2 Interview tips and mock sessions 5.3 Career management	06 Hrs.	
	Sessionals		
TOTAL		30 Hours	
Reference: <ul style="list-style-type: none"> • Use of Spears Language Lab 			

Subject Title:	COMMUNICATION SKILLS IN ENGLISH LAB	Credit:	01
Subject Code:	HS105	Semester:	FIRST/SECOND
Practical Hrs. / week:	02 Hrs.	Total Hrs. / semester:	30 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: This course is designed to provide the trainee with the knowledge and skills necessary to meet with confidence in speaking tasks that he/she will face in business and industry. Emphasis is placed on basic speaking skills like conversation skills, presentation skills and interview skills.</p> <p>The activities in the lab sessions are in association and use of the language lab by 'Spears Language Lab'.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Use English Language effectively in written forms. 2. Comprehend the given texts and respond appropriately. 3. Communicate confidently in formal and informal contexts. 4. Develop listening capacity for easy interpretation of contents 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>EXERCISES TO BE PERFORMED WITH RESPECT TO FUNDAMENTALS:</p> <p>1.1 Common grammar mistakes 1.2 Foundation English I,II,III 1.3 Building Blocks of English I,II,III</p>	05 Hrs.	
2.	<p>SPEAKING SKILLS EXERCISES:</p> <p>2.1 Voice and accent training, professional English I,II 2.2 Fluent English I,II,III 2.3 Basic English I,II,III 2.4 Art of Effective Communication 2.5 Vocabulary builde 2.6 Presentations</p>	09 Hrs.	
3.	<p>EXERCISES ON WRITING SKILLS:</p> <p>3.1 Critical thinking 3.2 Creative thinking 3.3 Resume and cover letter writing 3.4 Comprehensions 3.5 Reports writing</p>	06 Hrs.	
4.	<p>LISTENING SKILLS EXERCISES:</p> <p>4.1 Listening activities like stories, poems, passages, discussions, Seminars etc 4.2 Fill in the blanks based on listening activity 4.3 Summarizations based on listening activity</p>	04 Hrs.	

5.	PROFESSIONAL SKILLS EXERCISES: 5.1 Group Discussions 5.2 Interview tips and mock sessions 5.3 Career management	06 Hrs.	
	Sessionals		
TOTAL		30 Hours	
Reference:			
<ul style="list-style-type: none"> • Use of Spears Language Lab 			

Subject Title:	ENGINEERING WORKSHOP PRACTICE – II (DM / MT / ME)	Credit:	02
Subject Code:	ES109	Semester:	SECOND
Practical Hrs. / week:	04 Hrs.	Total Hrs. / semester:	60 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: This course emphasizes on the importance of knowledge of various machining process by using different tools in various workshop machines. This encourages the trainees to understand the workshop process better in order to develop themselves into capable supervisors for various production process required for optimizing maximum utilization of resources and results.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to: -</p> <ol style="list-style-type: none"> 1. Read and interpret job drawings 2. Select and use various marking, measuring, holding, striking, cutting tools & equipments in fitting shop 3. Operate bench drilling machine & lathe 4. Apply work ethics, follow 5S process and apply the concept of team work 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>TOOL GRINDING:</p> <p>1.1 Introduction to tool geometry and grinding basics 1.2 Safety precautions 1.3 Grinding right handed single point turning tool and parting tool 1.4 Use of measuring instruments Vernier, bevel protractor</p>	12 Hrs.	
2.	<p>OPEN FIT (Filing, Hacksawing, measuring and marking, letter and number punching):</p> <p>2.1 To make an open fit (clearance fit) 2.2 Use of various hand tools - vice, files, hammer, chisel, hacksaw, straight edge, tri-square, scribe, centre punch, dot punch, steel rule, Vernier and height gauge 2.3 Different fitting operation like filing, marking, hacksawing, letter and number punching 2.4 Operation on drilling machine to produce relief holes and to perform chain drilling</p>	26 Hrs.	
3.	<p>PAPER WEIGHT:</p> <p>3.1 Manufacturing a simple base plate involving angle filing, drilling, and counter sinking operations to produce a paper weight 3.2 Assembling, exercise of paperweight using drilling, tapping operations</p>	22 Hrs.	
4.	<p>PIN PUNCH:</p> <p>4.1 Introduction to lathe 4.2 Perform the operations of turning, facing, taper turning, knurling, filing, number punching</p>	10 Hrs.	
	Sessionals		
TOTAL		60 Hours.	
<p>Textbooks:</p> <ul style="list-style-type: none"> • MANUAL FOR WORKSHOP –II (TDM/DM/DMT/DME/DCVE) 			

Subject Title:	ENGINEERING WORKSHOP PRACTICE – II (CIVIL)	Credit:	02
Subject Code:	ES109	Semester:	SECOND
Practical Hrs. / week:	04 Hrs.	Total Hrs. / semester:	60 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: This course emphasizes on the importance of knowledge of various basic skills such as Carpentry, Masonry, Fitting, Drilling, Tapping, plumbing works etc. Therefore, students should be given basic practices of these skills with the safety aspects required for the same. This course facilitates the development of basic skills to supervise construction activities like brick masonry, woodwork, concreting, finishing etc. including quality control and maintenances of safety to self, co-workers and the constructed components of the building. This encourages the trainees to understand the necessary technical aspects and safety precautions needed to be observed.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to: -</p> <ol style="list-style-type: none"> 1. Perform basic tasks in masonry, concreting, carpentry, fitting, drilling, tapping, plumbing, etc 2. Select and use various marking, measuring, holding, striking, cutting tools & equipments. 3. Follow safety norms for handling materials, tools and equipments required for each construction activity. 4. Apply work ethics, follow 5S process and apply the concept of team work. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	CARPENTRY SHOP: 1.1 To prepare half lap corner joint from given pieces of wood. 1.2 To prepare mortise and tenon joint from given piece of wood. 1.3 To understand safety precautions during actual work.	12 Hrs.	
2.	MASONRY AND CONCRETING: 2.1 To prepare brick masonry using various bond (English Bond ; Flemish Bond) 2.2 To prepare a concrete mix of different grades.	12 Hrs.	
3.	FORMWORK, SCAFFOLDING & SHUTTERING: 3.1 To prepare a formwork for various structural components (Beam,Column,Slab) 3.2 To prepare a frame structure including shuttering and scaffolding elements.	12 Hrs.	
4.	WELDING & DRILLING: 4.1 To prepare simple butt joint and lap joint by Electric arc welding from given pieces of mild steel. 4.2 To drill the hole of given dimension at a given location on a metal piece.	12 Hrs.	
5.	PLUMBING & FINISHING WORK: 5.1 Plumbing works : Threading; Elbow joint; T joint 5.2 White washing/Painting work(Surface preparation carried out for Plastered surface/Wall/ Parapet.)	12 Hrs.	

	Sessionals		
		TOTAL	60 Hours.
Textbooks:			
<ul style="list-style-type: none"> MANUAL FOR WORKSHOP-II (CIVIL) 			

Subject Title:	ENGINEERING WORKSHOP PRACTICE – II (COMPUTER)	Credit:	02
Subject Code:	ES109	Semester:	SECOND
Practical Hrs. / week:	04 Hrs.	Total Hrs. / semester:	60 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: The course is designed to introduce the trainee to the working, maintenance and configuration of various types of computer hardware systems. They will be able to install and configure various operating systems and maintain the computer system with ease.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate safety precautions while handling computer system. 2. Identify the functions of different computer hardware components. 3. Assemble and disassemble various hardware parts of computer system. 4. Install and configure Windows Operating system. 5. Identify and configure different networking cables. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	REMARKS
1.	<p>SAFETY PRECAUTIONS WHILE TROUBLESHOOTING COMPUTERS:</p> <p>1.1 Protecting computer against ESD 1.2 Unplug power supply, discharge of capacitors 1.3 Use of anti-static wrist strap 1.4 Handling electronic equipments 1.5 Servicable and non serviceable components</p>	03 Hrs.	
2.	<p>BASIC CONCEPTS & TERMINOLOGIES USED IN PC:</p> <p>2.1 Input Devices: (Keyboard, Mouse, Joy Stick, Light Pen, Microphone, Scanner, Bar Code Reader, Web Camera, Digital Camera) 2.2 Output devices: (VDU/Monitor(Impact Printers , Non-impact Printers , Printer, Plotter) 2.3 Permanent Storage Media: (Hard Disk Drive—IDE/ATA, SCSI, Serial ATA (SATA), Storage capacity of HDD & major HDD manufacturers, CD-ROM, DVD, Read/write speed of DVD-RW, Pen Drive) 2.4 Connectors: (Power Cable, Socket, Pin, Port, Graphics/video card & video memory PCI / PCI express, AGP, USB, Firewire) 2.5 Memory: (Memory Measurement (Kilobyte, Megabyte, Gigabyte, Terabyte), Cache memory, DDR2 & DDR3 SDRAM & its I/O bus speed, Storage capacity of various DDR RAM) 2.6 Processors (CPU): (Block diagram of CPU, Leading manufacturers of processors, latest processors and its predecessors, No. of cores, Pin configuration, 32 bit/ 64 bit) 2.7 Software: (OS & device drivers, Application softwares, Anti-Virus package, Protection against Viruses)</p>	10 Hrs	
3.	<p>IDENTIFICATION OF MOTHERBOARD COMPONENTS:</p> <p>3.1 Motherboard 3.2 ATX technology, Chipsets --North and South bridge</p>	12 Hrs	

	3.3 BIOS 3.4 CMOS 3.5 CPU (Intel and AMD, IDE Controller) 3.6 PCI & PCI Express slots 3.7 CPU-Fan Connection, CPU Socket 3.8 Heat sink, Memory Slots 3.9 SATA Connections, Front Panel Connections.		
4.	ASSEMBLY AND DISASSEMBLY OF PC: 4.1 Identify the CPU case/cabinet 4.2 Installing the motherboard, processor, CPU fan & heat sink, RAM 4.3 Installing the graphics/video card 4.4 Installing the HDD (ATA / SATA) 4.5 Installing the optical drive--DVD-ROM/DVD-RW 4.6 Installing the power supply 4.7 Connecting various cables 4.8 ATX power connector on your motherboard power to the processor 4.9 Connect the front USB/audio panel cable in the motherboard 4.10 Plug the cable of cabinet fans 4.11 Connect the VGA cable of the monitor into the VGA port 4.12 Connect the speaker cable in the audio port 4.13 Plug in the power cable from SMPS into the UPS 4.14 Plug in the power cable of the monitor	10 Hrs	
5.	INSTALLING THE OPERATING SYSTEM, DEVICE DRIVERS AND APPLICATION SOFTWARE	10 Hrs	
6.	PREVENTIVE MAINTENANCE & TROUBLESHOOTING OF A SYSTEM: 6.1 Discussion on Preventive maintenance & tools required 6.2 Different techniques to Preventive maintenance & troubleshooting	05 Hrs	
7.	IDENTIFICATION OF NETWORK HARDWARE AND PREPARATION OF PATCH CABLES: 7.1 Terms of Computer Networks (LAN, WAN, Topology, Nodes) 7.2 Protocol, Client/Server, Peer-to-peer, data packets, Ethernet 7.3 Hub, Switch, UTP Cables, RJ45 connectors, crimping tool 7.4 CAT levels for UTP cables & bandwidth 7.5 Types of patch cables 7.6 Straight Thru patch cables 7.7 Peer to Peer/crossover patch cables 7.8 UTP color codes and pin configurations 7.9 Preparation of different types of patch cables 7.10 Networking of two or more computers using a hub. 7.11 Basic network Utility Commands: Ping, Ipconfig etc	10 Hrs	
	Sessionals		
TOTAL		60 Hours.	
Textbooks:			
<ul style="list-style-type: none"> • MANUAL FOR WORKSHOP-II (COMPUTER) 			

Subject Title:	MICRO PROJECT	Credit:	02
Subject Code:	ES109	Semester:	SECOND
Practical Hrs. / week:	04 Hrs.	Total Hrs. / semester:	60 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.

RATIONALE/AIM: This course is intended to encourage the trainee for hands-on practice of their theoretical knowledge by implementing the same in the form of a project to be executed in groups. The project will enable the students to apply whatever knowledge they have earned into a real-time based application. This will not only clarify most theoretical doubts but also will allow the trainees to learn about group dynamics, being a team player, inculcate leadership abilities in addition to showing off their technical skills in their area of expertise

COURSE OUTCOME: After successful completion of the course, students will be able to:

1. Develop skills to select project based on the areas specified, feasibility, need and application
2. Include the proper format of the project taking into perspective planning, estimation and costing, design or design and fabrication
3. Develop skills for time management; work in group and leadership quality
4. Develop skills for documentation and presentation of the project
5. Submit their report on the project by the end on II semester (both in soft and hard copy)

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS	TIME ALLOCATED	MARKS DISTRIBUTION
1.	<ul style="list-style-type: none"> • Group size – 4 to 5 trainees depending on the size of the project. • Time allocation for the project –The student has to carry out the project in the allotted time during the working hours or after working hours/off days. • Project guide to be allotted to each group. • The project group has to submit the synopsis before the starting the project. Based on the synopsis presentation the guide has to give the approval for carrying out the project further. <p>Note: Under the mini project, 64 hours per semester of time is allotted during the working slot. This should be purely used for interaction between the guide and the project group during the process of developing concept design, discussion and also includes the synopsis presentation and final presentation. For proper utilization this 60 hours, a slot of 4 hours per week can be provided during the working time in the time table. All the other time required for completion of the project to be met by working extra hours or working in off days and holidays. No minimum and maximum time limit for the mini project is specified here. The individual guides of the project should recommend such projects taking into following points:</p> <ol style="list-style-type: none"> 1. The project should be based on any topic related to course related field. 2. 60 hours time allotted during the working hours per semester and the remaining should be after the working hours. 	60 Hrs.	100 Marks.

	<p>3. The student has to submit project report in hard and soft copy before the final presentation.</p> <p>4. Evaluation should be carried out in prescribed format covering all the major areas.</p> <p>5. The objective of micro project is to bring the new ideas, application of the technology and give a platform for successful execution of major projects during the fifth/sixth semester.</p> <p>There is no limit on the number of area mentioned above. The student can be encouraged to take up the project beyond this area or may be any advanced technology related to the engineering or course related field.</p>		
TOTAL		60 Hours.	100 Marks
<p>Reference:</p> <ul style="list-style-type: none"> • FORMAT FOR PROJECT REPORT (MICRO) 			

Subject Title:	FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB	Credit:	1.5
Subject Code:	ES107	Semester:	FIRST/SECOND
Practical Hrs. / week:	03 Hrs.	Tutorials Hrs. / week:	00 Hrs.
		Total Hrs. / semester:	45 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.
<p>RATIONALE/AIM: The trainee is introduced to basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.</p>			
<p>COURSE OUTCOME: After successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Identify the use of various components and its symbol and measuring instruments that are frequently used in experimentation of various circuits. 2. To understand the DC network theorems and their importance. 3. To Understand logic gates and its application in various electrical/electronic circuits. 4. To understand the parts of DC machine and transformer. 5. To understand the working and performance of electronics elements. 			
SUBJECT CONTENTS			
UNIT	TOPICS / EXPERIMENTS		
1.	Familiarization with Voltmeter, Ammeter, Multimeter, CRO/DSO, Function Generator, Breadboard and electrical/electronics safety measures.		
2.	To study different Electrical and Electronics symbols & differentiate active and passive components.		
3.	Use multimeter to measure the value of given resistor to confirm with colour code and Connect resistors in series /parallel combination on bread board and measure its value using digital multimeter.		
4.	Charging and discharging of capacitor		
5.	To verify ohm's law & plot the V-I graph.		
6.	Verification of Kirchhoff's Current and Voltage laws.		
7.	Verification of Thevenin's theorem.		
8.	To study different parts of DC machine and Transformer.		
9.	Connect single phase transformer and measure its input and output quantities. Determination of the transformation ratio (K) of 1-phase transformer using the measured data.		
10.	Verify the truth tables of logic gates.		
11.	Test the performance of PN-junction diode and Test the performance of Zener diode.		
12.	Test the performance of LED and Identify three terminals of a transistor using digital multimeter.		
13.	Test the performance of NPN transistor and test the performance of transistor as switch circuit.		

14.	Test Op-Amp as amplifier.		
	Sessionals		
		TOTAL	45 Hours
Textbooks:			
<ul style="list-style-type: none"> • Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi • Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi • Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014 			
Reference Books:			
<ul style="list-style-type: none"> • Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House • Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, • Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 			