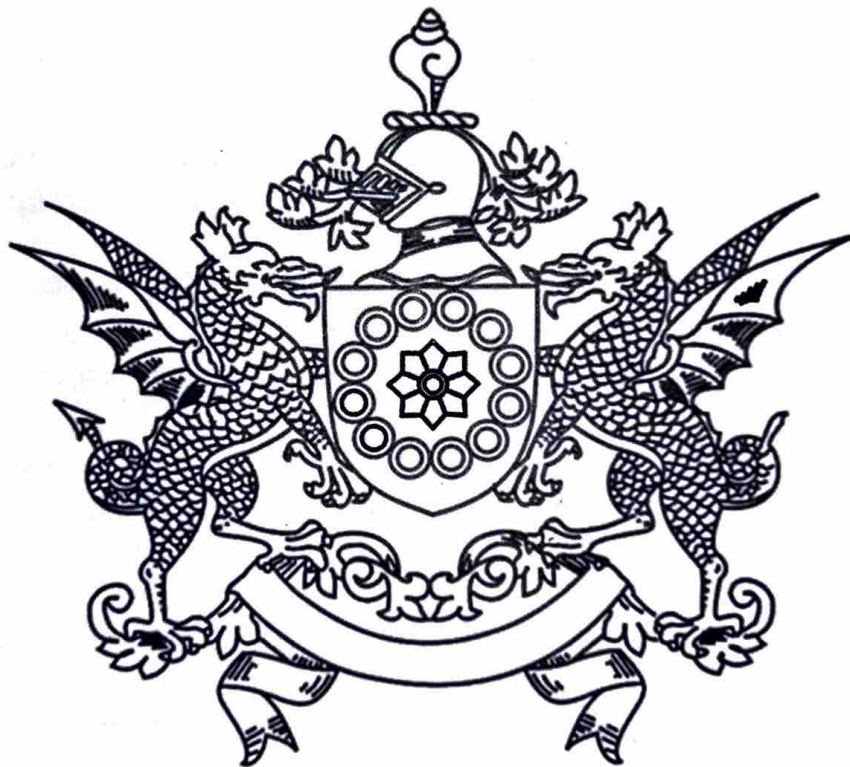


ORIGINAL

FIRST YEAR
(COMMON FOR ALL TRADES)

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EDUCATION DEPARTMENT
GOVERNMENT OF SIKKIM
TASHILING, GANGTOK, EAST SIKKIM**



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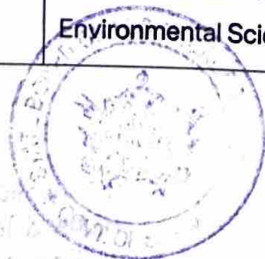
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**Syllabus Structure for
Semester I and Semester II**

SN	CODE	COURSE	CONTACT HRS / WEEK			Total Credits
			L	T	P	
1.	BS101	Mathematics-I	2	1	0	3
2.	BS103	Applied Physics	2	1	0	3
3.	BS105	Applied Physics Lab	0	0	2	1
4.	ES101	Engineering Graphics	0	0	4	2
5.	ES103	Engineering Workshop Practice-I	0	0	4	2
6.	ES107	Basic Mechanical Engineering	2	1	0	3
7.	HS101	Communication Skills in English	2	0	0	2
8.	HS103	Sports and Yoga	0	0	2	1
9.	HS105	Communication Skills in English Lab	0	0	2	1
10.	BS102	Mathematics-II	2	1	0	3
11.	BS104	Applied Chemistry	2	1	0	3
12.	BS106	Applied Chemistry Lab	0	0	2	1
13.	ES102	Introduction to IT Systems	2	0	0	2
14.	ES104	Fundamentals of Electrical & Electronics Engineering	2	1	0	3
15.	ES106	Engineering Mechanics	2	1	0	3
16.	ES108	Introduction to IT Systems Lab	0	0	2	1
17.	ES110	Fundamentals of Electrical & Electronics Engineering Lab	0	0	3	1.5
18.	ES112	Engineering Workshop Practice-II	0	0	4	2
19.	AU102	Environmental Science	2	0	0	0



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
1.	<p>ADVANCE ALGEBRA:</p> <p>1.1. Binomial Theorem</p> <p>1.1.1. Fundamental principle of counting.</p> <p>1.1.2. Permutation as an arrangement, Combination as selection</p> <p>1.1.3. Meaning of $n!$ (factorial n), ${}^n P_r$ and ${}^n C_r$</p> <p>1.1.4. Problems involving ${}^n P_r$ and ${}^n C_r$</p> <p>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</p> <p>1.2.1 Definition of complex numbers, real and imaginary part of complex number, argand diagram.</p> <p>1.2.2. Definition of conjugate complex, equality of complex number, addition and subtraction of two complex numbers, multiplication and division of complex numbers</p> <p>1.2.3. Express any complex number in $a+ib$ form,</p> <p>1.2.4. Modulus and argument of complex number</p> <p>1.2.5. Polar form of complex number, conversion from polar to Cartesian from Cartesian to polar form</p> <p>1.2.6. Exponential form of complex number, conversion from exponential to Cartesian and from Cartesian to exponential form</p>
2.	<p>TRIGONOMETRY:</p> <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. $\sin\theta$, $\cos\theta$, $\tan\theta$ their reciprocal etc</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°, 30° ($\frac{\pi}{6}$), 45° ($\frac{\pi}{4}$), 60° ($\frac{\pi}{3}$), 90° ($\frac{\pi}{2}$),</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>



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	<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:</p> <p>a) Deducing the expansion for multiple angle $\sin 2A$, $\cos 2A$, $\tan 2A$, $\sin 3A$, $\cos 3A$, $\tan 3A$ etc.</p> <p>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>
<p>3.</p>	<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>
<p>4.</p>	<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>
	<p>Sessional</p>
<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: <ul style="list-style-type: none"> www.khanacademy.org www.sosmath.org www.arcademics.com http://tutorial.math.lamar.edu http://patrickjmt.com 	



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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. Represent physical quantities as scalar and vectors and solve real life relevant problems.
3. Compare and relate physical properties associated with linear motion and solve simple problems.
4. Differentiate between Newton's gravitational constant "G" and acceleration due to gravity "g"
5. Define the terms: heat and temperature, convert temperature to different scales.
6. Enumerate the properties of dia, para and ferromagnetic materials.
7. Define various wave parameters.
8. State basic optical laws and enumerate conditions for total internal reflection.
9. Differentiate between insulators, conductors and semiconductors.
10. Express importance of nanoscience and nanotechnology and impact of nanotechnology to the society

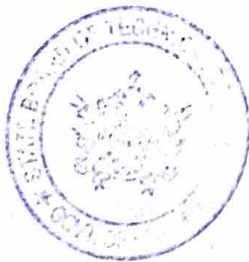
SUBJECT CONTENTS

Chap. No.	NAME OF CHAPTER/TOPIC
1.	<p>UNITS & DIMENSIONS</p> <p>1.1 Physical Quantities: Fundamental and derived, Units and systems of units (FPS, CGS and SI units).</p> <p>1.2 Dimensions and dimensional formulae of physical quantities.</p> <p>1.3 Measurements: Need, measuring instruments, least count, Errors in measurements (systematic and random) and significant figures.</p> <p>FORCE and MOTION:</p> <p>1.4 Scalar and Vector quantities: Examples, representation of vector, types of vectors. Triangle and Parallelogram law of Addition of Vectors (Statement only), Resolution of a Vector.</p> <p>1.5 Force: Newton's 1st Law of Motion, Momentum, Newton's 2nd Law of Motion, Definition of Force, Conservation of linear momentum. Newton's 3rd Law of Motion.</p> <p>1.6 Linear Motion: Speed and Velocity, Acceleration, Equations of Uniform Motion, Velocity-Time graph.</p> <p>WORK, POWER and ENERGY</p> <p>1.7 Work: Definition, units and dimensional formula, examples of zero work, positive work and negative work</p> <p>1.8 Energy: Definition, units and dimensional formula, kinetic energy and potential energy with examples, transformation of energy (examples).</p> <p>1.9 Power: Definition, units and dimensional formula.</p>
2	<p>GRAVITY and GRAVITATION</p> <p>2.1 Newton's laws of gravitation, Newton's gravitational constant G and its SI unit, Acceleration due to gravity (g) and its relationship with "G", Variation of g with altitude and latitude (deduction not required), Difference between mass and weight.</p> <p>HEAT and THERMOMETRY</p> <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>MAGNETISM</p> <p>2.4 Types of magnetic materials: dia, para and ferromagnetic with their properties.</p>



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	2.5 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization.
3.	WAVE MOTION 3.1 Waves: Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wavelength and their relationship. Sound and light waves and their properties. OPTICS 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. MODERN PHYSICS 3.3 Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode. 3.4 Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology and nanotechnology-based devices and applications.
Textbooks: <ol style="list-style-type: none">1. Physics Std XI (NCERT)2. Physics Std XII (NCERT) Reference Books: <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	




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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.

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.

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

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
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 find the Focal Length of a Lens by u-v method
9.	To determine Spring Constant and to verify Hooke's Law
10.	To measure the velocity of sound in a resonance tube.
11.	To draw the Magnetic Lines of Force of a Bar Magnet
	Sessionals
	End Semester Exams

Textbooks: MANUAL FOR PHYSICS LAB



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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:

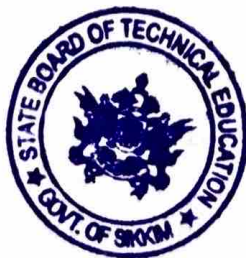
1. Recognize and use drafting equipment
2. Demonstrate knowledge of various rules dimensions and use of proper lines
3. Construct various geometrical figures like polygon, ellipse, parabola cycloid and involutes of circle
4. Develop orthographic and isometric projection of solids on planes
5. Demonstrate 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
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 equipment - 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
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
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
4.	ORTHOGRAPHIC PROJECTION: <ol style="list-style-type: none"> 4.1 Four quadrants, principle planes, projections, objections, profile plane, designation of view 4.2 First angle projection - explanation of the various views front, top, side views, bottom view 4.3 Third angle projection- explanation of the various views front, top, side views 4.4 Projection of solids on principal views (minimum of 12 exercises to be completed)
5.	SECTIONAL VIEW: <ol style="list-style-type: none"> 5.1 Need for drawing section, explanation of cutting plane and its representation, types of sections



	5.2 Practice on drawing sectional views (minimum of 10 exercises to be completed)
6.	ISOMETRIC PROJECTION: 6.1 Isometric projection of regular objects like cube, prism, pyramids, cone, cylinder and sphere 6.2 Isometric projection of solids (minimum of 6 exercises to be completed)
7.	FREE HAND SKETCHES: 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)
8.	COMPUTER AIDED DRAFTING: 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. 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 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.
	Sessional
Textbooks: <ul style="list-style-type: none">• Engineering Drawing By Dr. K.Venugopal (New Age International Publication)• Engineering Drawing By N.D Bhatt (Charotar Publications)	
Reference Books: <ul style="list-style-type: none">• Technical Drawing By K.V Natarajan• Essentials Of Engineering Drawing And Graphics Using Autocad By Jeyapooan, T. (Vikas Publishing Housepvt. Ltd)• Technical Drawing By S.S Mani And Rajagopal	



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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.

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 to develop themselves into capable supervisors for various production process required for optimizing maximum utilization of resources and results.


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

1. Follow proper safety procedures
2. Read and interpret job drawings
3. Select and use various marking, measuring, holding, striking, cutting tools & equipment 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
1.	<p>SAFETY:</p> <p>1.1 Introduction 1.2 Safety precautions and safety equipment</p>
2.	<p>FITTING SHOP PRACTICE (Filing, Hacksawing, measuring and marking, letter and number punching):</p> <p>2.1 To be practiced on U- Channel 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 2.3 Different fitting operation like filing, marking, hacksawing, letter and number punching.</p>
3.	<p>DRILL PLATE:</p> <p>3.1 Filing on a flat workpiece for reference in three sides 3.2 Filing on a flat workpiece to maintain the given dimensions 3.3 Various marking, measuring, cutting, holding and striking tools 3.4 Use of drilling machine, to drill and ream holes using different diameter drill bits and reamers 3.5 Tapping to produce internal threads in drilled holes.</p>
4.	<p>ANGLE GAUGE:</p> <p>4.1 Holding the job in the bench vice 4.2 Measuring the required length 4.3 Cutting the material keeping some allowance with a Hacksaw 4.4 Maintaining the external dimensions. 4.5 Marking on the surface of plate with a Height Gauge 4.6 Marking centre punch for locating the centres of the holes to be drilled 4.7 Holding the job in the drilling vice and drill in the drilling machine 4.8 Filing and maintaining angles.</p>




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5.	WELDING PRACTICE: 5.1 Introduction 5.2 Safety precautions in welding safety equipment 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
	Sessional
Textbooks: • MANUAL FOR WORKSHOP - I	



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Subject Title:	BASICS OF MECHANICAL ENGINEERING	Credit:	03
Subject Code:	ES107	Semester:	01 Hrs.
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	45 Hrs.
		Total Hrs. / semester:	40 Marks.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	

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
1.	<p>MATERIALS:</p> <p>1.1 Classification of engineering material, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels and their applications.</p> <p>1.2 Mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, Tensile test</p> <p>1.3 Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity, Hardness and Impact testing of materials, BHN etc.</p>
2.	<p>FITTING AND MEASUREMENT:</p> <p>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.</p> <p>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.</p>
3.	<p>WELDING AND SHEET METAL WORKING:</p> <p>3.1 Definitions of different welding tools / machines.</p> <p>3.2 Explanations on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding.</p> <p>3.3 Sheet Metal Working- Different sheet metal tools / machines.</p> <p>3.4 Different types of sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, and riveting.</p>
4.	<p>MACHINES AND BOILERS:</p> <p>4.1 Machines for production to lathe, Milling, Drilling, Shaper, Planer etc, Its types and operations.</p>



	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.
	Sessional
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	




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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.

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. 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.

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

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
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>
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>
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>
4.	<p>LISTENING AND READING SKILLS:</p> <p>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 instructions 4.4 Reading for comprehension, develop ability to guess meanings of words from the context and grasp by means of Skimming and scanning the text</p>



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.
	Sessional
Textbooks: <ul style="list-style-type: none">• Communication Skills By Dr. Meenakshi Raman &Dr. Sangeeta Sharma (Oxford University Press)• Business Correspondence & Report Writing By R.C Sharma & Krishna Mohan (TMH Publications)	
Reference Books: <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)	




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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 :-

1. To make the students understand the importance of sound health and fitness principles as they relate to better health.
2. 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.
3. To create a safe, progressive, methodical and efficient activity-based plan to enhance improvement and minimize risk of injury.
4. To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS
1.	<p>INTRODUCTION TO PHYSICAL EDUCATION, PHYSICAL FITNESS, WELLNESS & LIFESTYLE:</p> <p>1.1 Meaning & definition of Physical Education, Aims & Objectives of Physical Education, Changing trends in Physical Education</p> <p>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</p>
2.	<p>FUNDAMENTALS OF ANATOMY & PHYSIOLOGY IN PHYSICAL EDUCATION, SPORTS AND YOGA:</p> <p>2.1 Define Anatomy, Physiology & Its Importance</p> <p>2.2 Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)</p>
3.	<p>KINESIOLOGY, BIOMECHANICS & SPORTS:</p> <p>3.1 Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports</p> <p>3.2 Newton's Law of Motion & its application in sports.</p> <p>3.3 Friction and its effects in Sports</p>
4.	<p>POSTURES, YOGA & LIFESTYLE:</p> <p>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.</p> <p>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</p> <p>4.3 Asanas as preventive measures Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Bharasana, Obesity: Procedure, Benefits & contraindications for Vajrasana, Matsasana, Bhokasana, Ardh Matsyendrasana, Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana. Diabetes: Procedure, Benefits &</p>

	contraindications for Bhujangasana, Paschimottasana, Pavanuktasana, Ardha 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.
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
7.	SPORTS / GAMES: 7.1 Following subtopics 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. 7.2 History of the Game/Sport. 7.3 Latest General Rules of the Game/Sport. 7.4 Specifications of Play Fields and Related Sports Equipment. 7.5 Important Tournaments and Venues. o Sports Personalities. 7.6 Proper Sports Gear and its Importance
	Sessional
	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)



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Subject Title:	COMMUNICATION SKILLS IN ENGLISH LAB (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. 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		
1.	<p>EXERCISES TO BE PERFORMED WITH RESPECT TO FUNDAMENTALS:</p> <ol style="list-style-type: none"> 1.1 Common grammar mistakes 1.2 Foundation English I,II,III 1.3 Building Blocks of English I,II,III 		
2.	<p>SPEAKING SKILLS EXERCISES:</p> <ol style="list-style-type: none"> 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 build 2.6 Presentations 		
3.	<p>EXERCISES ON WRITING SKILLS:</p> <ol style="list-style-type: none"> 3.1 Critical thinking 3.2 Creative thinking 3.3 Resume and cover letter writing 3.4 Comprehensions 3.5 Reports writing 		
4.	<p>LISTENING SKILLS EXERCISES:</p> <ol style="list-style-type: none"> 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 		
5.	<p>Professional skills exercises:</p> <ol style="list-style-type: none"> 5.1 Group Discussions 5.2 Interview tips and mock sessions 5.3 Career management 		
	Sessional		



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Subject Title:	COMMUNICATION SKILLS IN ENGLISH (CCCT)	Credit:	1
Subject Code:	HS105	Semester:	FIRST
Lecture Hrs. / week:	02 Hrs.	Tutorials Hrs. / week:	00 Hrs.
Practical Hrs. / week:	02 Hrs.	Total Hrs. / semester:	64 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.

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.

The activities in the lab sessions are in association and use of the language lab.

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

- GE-101.1: Use English Language effectively in spoken forms.
- GE-101.2: Comprehend the given texts and respond appropriately.
- GE-101.3: Communicate confidently in formal and informal contexts.
- GE-101.4 : Develop listening capacity for easy interpretation of contents

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS
1. CONVERSATION	<p>1.1 The student engages in a brief conversation led by the teacher on one or two of the following topics)</p> <ul style="list-style-type: none"> • Their favourite time of day • Their favourite subject at school • Leisure activities they enjoy • What job they would like to do in the future <p>1.2 The student gives a talk about one of the following topics:</p> <ul style="list-style-type: none"> • 'Why I am concerned about ...' • 'What I would like to see more of/less of in the world' • 'Why I think ... should be banned' <p>1.3 The candidates give a talk about one of the following topics:</p> <ul style="list-style-type: none"> • 'Why we love this book' • 'Why we love this film' • 'Why we love this TV programme' • 'Why we love this play'



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2. PRESENTATION

2.1. The student gives a 2 slide presentation in support of a particular cause or charity.

2.2 Presentation skills

- Use of body language
- Use of Visual Aids
- Opening and closing a presentation
- Designing a presentation slide
- Taking questions

(The teacher engages the candidate in a discussion about the preparation and delivery of the presentation. The discussion focuses on how the candidate prepared for the tasks and how vocal and physical skills were used to communicate ideas, including the use of pause, emphasis, variations in phrasing and pace, and the use of space.)

2.3. The student gives a 5 slide presentation on an idea for a business enterprise, social event or creative endeavour.

The teacher engages the candidate in a discussion that explores the purpose and the planning of the topic presented and its possible impact.

3. MOCK INTERVIEW

3.1 The situation may be a real job, an internship opening, a call-back interview, for graduate school admission, or for promotion.

*The teacher will be the mock interviewer and will critically evaluate the students on an evaluation form. (*sample provided below)*

CHARACTERISTICS	Please Use Check or Comments				
	OUTSTANDING (A)	ABOVE AVERAGE (B)	SATISFACTORY ACCEPTABLE (C)	LIMITED POTENTIAL (D)	NOT ACCEPTABLE (F)
A. APPEARANCE Grooming Posture Dress					
B. PREPARATION FOR INTERVIEW Knowledge of Company Knowledge of Positions Open Asked Pertinent Questions					
C. VERBAL COMMUNICATION Delivery and Animation Presentation of Ideas Grammar and Vocabulary					
D. DIRECTION Well-Defined Goals Confidence in Abilities Realistic and Practical					
E. MATURITY Responsible Decisive					
F. SINCERITY Genuine, Wholesome Attitude Honest and Sincere Artificial					
G. PERSONALITY Enthusiastic Extrovert Motivation					
H. OVERALL EVALUATION					

4. LISTENING

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



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5. PROFESSIONAL SKILLS	5.1 Group Discussions
	5.2 Career Management

● Reference: Use of Orell Language Lab



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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 are 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
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>
2.	<p>INTEGRAL CALCULUS:</p> <p>2.1. Indefinite Integrals:</p> <p>2.1.1 Indefinite integrals: Integration as inverse of differentiation,</p> <p>2.1.2 Integration general methods</p> <p>2.1.3 Integration by substitution</p> <p>2.1.4 Integration by parts $\int xe^x dx, \int \log x dx, \int e^x \cos x dx, \int$</p> <p>2.1.5 Partial fractions and their use in integration</p> <p>2.1.6 Special Integrals</p> <p>2.2. Definite Integrals:</p> <p>2.2.1 Evaluation of integrals with limit (Lower limit upper limit)</p> <p>2.2.2 Evaluation of definite integrals by</p> <p>(i) Substitution, by parts</p> <p>(ii) Using properties of definite integrals.</p> <p>2.2.3 Properties of definite integrals</p> <p>2.2.4 Application of definite integrals to find areas under plane curves.</p>




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3.	<p>DIFFERENTIAL EQUATIONS:</p> <p>3.1.1. Definition of differential equations, degree and order of a differential equation.</p> <p>3.1.2. Formation of a differential equation up to 2nd order by eliminating constants.</p> <p>3.1.3. Solution of differential equations of the first degree and first order. Variable separable method Homogeneous method Linear differential equations of the type</p> $\frac{dy}{dx} + Py = Q$ <p>3.1.4 Using differential equations, finding charge and current for L-R and L-R-C circuits.</p>
4.	<p>ANALYTICAL GEOMETRY (2D):</p> <p>4.1 Circles: General equation of circle, its characteristics. Equation of circles given Centre and radius, Three-point form, diametrical form</p> <p>4.2. Conic Section: Definition of conic section, Parabola: standard equation of parabola (without proof), finding its focus, axis, vertex, directrix and latus rectum from given equation. Ellipse and Hyperbola: Standard equation (without proof), finding the foci, Directrix, axes, latus rectum and eccentricity.</p>
Sessional	
<p>Textbooks:</p> <ol style="list-style-type: none"> 1 Institutional Study Material Applied mathematics for Polytechnic by H.K.Dass, CBS publishers and Distributor 2 Applied mathematics –I & II R.D.Sharma Dhanpat Rai Publication 3 NCERT mathematics Class XI and XII, NCERT 4 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 	



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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:	60 Marks.	Progressive Assessment Theory:	40 Marks.

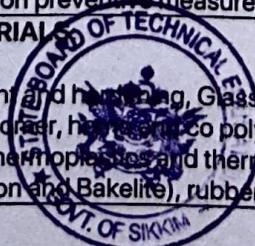
RATIONALE/AIM: There are numerous materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. Successful completion 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.

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

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

Chap. No.	NAME OF CHAPTER/TOPIC
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>
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>
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, aluminum from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.</p> <p>3.3 General chemical composition, composition-based applications of some common alloys (elementary idea only details omitted)</p>
4.	<p>CORROSION:</p> <p>4.1 Definition, types of corrosion (chemical and electrochemical), H₂ liberation and O₂ absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.</p> <p>4.2 External corrosion preventive measures: metal coatings, using organic inhibitors.</p>
5.	<p>ENGINEERING MATERIALS:</p> <p>5.1 Port land cement and hardening, Glasses Refractory and Composite materials.</p> <p>5.2 Polymers – monomer, homopolymer and copolymers, 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.</p>



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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.
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.
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 properties (coke number, total acid number, iodine value) of lubricants.
Sessional	
Textbooks: <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.• NCERT Class XI and Class XII Chemistry Reference Books: <ol style="list-style-type: none">1. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.2. Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013.	




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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.

RATIONALE/AIM: There are numerous numbers 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.

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

1. Understand and assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.
2. Qualitatively analyse the engineering materials and understand their properties and applications.
3. Choose fuel and lubricants suitable for economical industrial processing to obtain eco-friendly finished products.
4. Understand corrosion and develop economical prevention techniques.
5. Understand the classification and general properties of engineering materials such as metals, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding.
6. Ascertain construction, mechanism and efficiency of electrochemical cells, solar cells and fuel cells

LIST OF EXPERIMENTS TO BE PERFORMED

LABORATORY EXPERIMENTS	
SL. NO.	
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)
	Sessional
	End Semester Exams.
Textbooks: MANUAL FOR PHYSICS LAB	



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Subject Title:	INTRODUCTION TO IT SYSTEMS	Credit:	02
Subject Code:	ES102	Semester:	FIRST/SECOND
Lecture Hrs. / week:	02 Hrs.	Total Hrs. / semester:	30 Hrs.
End semester Assessment Theory:	60 Marks.	Progressive Assessment Theory:	40 Marks.

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.

COURSE OUTCOME: At the end of the course, student will be able to:

1. Comfortably work on computer.
2. Install 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
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>
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>
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. 3.3 Application Software 3.3.1 Introduction 3.3.2 Types – Word Processing, Image Processing, Spreadsheets 3.4 Utility Software</p>



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	3.5 Open-Source Software Vs Proprietary Software
4.	WEB DESIGNING: 4.1 HTML, CSS, JavaScript, making basic personal webpage
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.
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
7	SECURITY 7.1 Information security 7.2 Computer security 7.3 Computer Virus & Antivirus
	Sessional
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 Waller 	



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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.

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.

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

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
1.	<p>OVERVIEW OF ELECTRONIC COMPONENTS & SIGNALS:</p> <p>1.1 Passive component types, characteristics and its application 1.2 Active component 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>
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>
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>
4.	<p>A.C. CIRCUITS:</p> <p>4.1 Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor</p>



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	<p>4.2 Mathematical and phasor representation of alternating emf and current</p> <p>4.3 Voltage and Current relationship in Star and Delta connections</p> <p>4.4 A.C in resistors, inductors and capacitors</p> <p>4.5 A.C in R-L series, R-C series, R-L-C series and parallel circuits</p> <p>4.6 Power in A. C. Circuits, power triangle.</p> <p>4.7 Transformer-General construction, type of transformers and its application.</p> <p>4.8 DC Generator/Motor-General construction and principal of operation and its application.</p>
5.	<p>DC LAWS AND THEOREMS:</p> <p>5.1 Series and Parallel Circuits</p> <p>5.2 Ohm's Law with examples</p> <p>5.3 Kirchoff's Voltage & Current Law with examples</p> <p>5.4 Superposition Law with examples</p> <p>5.5 Thevenin's Theorem with examples</p>
	<p>Sessional</p>
<p>Textbooks:</p> <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 <p>Reference Books:</p> <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 	



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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.

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.

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

1. To understand mechanics, force system and resolve the forces acting on a particle.
2. To analyze and calculate the equilibrium of body under system of forces.
3. Find the centroid and centre of gravity of various components in engineering systems.
4. To know the fundamental law of machine and their applications to various engineering problems.
5. To understand and apply principles of friction for various useful purposes.

SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS
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>
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>
3.	<p>FRICITION:</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>
4.	<p>CENTROID AND CENTRE OF GRAVITY:</p> <p>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.</p>



	<p>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.</p>
5.	<p>SIMPLE LIFTING MACHINES: (NO DERIVATIONS, SIMPLE NUMERICAL PROBLEMS):</p> <p>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.</p>
	<p>Sessional</p>
<p>Textbooks:</p> <ol style="list-style-type: none">1. Engineering Mechanics By R.S. Khurmi & N. Khurmi (S. Chand Publications)2. Engineering Mechanics By Dr. R. K. Bansal (Laxmi Publication Pvt. Ltd.)3. Engineering Mechanics By S.S. Bhavikatti (New Age Publications)4. Engineering Mechanics By Dutta & Bhattacharya (Bhagabati Publications)5. Engineering Mechanics By R. Kumaravelan <p>Reference Books:</p> <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)	



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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.

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.

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

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.
	Sessional

Reference Books:

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




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Subject Title:	FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB	Credit:	1.5
Subject Code:	ES110	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.

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.

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

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/electronic 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 Thevinin'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
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Textbooks:

- 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:

- Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House
- Mittal and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015,
- Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015



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Subject Title:	ENGINEERING WORKSHOP PRACTICE – II (DM / MT / ME)	Credit:	02
Subject Code:	ES112	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 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 to develop themselves into capable supervisors for various production process required for optimizing maximum utilization of resources and results.

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

1. Read and interpret job drawings
2. Select and use various marking, measuring, holding, striking, cutting tools & equipment in fitting shop
3. Operate bench drilling machine & lathe
4. Apply work ethics, follow 5S process and apply the concept of teamwork

SUBJECT CONTENTS


UNIT	TOPICS / EXPERIMENTS
1.	TOOL GRINDING: 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
2.	OPEN FIT (Filing, Hacksawing, measuring and marking, letter and number punching): 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
3.	PAPER WEIGHT: 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
4.	PIN PUNCH: 4.1 Introduction to lathe 4.2 Perform the operations of turning, facing, taper turning, knurling, filing, number punching

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Textbooks:

- MANUAL FOR WORKSHOP –II (TDM/DM/DMT/DME/DCVE)




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Subject Title:	ENGINEERING WORKSHOP PRACTICE - II (CIVIL)	Credit:	02
Subject Code:	ES112	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 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.

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

1. Perform basic tasks in masonry, concreting, carpentry, fitting, drilling, tapping, plumbing, etc
2. Select and use various marking, measuring, holding, striking, cutting tools & equipment.
3. Follow safety norms for handling materials, tools and equipment required for each construction activity.
4. Apply work ethics, follow 5S process and apply the concept of teamwork.

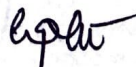
SUBJECT CONTENTS

UNIT	TOPICS / EXPERIMENTS
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.
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.
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.
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.
5.	PLUMBING & FINISHING WORK: 5.1 Plumbing works: Threading; Elbow joint; T joint White washing/Painting work (Surface preparation carried out for Plastered surface/Wall/ Parapet.)
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Textbooks:

- MANUAL FOR WORKSHOP PRACTICE (CIVIL)




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Subject Title:	ENGINEERING WORKSHOP PRACTICE – II (COMPUTER)	Credit:	02
Subject Code:	ES112	Semester:	SECOND
Practical Hrs. / week:	04 Hrs.	Total Hrs. / semester:	60 Hrs.
End semester Assessment Practical:	40 Marks.	Progressive Assessment Practical:	60 Marks.

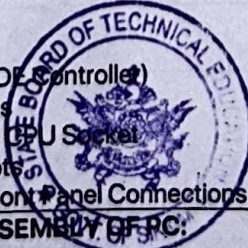
RATIONALE/AIM: The course is designed to introduce the trainee to the working, maintenance and configuration of various types of computer hardware systems. They will be able to install and configure various operating systems and maintain the computer system with ease.

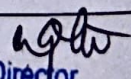
COURSE OUTCOME: After successful completion of the course, students will be able to:

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

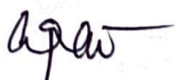
UNIT	TOPICS / EXPERIMENTS
1.	<p>SAFETY PRECAUTIONS WHILE TROUBLESHOOTING COMPUTERS:</p> <p>1.1 Protecting computer against ESD 1.2 Unplug power supply, discharge of capacitors 1.3 Use of anti-static wrist strap 1.4 Handling electronic equipment 1.5 Serviceable and non-serviceable components</p>
2.	<p>BASIC CONCEPTS & TERMINOLOGIES USED IN PC:</p> <p>2.1 Input Devices: (Keyboard, Mouse, Joystick, 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>
3.	<p>IDENTIFICATION OF MOTHERBOARD COMPONENTS:</p> <p>3.1 Motherboard 3.2 ATX technology, Chipsets --North and South bridge 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.</p>
4.	<p>ASSEMBLY AND DISASSEMBLY OF PC:</p>




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	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
5.	INSTALLING THE OPERATING SYSTEM, DEVICE DRIVERS AND APPLICATION SOFTWARE
6.	PREVENTIVE MAINTENANCE & TROUBLESHOOTING OF A SYSTEM: 6.1 Discussion on Preventive maintenance & tools required 6.2 Different techniques to Preventive maintenance & troubleshooting
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
	Sessional
Textbooks:	
	<ul style="list-style-type: none"> MANUAL FOR WORKSHOP-II (COMPUTER)




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Subject Title:	ENGINEERING WORKSHOP PRACTICE - II (ECE/EEE) CCCT	Credit:	02
Subject Code:	ES112	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: The course is designed to introduce the trainee to the working, maintenance and installation of various types of electrical and electronics equipment. They will be able to performing various basic experiments in the field of Electrical and Electronics engineering.

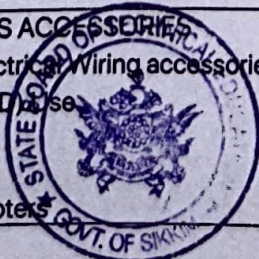
COURSE OUTCOME: After successful completion of the course, students will be able to:

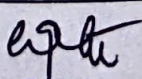
- 1: Explain Safety Rules in details
- 2: Explain electrical and electronics symbols used in the circuit.
- 3: Describe Electrical and Electronics equipment & Tools used.
- 4: Classify wiring materials
- 5: Work on Different Soldering Technique in PCB Board
- 6: Explain and Connect simple electrical circuits

SUBJECT

CONTENTS

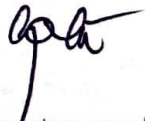
UNIT	TOPICS / EXPERIMENTS
1.	SAFETY RULES & ELECTRICAL AND ELECTRONICS SYMBOLS
2	<p>EQUIPMENT AND TOOLS USED Identify the following electrical and electronics measuring equipments (AC/DC)</p> <ul style="list-style-type: none"> • Ammeter • Voltmeter • Wattmeter • Energy meter • CRO • Function Generator • Multimeter • Power Supply <p>Identify the following electrical wiring tools with respect to A) Size B) Shape C) Purpose D) Use</p> <p>Screw drivers Pliers Drilling machines & Drilling Bits. Rawl plug jumper, and poker Voltage/line tester Splicers (insulation remover) Standard Wire gauge</p>
3	<p>WIRING MATERIALS AND ITS ACCESSORIES Identify different types of Electrical Wiring accessories with respect to A) Size B) Shape C) Purpose D) Use</p> <ul style="list-style-type: none"> • Switches • Ceiling roses • Lamp holders and adapters




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	<ul style="list-style-type: none"> • Sockets • Plug socket • Plug top <p>Identify different types of main switches with respect to</p> <ul style="list-style-type: none"> • Rating • Purpose • Use. <ul style="list-style-type: none"> • Sp,Dp Mains, Tp,lcdp, lctp, Spdt, Dpdt, Tpd, Change Over Knife Type/Globular, Rotary, Micro, Modular Switches. • Identify fuse, 1-pole, 2-pole and 3-pole MCBs, ELCBs and RCCBs with respect to rating, purpose, and use etc. • Identify various types of wires and cables with respect to sizes, rating, purpose and use etc.,
4	<p>SOLDERING TECHNIQUE AND WIRING JOINTS</p> <p>I. To Familiarize with Soldering accessories like soldron, soldering lead, flux, disordering pump, disordering wax etc.</p> <p>II. To solder different component on a Printed Circuit Board.</p> <p>Make Electrical Wiring Joints</p> <ul style="list-style-type: none"> • Make straight joint/ married joint • Make T joint • Make Western union joint • Make pigtail joint
5	<p>COMPONENTS TESTING</p> <ul style="list-style-type: none"> • Testing of passive components, Conduct GO/NO test on Passive Components and also check the value of passive component using multimeter, oscilloscope or RLC Meter. • Testing of passive components, Conduct GO/NO test on Active Components, Conduct GO/NO test on Active Components such as Diodes, Ziner Diodes, Bipolar Transistors, JFETs, MOSFETs, UJT<SCR<DIAC, TRIAC,LED, Photo detections, OP-AMP and ICs 555by using multimeter, oscilloscope and test jigs
6	<p>TESTING AND TROUBLESHOOTING:</p> <ul style="list-style-type: none"> • To troubleshoot a commercially available variable Power Supply • To Troubleshoot a commercially available Digital Multimeter/Analog Multimeter
7	<p>MICRO PROJECT:</p> <ul style="list-style-type: none"> • STUDENTS MAY ASSIGNED TO CONSTRUCT SUCH AS: POWER SUPPLY, EXTENSION CORD, ELECTRIC HEATER ANY OTHER RELEVANT TO COURSE.
	Sessional
<p>REMARKS</p> <ul style="list-style-type: none"> • Minimum Twelve Experiment has to done/ Any Suggested Assignment / Micro project: 	




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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.

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
1.	<p>ECOSYSTEM:</p> <p>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</p>
2.	<p>AIR AND, NOISE POLLUTION:</p> <p>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</p>
3.	<p>WATER AND SOIL POLLUTION:</p> <p>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 Wastewater Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Tricking 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.</p>
4.	<p>RENEWABLE SOURCES OF ENERGY:</p> <p>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.</p>

	<p>4.3 Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.</p> <p>4.4 New Energy Sources: Need of new sources. Different types of new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy</p>
<p>5.</p>	<p>SOLID WASTE MANAGEMENT, ISO 14000 & ENVIRONMENTAL MANAGEMENT:</p> <p>5.8 Solid waste generation- Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste.</p> <p>5.9 Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries.</p> <p>5.10 Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste</p> <p>5.11 Air quality act 2004, air pollution control act 1981 and water pollution and control act 1996. Structure and role of Central and state pollution control board.</p> <p>5.12 Concept of Carbon Credit, Carbon Footprint.</p> <p>5.13 Environmental management in fabrication industry.</p> <p>5.14 ISO14000: Implementation in industries, Benefits.</p>
	<p>Sessional</p>
<p>Textbooks:</p> <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. <p>Open-source software and website address:</p> <p> www.eco-prayer.org www.teriin.org www.cpcp.nic.in www.cpcp.gov.in www.indiaenvironmentportal.org.in www.whatis.techtarget.com www.sustainabledevelopment.un.org </p>	




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