GOVERNMENT OF ASSAM
STATE COUNCIL FOR TECHNICAL EDUCATION
DIRECTORATE OF TECHNICAL EDUCATION, ASSAM

FINAL SYLLABUS OF 1st SEMESTER

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Inclusion of National Education Policy, 2020:

As envisioned in the NEP 2020 the State Council for Technical Education, Assam will be responsible for mentoring its affiliated Polytechnics so that they develop capabilities and achieve minimum benchmarks in academic and curricular matters, teaching and assessment.

State Council for Technical Education (SCTE), Assam will notify the pool of MOOCs courses duly approved by its statutory bodies and map them in Academic Bank of Credits (ABC). Affiliated Polytechnics may opt for any of these courses as required. State Council for Technical Education (SCTE) will take suitable action for preparation of syllabus for these courses including learning objective and learning outcome.

The State Council for Technical Education (SCTE) may fix the minimum number of credits to be earned by the students from a parent institution.

All the affiliating institutions will complete Academic Bank of Credits registration through SCTE. Institute will monitor the opening of ABC account by all the students.

Salient features

Salient features that are to be considered for developing the curriculum aligned to NEP 2020 are as follows:

- Reduced number of credits.
- Introduction of Student Induction Program.
- Well defined learning objectives & outcomes for each course.
- Inclusion of courses on socially relevant topics.
- Built-in flexibility to the students in terms of professional elective and open Electivecourses.
- Mandatory internship to equip the students with practical knowledge and providethem exposure to real time industrial environments.
- Virtual Labs.
- Mapping of Courses to its equivalent NPTEL/SWAYAM Course.
- Course on 'Entrepreneurship and Startups' to encourage entrepreneurial mindset.
- Introduction of Design Thinking and Universal Human Value course.

Basic Guidelines:

The existing Credit System is revised as Choice Based Credit System (CBCS) in line with NEP guidelines, to infuse innovation and flexibility. No hard separation between streams, between curricular and extra-curricular, between Vocational and Academic, Multidisciplinary and holistic education across the disciplines, Ethics and Human & Constitutional values, Life skills, use of technology as part of all curriculum.

- An academic year is divided into two semesters as per AICTE guidelines.
- A semester consists of approximately 90 working days. One working week will have approximately 40 hours of instructional time.
- There shall also be a Winter Internship Program for duration of 4 weeks/one month from 1st January to -31st January.
- Summer term courses may be offered on a fast-track mode to enable students to complete arrears/special courses.

- Teachers may avail semester end vacations after the end of each semester. Subject to completion all kinds of examination related work.
- The Polytechnics under the Directorate of Technical Education can decide on the kind of courses to be offered in the summer term, based on the requirements and also based on the availability of teaching faculty.
- Internship/apprenticeship can be carried out during the winter term, mandatorily for regular student.
- Students who wish to exit after 1st year or 2nd year of study, have to undergo mandatory bridge courses as defined in the course structure.

Induction Program:

The Essence and Details of Induction program can be find from the 'Detailed Guide on Student Induction program', as available on AICTE Portal,
(Link: https://www.aicteindia.org/sites/default/files/Detailed%20Guide%20on%20Student%20Induction%20program.pdf),
The Induction program for students to be offered right at thestart of the first year for three-week duration.

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas

Mandatory Visits/ Workshop/Expert Lectures:

a) It is mandatory to arrange one industrial visit every semester for the students of each branch.
b) It is mandatory to conduct a One-week workshop during the winter break after fifth semester on professional/ industry/ entrepreneurial orientation.
c) It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry

GENERAL COURSE STRUCTURE & CREDIT DISTRIBUTION

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hours Practical (P) per week	1 credit

B. Range of Credits:

In the light of the fact that a typical Model Four-year Under Graduate degree program in Engineering has about 160 credits, the total number of credits proposed for the three-year Diploma program in Engineering & Technology is 120.

C. Structure of Diploma Engineering program:

The structure of Diploma Engineering program shall have essentially the following categories of courses with the breakup of credits as given:

Sr. No.	Category	Suggested Breakup of Credits
1.	Humanities & Social Sciences courses	8*
2.	Basic Science courses	19*
3.	Engineering Science courses	15*
4.	Program Core courses (Branch specific)	45*
5.	Program Elective courses (Branch specific)	12*
6.	Open Elective courses (from other technical and /or emerging subjects)	9*
7.	Project work, seminar and internship in industry or elsewhere	12*
8.	Audit Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge etc.]	(non-credit)
	Total	**120***

**Minor variation is allowed as per need of the respective disciplines.*

D. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
HS	Humanities & Social Sciences Courses
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Program Elective Courses
OE	Open Elective Courses
AU	Audit Courses
SI	Summer Internship
PR	Project
SE	Seminar

E. Course level coding scheme:

Three-digit number (odd numbers are for the odd semester courses and even numbers are for even semester courses) used as suffix with the Course Code for identifying the level of the course e.g.

101, 102 … etc. for first year
201, 202 …. Etc. for second year
301, 302 … for third year

F. Evaluation Scheme for 1st Semester of Diploma in Engineering courses under State Council for Technical Education (SCTE), Assam

For Theory Courses:

(The weightage of Internal assessment is 40% and for End Semester Exam is 60%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

For Practical Courses:

(The weightage of Internal assessment is 60% and for End Semester Exam is 40%) The student has to obtain at least 40% marks individually both in internal assessment and end semester exams to pass.

For Summer Internship / Projects / Seminar etc.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

Note: The internal assessment is based on the student's performance in mid semester tests (two best out of three), quizzes, assignments, class performance, attendance, viva-voce in practical, lab record etc.

G. Mapping of Marks to Grades

Each course (Theory/Practical) is to be assigned 100 marks, irrespective of the number of credits, and the mapping of marks to grades may be done as per the following table:

Range of Marks	Assigned Grade	Grade Point
91-100	A^+	10
81-90	A	9
71-80	B^+	8
61-70	B	7
51-60	C^+	6
46-50	C	5
40-45	D	4
< 40	F (Fail due to less marks)	-
-	F^R (Fail due to shortage of attendance and therefore, to repeat the course)	-

H. Credit Distribution, Mark Distribution and Break up of Internal Assessment Marks as per following table:

a) Credit Distribution:

Semester-I

S. No.	Course Code	Course Title	L	T	P	Credit
1	BS-101	Mathematics-I	2	1	0	3
2	BS-102	Applied Physics -I	2	1	0	3
3	BS-105	Applied Chemistry	2	1	0	3
4	HS-101	Communication Skills in English	2	0	0	2
5	ES-101	Engineering Graphics	0	0	4	2
6	ES-103	Engineering Workshop Practice	0	0	6	3
7	BS-107	Applied Physics Lab - I	0	0	2	1
8	BS-109	Applied Chemistry Lab -I	0	0	2	1
9	HS-103	Sports and Yoga	0	0	2	1
10	HS-105	Communication Skills in English Lab	0	0	2	1
TOTAL CREDIT=						20
Total Hours per week = 29 [L=8; T=3; P=18]						

b) Marks Distribution

Semester – I

S. No.	Course Code	Course Title	Internal Assessment (Theory)		ESE		Internal Assessment (Practical)		Practical Test		Total Marks (Course)	Pass Marks (Course)
			Total Marks	Pass Marks	Total Marks	Pass Marks	Total Marks	Pass Marks	Total Marks	Pass Marks		
1	BS-101	Mathematics-I	40	16	60	24	-	-	-	-	100	40
2	BS-102	Applied Physics -I	40	16	60	24	-	-	-	-	100	40
3	BS-105	Applied Chemistry	40	16	60	24	-	-	-	-	100	40
4	HS-101	Communication Skills in English	40	16	60	24	-	-	-	-	100	40
5	ES-101	Engineering Graphics	-	-	-	-	60	24	40	16	100	40
6	ES-103	Engineering Workshop Practice	-	-	-	-	60	24	40	16	100	40
7	BS-107	Applied Physics Lab - I	-	-	-	-	60	24	40	16	100	40
8	BS-109	Applied Chemistry Lab -I	-	-	-	-	60	24	40	16	100	40
9	HS-103	Sports and Yoga	-	-	-	-	60	24	40	16	100	40
10	HS-105	Communication Skills in English Lab	-	-	-	-	60	24	40	16	100	40
Total											1000	

c) Break Up of Internal Assessment Marks

Internal Assessment for Theory (TA+HA&CT)

Component	Teacher's Assessment (TA)			Home Assignment & Class Test (HA&CT)				Total
	Attendance	Discipline	Class Participation	Home Assignment	Presentation/ Seminar	Quiz	Class Test	
Maximum Marks	5	1	2	4	6	2	20	**40**
Note: Three (3) class tests must be conducted for each course. For calculation of Internal Assessment, best two (2) class tests out of the three (3) conducted is to be considered.								

Internal Assessment for Practical (PA)

Component	**Maximum Marks**
Teacher's Assessment (TA)	
Attendance	10
Discipline	2
Practical Assignment	
Practical Work and/or Laboratory Report	30
Presentation	10
Viva	8
Total	**60**

Note: Student must pass in Internal Assessment (Theory & Practical). If a student fails in Internal Assessment, he/she will not be allowed to appear in the End Semester Examination.

d) Grading System proposed is Absolute Grading System.

e) Conversion factor from Cumulative Grade Point Average (CGPA) to Percentage (%) is 10.

Range of Attendance with Marks (for Theory):

Sl No.	Range of Attendance	Marks
1	96% and above	5 Mark
2	91% to 95%	4 Mark
3	86% to 90%	3 Mark
4	81% to 85%	2 Mark
5	76% to 80%	1 Mark
6	75%	Only permitted to appear in the exam
7	Between 60% to 75%	NC: May appear in the exam if there are genuine reasons
8	Below 60%	DC: Cannot appear in the exam

Range of Attendance with Marks (for Practical):

Sl No.	Range of Attendance	Marks
1	96% and above	10 Mark
2	91% to 95%	9 Mark
3	86% to 90%	8 Mark
4	81% to 85%	7 Mark
5	76% to 80%	5 Mark
6	75%	Only permitted to appear in the exam
7	Between 60% to 75%	NC: May appear in the exam if there are genuine reasons
8	Below 60%	DC: Cannot appear in the exam

Valid Ground for Non-collegiate students:

1. Medical grounds.
2. Participation in a state/national level competition, including the journey period as approved by the Head of Institution.
3. Participation in a seminar of national/international level, workshop or conference, including the journey period as approved by the Head of Institution.
4. Participation in voluntary programmes conducted by the Institute/Directorate as per Government notification.
5. Any other grounds which the Examination Committee, in consultation with the Secretary, SCTE may approve.

Current Examination Fee structure:

- Non Collegiate Fees: Rs. 300/- (per subject)
- Examination Fee: Rs. 500/-
- Retest Fee: Rs. 200/- (per subject)

N.B: The rates may be changed subject to Government order.

Conditions for Dis-Collegiate (DC) student:

(i) Any candidate who is an internal student but has attended less than 60% of classes in any one or more subjects on theory and/ or practical shall not be eligible to appear in the respective semester examination and termed as Dis-collegiate student.

(ii) Dis-collegiate students will have to repeat the semester by taking admission in the next session.

Note: The above guidelines may be changed/modified as per of AICTE and Government of Assam notification from time to time.

Detailed First Semester Curriculum Contents (Common to all Branches)

1. Course Title: Mathematics-I

1. **COURSE Title: Mathematics –I**
2. **COURSE CODE: BS-101**
3. **Semester: First Semester**
4. **Objectives:** The main objectives of this course are:

   i) To learn about Complex numbers.

   ii) To learn ways of solving binomials, finite and infinite series.

   iii) To learn about equations involving large number of unknowns.

   iv) To learn application of Trigonometry, Mensuration and plane figures.

5. **Course Outcomes:** At the end of the course, students will be able to:

   CO -1 Recognize and differentiate between Real and complex numbers.

   CO-2 Obtain solutions for finite and infinite series expressions.

   CO – 3 Solve equations having large numbers of unknowns.

   CO – 4 Learn Basic Trigonometric concepts and its applications in various domain.

   CO-5 Obtain results for physical problems related to area and volume.

   CO-6 Identify and formulate the equation of straight lines in different forms.

6. **Teaching scheme:**

Teaching scheme(in hours)		
Lecture	Tutorial	Total per week
2	1	3

Total Number of classes	45
Theory	30
Tutorial	15

7. Detailed course content:

Chapter No	Chapter Title	contents	Intended learning outcomes	Hours (Theory) 30
Group - A : Algebra Hours: 16 Marks: 32				
A1	Complex numbers	1.1 Definition, Geometric representation, Modulus, amplitude, Polar form of a complex number. 1.2 Rationalization, addition, Multiplication, Conjugate, cube root of unity.	1. Recognize and define Cartesian and Polar form of complex number. 2. Locate it in argand plane. 3. Carry out algebraic operations on complex numbers	3
A2	Permutation and combination	2.1 Factorial Notation and basic principle of counting. (Simple problems only) 2.2 Definition of formulae for Permutation and combination.(Simple problems only)	1. Arrangement of elements (Similar and unique) 2. Combination of elements.	2
A3	Binomial Theorem	3.1 Binomial Theorem for positive integral index (Statement only), general term, middle term, Specific term.	1. Form and expand different types of Binomial expression.	2
A4	Logarithm	4.1 Definition, Laws of Logarithm. 4.2 Problems related to Laws of Logarithm and application.	1. Convert product and quotient of large numbers into simple sums and differences.	2
A5	Series	5.1. Arithmetic Progression Series, arithmetic mean, Sum to n-terms. 5. 2. Geometric Progression Series, Geometric mean, Sum to n-terms. 5.3. Sum to infinity of a GP series.	1. Use and solution of series expressions having equal intervals. 2. Use and solution of series expressions having common ratio. 3. Calculation of the possible finite Sum of an infinite series.	2
A6	Matrix	6.1 Definition, Type of matrix-row matrix, column matrix, Square matrix, diagonal matrix, unit matrix, Symmetric matrix, Skew-Symmetric matrix. 6.2 Algebra of matrices: Equality, addition, subtraction, Scalar multiplication, multiplication.	1. Presentation of large data in an organized expression. 2. Applying algebraic operations on matrices under certain conditions.	2

A7	Determinants	7.1. Definition and expansion of Determinants of third orders. Minors, cofactors. 7.2 Properties of Determinant and problems using properties. 7.3. Solution of simultaneous equations using crammer's rule	1. The expression of square matrix as a Determinant with a value. 2. Solution of systems of linear equations.	3
GROUP- B TRIGONOMETRY **HOURS : 7 MARKS : 13**				
B1	**Trigonometric Ratios**	1.1. Compound angles and associated angles. 1.2. Transformation of sum or differences into products and products into sum or differences. 1.3. Multiple and sub-multiple angles.	1. To get fair knowledge of angle, distance, height with reference to different shapes objects etc. 2. Use of trigonometry in different field.	3
B2	Inverse **Trigonometric** Functions	2.1. Definition and basic concepts. 2.2. Properties of Inverse trigonometric functions.	Uses of Inverse trigonometric functions to calculate angles and inclinations under different situations.	2
B3	Properties of triangles	3.1. Relation between the sides and angles of a triangle. 3.2. Sine- cosine formulae. (formulae only for concept)	Relation between different trigonometric functions.	2
GROUP- C MENSURATIONS **HOURS : 4 MARKS : 8**				
C1	Area Curvilinear Figures	1.1 Area Curvilinear Figures using Simpson's $\frac{1}{3}$ rule	Calculation of area of non-linear figures.	1
C2	Volume and Surface area	2.1. Volume and Surface area of prism, Pyramid, sphere and Cone. Frustum of Pyramid and cone. (Simple problems only).	Calculation of volume and area of some three dimensional objects.	3
GROUP- D CO-ORDINATE GEOMETRY OF TWO-DIMENSIONS **HOURS : 3 MARKS : 7**				
D1	Straight Line	1.1. Distance formulae, Section formulae, Slope and Gradient, Different forms of Straight lines; point-slope form, point –point form, slope-intercept form,	1. Concept and use of Cartesian co-ordinates. 2. To get a good knowledge of different forms of straight lines, there formation and some properties with respect	3

		intercept form, perpendicular form. 1.2. Angle between two straight lines, equation of parallel and perpendicular straight lines.	to each other.	

9. Distribution of Marks:

Chapter no.	Chapter Title	Type of question			Total
		Objective Type	Short questions	Descriptive questions	
A1	Complex Number	2	2	3	
A2	Permutation and combination	1	2	……	
A3	Binomial Theorem	1	2	……	
A4	Logarithm	1	2	3	
A5	Series	1	2	3	
A6	Matrix	1	2	…….	
A7	Determinants	1	……	3	
B1	**Trigonometric Ratios**	1	2	3	
B2	Inverse **Trigonometric** Functions	1	……	3	
B3	Properties of triangles	1	2	……	
C1	Area Curvilinear Figures	….	…….	3	
C2	Volume and Surface area	2	……..	3	
D1	Straight Line	2	2	3	
		15	18	27	60

10. Suggested implementation strategies: The syllabus can be completed by taking regular classes along with tutorial classes. Audio-Visual aids also can be used.

11. Prerequisites: Class X Standard Algebra, Trigonometry. Straight line (co-ordinate) Mensuration.

12. Suggested learning resources:

1. An introduction to Polytechnic Mathematics Vol-1 by Ajanta Choudhury, Parbin Ahmed, Geetali Das.
2. Applied Mathematics for class XII (vol I and II) by R.D Sharma
3. Engineering mathematics by H.K Das.
4. Higher Trigonometry by Das and Mukherjee.

13. TABLE OF SPECIFICATION FOR THEORY

Sr. no	Topic (a)	Time allotted in hours (b)	Percentage weightage(c)	k	C	A	HA
1	Algebra	16	53.3%	8	14	10	
2	Trigonometry	7	23.3%	3	6	4	
3	Mensuration	4	13.3%	2	2	4	
4	Co-ordinate geometry of two dimensions	3	10%	2	2	3	
	Total	30	100				

K = knowledge C = Comprehension A = application

HA = Higher than application (Analysis, Synthesis, Evaluation). C= $\frac{b}{\sum b} \times 100$

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2. Course Title: Applied Physics – I

1. **Course Title : Applied Physics - I**
2. **Course Code : BS-102**
3. **Semester : 1st semester**
4. **Prerequisites : High School Level Physics**
5. **Rationale of the subject:** Physics is the 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 concepts used in Industrial Applications. So, physics is taught in the 1st and 2nd semester in all disciplines of Diploma Engineering.
6. **LEARNING OBJECTIVES**: The main objectives of this course are to:

a) learn and understand different system of measurement and errors in measurements

b) learn different physical quantities with units and dimensions.

c) learn, understand and apply different laws of motions and laws of Gravitations.

d) learn, understand and apply the laws and concept of static and current electricity.

e) learn, understand and apply the concept of electromagnetism.

f) learn, understand and apply the concept of semiconductor.

g) tackle engineering problems in their chosen area of applications.

7. Course outcomes: After completion of the course, students will be able to:

C.O.1: Identify different systems of units and convert units from one system to another as well as conversant with practical units and understand errors in measurement.

C.O.2: Understand and apply equations of motion and their applications.

C.O.3: Understand the concept of Circular motion, centripetal, centrifugal forces and able to apply in practical application.

C.O.4: Understand the concepts of charge, current, resistance, capacitance and acquire basic knowledge on semiconductor and applications of p-n junction diode.

C.O.5: Learn the applications of electromagnetic induction in transformers, motors etc. in industrial engineering.

8. Teaching Scheme (in hours):

Theory			Practical	Total
Lectures	**Tutorial**	**Class Test**		
30	**30**	**3**	**30**	93

9. **Teaching scheme (in hours)/ week**

Lectures	Tutorial	practical	Credits
2	1	0	3

10. Examination Scheme:

Theory				Practical				Total Marks
Examination		Sessional		Practical Viva		Sessional		**200**
Full Marks	**Pass Marks**	**Full Marks**	**Pass Marks**	**Full Marks**	**Pass marks**	**Full Marks**	**Pass Marks**	
60	24	40	16	40	16	60	24	

11. **DETAILED COURSE CONTENTS:**

Chapter	Title of Chapter	Topics and Sub-topics	Teaching Hours	Marks
1	**UNITS AND DIMENSIONS**	1.1 Physical quantities, fundamental and derived with examples; Need of measurements, Definition of Unit and its importance, fundamental and derived units, system of units (CGS, MKS, FPS and SI units) 1.2 Errors in measurements, random and systematic error; absolute error, relative error and percentage error (numerical examples); accuracy and precision of measurements. Significant figures, rules to find	3	5

		significant figures in calculation with examples. 1.3Dimensions of physical quantities, dimensional formulae; Principle of homogeneity of dimensions, Applications of dimensional analysis (conversion of one system of units to other, checking of dimensional equations and derivation of possible relationship between physical quantities); Limitations of dimensional analysis.		
2	**BASIC MECHANICS (Force and Motion)**	2.1 Definition of Scalar and Vector quantities (examples), geometrical representation of a vector, addition and subtraction of vectors, types of vectors. Triangular and Parallelogram law of vector addition, Expressions for magnitude and direction of resultant vector (deduction not required) with numerical examples. Resolution of vectors. Scalar and Vector Product of two vectors with physical examples; (numerical examples). 2.2 Recapitulation of Equation of motions (Deduction not necessary) and associated numerical problems. 2.3 Revision of Newton's laws of motion, measurement of force and its units, Linear momentum, law of conservation of linear momentum and its application to recoil of gun, Impulse and its applications. (numerical problems) 2.4 Circular uniform motion, definitions of angular displacement, angular velocity, angular acceleration, time period, frequency and their units; relation between linear and angular velocity. Centripetal and Centrifugal forces and practical applications; Banking of roads and railway tracks, super elevation; Bending of a cyclist, the Cream separator, the engine flywheel (details do not require). 2.5 Rotational motion, torque, angular momentum and	7	12

		their relation, Moment of inertia and its expression, radius of gyration, Relation between torque and angular acceleration, kinetic energy of rotating body, Acceleration of a body rolling down an inclined plane.		
3	**Work, Power and Energy**	3.1 Recapitulation of Work, Power and energy, types of energy (K.E and P.E) and their units. Dimensions of work, power and energy. 3.2 Work-energy theorem, Law of conservation of energy, conservation of mechanical energy for a freely falling body, numerical problems.	2	4

4	**GRAVITY AND GRAVITATION**	4.1 Newton's law of gravitation, gravity, acceleration due to gravity, relation between 'G' and 'g', their units, variation of g with altitude and depth, Centre of gravity and Centre of mass. Escape velocity, orbital velocity, artificial satellite. (simple idea), Geo-stationery Satellite.	2	4
5	**ELECTRO STATICS**	5.1 Concept of Electric charge according to Modern Electron Theory, Inverse Square law of Electrostatic force, permittivity, Unit of Charge, Electric Field, Electric Intensity, Electric lines of Force and its properties, concept of electric flux, Gauss's law (application not required). 5.2 Electric Potential and its unit, relation between potential and intensity, calculation of electrostatic Potential at a point due to a point charge. 5.3. Capacity of a condenser, Capacitor and its working principle, Capacitance and its units, capacitance of parallel plate capacitor, series and parallel combination of condensers, numerical problems. Dielectric and its effect on capacitance.	3	7
		6.1 Potential difference and current with their mathematical expression and units. Electromotive force, difference between e.m.f. and P.D. 6.2 Primary and Secondary Cell, Difference between primary and secondary cell, storage cell, internal resistance of cell, Groupings of cell- series, parallel	5	10

6	**CURRENT ELECTRICITY**	and mixed grouping of cells. 6.3 Basic D.C circuit: Ohm's Law, verification and mathematical expression of Ohms law, Units of resistance, specific resistance or resistivity, conductance, effect of temperature on resistance. Series and parallel combination of resistances. Numerical. 6.4 Kirchhoff's Laws with explanations. Wheatstone bridge principle with its proof, meter bridge and post office box. 6.5 Heating Effect of Current: Joule's Law of heating, Electric energy and Power, numerical problems.		
7	**ELECTRO-MAGNETISM**	7.1 Magnets, properties of magnet, magnetic field, units of magnetic field, lines of magnetic field. 7.2 Biot-Savart law, direction of magnetic field produced by current carrying conductor (Right hand thumb rule for linear and circular current) magnetic field due to current carrying straight conductor, circular loop and solenoid (derivation not required), 7.3 Force on a charge moving in a magnetic field, definition and unit of magnetic induction (strength of magnetic field), direction of magnetic force (Fleming's left-hand rule), force on a current carrying conductor placed in a magnetic field, force between two straight and parallel conductors(derivation not required). 7.4 Electromagnetic Induction, e.m.f. induced in a coil due to magnet, explanation of Faraday's law of electro-magnetic induction, Lenz law, self and mutual induction, Fleming –Right hand rule. 7.5 Transformer, step up and step-down transformer, losses in a transformer and long-distance transmission of A.C by transformer.	5	12
8	**ELECTRONICS AND SEMI CONDUCTOR**	8.1 Energy band in solids (Idea only). Conductors, semiconductors, and Insulators in terms of energy band diagram, intrinsic and extrinsic semiconductor, P-type and N-type semiconductor 8.2. P-N junction diode, forward and reverse bias. P-N junction diode as half wave rectifier, full wave rectifier and bridge rectifier, simple idea of LED and its use. Junction transistors, P-N-P and N-P-N transistor (Idea only).	3	6

12. Distribution of Marks:

Chapter No	Chapter Title	Teaching Hours	Type of Question			Total Marks
			Objective type Compulsory	Short Question	Descriptive Question / Numerical	
1	Units and Dimension	3	2	1	2	5
2	Basic Mechanics (Force and Motion)	7	3	3	6	12
3	Work, Power and energy	2	2	1	1	4
4	Gravitation and Gravity	2	-	2	2	4
5	Electrostatics	3	2	2	3	7
6	Current electricity	4	2	2	6	10
7	Electromagnetism	4	2	3	6	12
8	Electronics and Semiconductor	3	1	2	3	6
Total		**30**	**15**	**15**	**30**	**60**

13. DETAILED TABLE OF SPECIFICATIONS FOR THEORY.

Sr. NO.	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE				
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T
1	Units and Dimension	1	1	-	2	1	-	-	-	1	1	-	1	-	2
2	Basic Mechanics (Force and Motion)	1	-	2	3	1	-	2	-	3	1	2	3	-	6
3	Work, Power and energy	1	1	-	2	-	-	1	-	1	-	-	1	-	1
4	Gravitation and Gravity	-	-	-	-	1	1	-	-	2	-	1	1	-	2
5	Electrostatics	1	-	1	2	-	1	1	-	2	1	-	2	-	3

6	Current electricity	1	-	1	2	1	1	1	-	2	1	1	2	-	4
7	Electromagnetism	1	-	1	2	1	-	1	1	3	1	1	3	-	5
8	Electronics and Semiconductor	1	-	-	1	-	1	-	-	1	1	-	2	-	3

K=Knowledge, C= Comprehension, A= Application, HA= Higher than application (analysis, synthesis, Evaluation) and T=Total

14. TABLE OF SPECIFICATIONS FOR THEORY

Sr. No:	Topics (a)	Time allotted in hours (b)	Percentage Weightage (c) %	K	C	A	HA
1	Units and Dimension	3	10	3	1	1	-
2	Basic Mechanics (Force and Motion)	7	23.33	3	2	7	-
3	Work, Power and energy	2	6.67	1	1	2	-
4	Gravitation and Gravity	2	6.67	1	2	1	-
5	Electrostatics	3	10	2	1	4	-
6	Current electricity	4	13.33	3	2	4	-
7	Effect of Current	2	6.67	2	1	1	-
8	Electromagnetism	4	13.33	3	1	6	-
9	Electronics and Semiconductor	3	10	2	1	2	-
TOTAL		30 ∑b	100%				

1

K=Knowledge, C= Comprehension, A= Application, HA= Higher than application (analysis, synthesis, Evaluation)

15. Suggested learning Resource:

A. Book list:

Sl. No.	Title	Author	Publisher
I	Modern Approach to Physics Part I & II	Dilip Sarma, N G Chakraborty, K N Sharma	Kalyani Publishers- New Delhi
2	Applied Physics Part I	Manpreet Singh, Dr. Major Singh, Mrs. Hitashi Gupta	S K Kataria & Sons- New Delhi
3	Applied Physics Part II	Manpreet Singh, Dr. Major Singh, Mrs. Hitashi Gupta	S K Kataria & Sons- New Delhi
4	Basic Applied Physics	R K Gaur	Dhanpat Rai Publication- New Delhi
5	Physics- Std XI, Std XII	-	HSC board/CBSE Board
6	Concept of physics Part I & II	H.C Verma	Bharati Bhawan-New Delhi

B. Websites:

I. http://hyperphysics.phy-astr.gsu.edu/
II. http://physics.info

C. By using Models, Video etc.

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3. Course Title: Applied Chemistry

1. **Course Title**: Applied Chemistry
2. **Course Code**: BS-105
3. **Semester:** First(1st)
4. **Total credit**: 3
5. **Rationale of Course:** Modern development of industries requires more understanding of the chemical substances used for engineering and industrial purposes. This part of Chemistry explains various fundamental aspects of chemical substances which will develop basic understanding and skill of engineering students.
6. **Course Outcome:** After completion of the course, students will be able to

   CO-1: Estimate the amount of reactant and product using balanced chemical equation and prepare a solution of desired strength.
   CO-2: Understand quantum mechanical model of an atom and concept of chemical bonding.
   CO-3: Understand the concept of pH and apply Le-Chateliar's principle to set the condition for high yield of industrially important products. Understand the importance of catalyst in industry.
   CO-4: Utilize electrolysis in industrial field and understand construction of various electrochemical cells.
   CO-5: Solve the engineering problems using knowledge of engineering materials and properties. Use relevant water treatment method to meet domestic and industrial needs.

7. **Teaching scheme (per week):**

Lecture	Tutorial	Practical
2	1	0

8. **Examination scheme:(in hours):**

Theory (Hours)			Practical	Total
Lecture	Tutorial	Class test	30	78
30	15	3		

9. **Examination Scheme:**

Examination scheme				
Theory		Practical		Total (Theory + Practical)
Sessional	ESE	PA	PT	100+100=200
40	60	60	40	

10. **Distribution of marks**:

Chapter No	Chapter title	Type of Question			Total
		Objective	Short	Descriptive	
1	Chemical Equation	1x1=1	2x1=2	1x3=3	6
2	Solution and Acidimetry & Alkalimetry	1x2=2	1x1=1	1x3=3	6
3	Atomic Structure and chemical bonding	1x2=2	2x1=2	2x3=6	10
4	Chemical equilibrium	1x2=2	2x1=2	1x2=2	6
5	Catalysis	1x1=1	3x1=3	-	4
6	Electrochemistry	1x2=2	2x1=2	1x4=4	8
7	Engineering materials	1x3=3	2x2=4	1x5=5	12
8	Water	1x2=2	2x1=2	1x4=4	8
		15	18	27	60

11. **Detailed course content:**

Chapter no.	Title	Content	I.L.O	Duration (in hours)	Marks
1	Chemical equation	1. Mole concept and related numerical. 2. Balancing chemical equation and stoichiometric calculations. 3. Oxidation and reduction. Balancing redox equations by partial equation method & ion-electron method.	Students will be able to: 1. Solve numerical problems on mole concept. 2. Balance chemical equations 3. Perform stoichiometric calculations 4. Understand redox reactions.	3	6
2	Solution and Acidimetry & al kalimetry	1. Idea of solute, solvent and solution. 3. Methods to express the concentration of solution (in terms of percentage, grams per litre, ppm, molarity, normality, molality and mole fraction) and related numerical problems. 4. Definition of acidimetry and alkalimetry, Principle of titration, Indicator and its choice, Related numerical.	Students will be able to: 1. Prepare a solution and calculate the strength. 3. Explain the concept of titration.	3	6

3	Atomic Structure and Chemical Bonding	1. Brief idea of sub-atomic particles 2. Dual nature of electrons, De-Broglie's hypothesis, Uncertainty principle 3. Quantum numbers Aufbau Principle, Pauli's exclusion principle, Hund's rule of maximum multiplicity. 5. Electronic configuration of elements 6. Chemical bonding and different types of chemical bonds - ionic covalent, and co-ordinate bonding and their characteristics 7. Hydrogen bonding and related properties. 8. Metallic bonding and related 4. properties, Conductor, semi-conductor and insulator.	Students will be able to: 1. Understand the structure of an atom and explain the quantum numbers and its significance. Write electronic configuration of different elements. 3. Understand different types chemical bonding and its influence on properties of compounds. 4. Explain metallic bonding and identify 2. conductors, insulators and semi-conductors.	5	10
4	Chemical equilibrium	1. Characteristics of equilibrium and law of mass action 2. Le-Chateliar's principle and its application 3. Ionic equilibrium and the concept of pH, numerical problems	Students will be able to: 1. Derive equilibrium constant. 2. Apply Le-Chateliar's principle 3. Explain the concept of pH and its importance.	3	6
5	Catalysis	1. Catalyst and Catalysis 2. Homogeneous and heterogeneous catalysis 3. Application of catalyst in industry. 4. Enzyme and its use in various chemical process.	Students will be able to : 1. Explain the function of a catalyst and its application in industrial process. 2. Understand the importance of enzyme.	2	4

6	Electro chemistry	1. Definition of terms: Electrolytes and non-electrolytes with example. 2. Faraday's laws of electrolysis and simple numerical problems. 3. Industrial application of electrolysis – Electro plating, Electrometallurgy and Electrolytic refining. 3. Electro-chemical cells Primary cell - Dry cell, Secondary cell –Lead storage battery. 4. Corrosion of metals, types of corrosion. 5. Rusting of iron and its mechanism. 6. Control of corrosion.	Students will be able to 1. Apply Faraday's laws of electrolysis. 2. Understand application of electrolysis in industry. 3. Prepare cells. 3. understand corrosion and suggest protective measure to control corrosion.	4	8
7	Engineering materials	Occurrence of metals in nature. Introduction of term- Minerals, ores, gangue, flux, slag. Brief account of general principles of metallurgy. Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications. Portland cement- Raw materials, manufacture of Portland cement, setting and hardening of Portland cement. Glass – Composition, classification and uses. Outline of manufacturing process of glass. Polymers – monomer, classification of polymer, Application of important polymers, rubber and vulcanization of rubber. Nano materials and Nano technology (Introductory idea only)	Students will be able to 1. Explain general principles of metallurgy. 2. Explain the manufacturing processes of iron and aluminum. 3. Describe the composition, properties and uses of Alloys. 4. Explain the manufacturing process of cement and glass 5. Explain the setting and hardening process of cement. 6. Understand polymer and its classification and also use of polymer in everyday life. Understand the versatility of nano materials in various fields.	6	12

8	Water	1. Soft and hard water, salts causing water hardness, unit of hardness and simple numerical on water hardness. 2. Water softening techniques – soda lime process, zeolite process and ion exchange process. 3. Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization 4. Problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), 5. Quantitative measurement of water hardness by ETDA method	Students will be able to 1. Explain the causes of Hardness. 2. Design set up to Remove hardness of water. 3. Explain the treatment processes for boiler feed water and Municipal water. 4. Estimate hardness of water.	4	8

Suggested Books:

1. **Text Book of Chemistry for class XI and XII,** NCERT, Delhi.
2. **Engineering Chemistry**, Jain & Jain, Dhanpat Rai Publications
3. **Chemistry for Polytechnic** (Volume I and Volume II), Jyotishmoy Borah &Raju Ojah, Kalyani Publishers
4. **Applied Chemistry** (Volume I and Volume II)**,** Dr. Raman Rani Mittal, S. K. Kataria & Sons.

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4. Course Title: Communication Skills in English

Course Title	Communication Skills in English
Course Code	HS - 101
Number of Credits	2
Prerequisites	Class X
Number of Credits	2 (L:2, T:0. P:0)

RATIONALE

Efficient and effective communication skill is the foundation of success in any professional and academic arena. In this context, English language skills have become indispensible in every profession in general and careers of especially engineering and polytechnic professions in particular with most of the service manuals, installation and commissioning manuals of various equipments are in English not to forget the everyday use of the English language in communicating with peers, seniors and clients. English competency plays a major part in creating employable opportunities for diploma engineers in the global level too. Fluency in English adds value to personality making. Written and spoken competency in English is obligatory for technical professionals. This course is hence designed to help the student achieve both written and spoken proficiency in the English language.

COURSE OBJECTIVES

This course aims at helping the students to attain the following industry identified competencies through various teaching learning experiences:
1. Communicate effectively in English both in spoken and written form.
2. Comprehend given passages and extract the main idea

COURSE OUTCOMES

On completion of the course student will be able to
1. CO1= Communicate effectively in General Indian English (GIE) applying varied English vocabulary and constructing grammatically correct English sentences in everyday situations confidently
2. CO2= Use proper format to write Job Application and E-mail
3. CO3 = Demonstrate proper etiquette and confidence while facing an interview

COURSE CONTENT

Unit-1 GRAMMAR AND VOCABULARY				
Chapter No.	**Chapter Title**	**Chapter Content**	**Intended Learning Outcome**	**Duration in Hours**
1	Parts of Speech	Recognition and Review of Parts of Speech with main focus on Prepositions of Time and Place	1.The student will be able to explain the different parts of speech 2. The student will be able to explain Prepositions of Time and Place	2

2	Subject Verb Agreement	Rules that guide the agreement of the subject to its verb	1. The student will be able to explain Subject Verb Agreement	3
3	Transformation of Sentences	Interchange of Assertive, Negative, Interrogative, Exclamatory Sentences; Voice Change	1. The student will be able to interchange Affirmative and Negative Sentences, Assertive and Interrogative Sentences, Assertive and Exclamatory Sentences 2. The student will be able to interchange Active and Passive Voice	3
4	Narration	Direct and Indirect Speech: Assertive, Interrogative and Exclamatory Sentences	1. The student will be able to exhange from Direct to Indirect Speech and vice versa	3
5	Vocabulary	Vocabulary of Commonly Used Words: Derivatives (Noun, Verb, Adjective), Affixation, One-Word Substitution,	1. The student will be able to explain the Derivatives 2. The student will be able to relate Prefixes and Suffixes 3. The student will be able to use One-Word Substitution	3
6	Punctuation	Use of Comma, Semi-Colon, Colon, Apostrophe, Exclamation Mark, Question Mark, Quotation Mark	1. The student will be able to explain the use of Punctuation Marks in different situations and sentences	2
7	Dressing for the Interview and Interview Skills	Dress code, the Business Etiquette, Positive and Negative Body Language, the Perfect Handshake, Handling an Awkward Situation in an Interview	1. The student will be able to face an interview confidently	3

UNIT-2 READING COMPREHENSION				
Chapter No.	**Chapter Title**	**Chapter Content**	**Intended Learning Outcome**	**Duration in Hours**
8	Reading Comprehension	Comprehension of unseen passages	1.It will develop the comprehensive skill and the ability to reproduce grammatically and semantically correct English sentences	2

UNIT 3 PROFESSIONAL WRITING				
Chapter No.	**Chapter Title**	**Chapter Content**	**Intended Learning Outcome**	**Duration in Hours**
9	Paragraph Writing	Paragraph Writing on everyday topics using Transition Words	1. The student will be able to organize meaningful sentences into a paragraph	2
10	Letter Writing – Job Application	Format of a Formal Letter: Job Application, Formats of Resume and CV, Difference between Resume, CV and Bio-data	1. The student will be able to use proper formats to write Job Application, Cover Letter, Resume and CV	4
11	E-mail Writing	Steps to write the perfect E-mail, Difference between Formal and Informal E-mail, Request through an E-mail, Writing an Apology, Complaint and seeking help and information in an E-mail, Informing about a file attached in an E-mail	1. The student will be able to use proper format to write a formal E-mail	3

Distribution of marks:

Chapter No.	Chapter Title	Types of Questions			Total
		Objective	Short	Descriptive	
1.	Parts of Speech	1x2=2			2
2.	Subject Verb Agreement	1x1=1	2x4=8		9
3.	Transformation of Sentences	1x1	2x4=8		9
4.	Narration	1x1=1	2x2=4		5
5.	Vocabulary	1x1=1	2x2=4		5
6.	Punctuation	1x1=1	2x1=2		3
7.	Dressing for the Interview and Interview Skills	1x1=1	2x1=2		3
8.	Reading Comprehension	1x1=1		1x5=5	6
9.	Paragraph Writing	1x1=1		1x5=5	6
10.	Letter Writing – Job Application	1x1=1		1x5=5	6
11.	E-mail Writing	1x1=1		1x5=5	6
Total					60

Prescribed Book:
A Handbook on Communication Skills in English and Language Lab for Polytechnics
by Dr Papori Rani Barooah

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5.Course Title: Engineering Graphics

Course Code	**ES 101**				
Category	**Engineering Science Course**				
Course Title	**Engineering Graphics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-I**
	0	**0**	**4**	**2**	
Pre-requisites (if any)	**None**				

LEARNING OBJECTIVES:

LO1	Demonstrate the uses of drawing equipments.
LO2	Illustrate the concepts of Engg drawing while drawing of lines, letter, curve and scales
LO3	Build two dimensional drawing of lines, planes and solids
LO4	Utilize the concept of orthographic and isometric projections in drawing of simple objects.
LO5	Construct free hand sketches of screw threads, fastenings and rivets.
LO5	Demonstrate the use of tools and techniques to sketch simple drawing using CAD software.

COURSE OUTCOMES:

On successful completion students will be able to:

CO1	Understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.
CO2	Develop drafting and sketching skills, to know the applications of drawing equipments, and get familiarize with Indian Standards related to engineering drawings.
CO3	Develop skills to visualize actual object or a part of it, on the basis of drawings
CO4	Develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.
CO5	Understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes using AUTOCAD.

DETAILED SYLLABUS:

Units	Detailed Contents	Contact Hour
UNIT-I	Uses of drawing equipment-set squares, T square, drafter etc. Layout of drawing sheets-size, margin boarder line etc. Types of lines-outline, margin line etc. Dimensioning –notation, dimensioning terms, dimensioning systems. Lettering-Single stroke (alphabets and numerals). Geometrical Constructions- bisecting a line, perpendicular line, parallel line, dividing a line, drawing angles of 30°, 60°, 45°, 90°. Construction of a circle, tangent to a circle, square, rectangle, pentagon and hexagon, in-circle and circum-circle. Curves- general methods of construction of Ellipse, parabola, hyperbola, tangents and normal to conics. Scales-representative fraction, diagonal and plain scale.	9
UNIT-II	Concepts of quadrant and planes. Projections of points-in four quadrants. Projections of lines- Straight line, lines parallel to one or both the planes, line perpendicular to one of the planes, lines inclined to both the plane. Projections of simple geometrical planes-types of plane, projections of plane in different simple positions. Types of solids, projection solids (axis perpendicular or horizontal to one of the plane)	12
UNIT-III	Orthographic Projections-Principle and method of projections, concepts of angle of projections, Planes and projections. First and third angle projections of different simple objects use in engineering practices. Isometric projection- isometric scale, isometric views, Isometric drawing of different simple objects.	9
UNIT-IV	Free hand sketches-screw treads (V-threads, square thread). Nuts and bolts (Hexagonal and square) Rivets- Types of rivet head and different types riveted joints.	6
UNIT-V	Introduction to CAD tools, menu system, toolbars, drawing area and dialog boxes, methods of zooming in and out, select and erase entities, applying annotations to drawings, applying dimensions to drawings, setting up and use of layers, drawing circle, parabola & polygons, drawing of cube, prism, pyramid, cylinder, cone and sphere in AutoCAD, CATIA v5 or Solidworks 2021 or newer versions.	9
Total Contact Hours		45

Table of Specification for Engineering Graphics																
Sl No	Contact Hours	Units	Objective			Short Answer Type				Long Answers Type						Total Marks
			R	U	AP	R	U	AP	AN	R	U	AP	AN	E	C	
1	9	Unit I	0	0	0	0	0	2	0	0	0	5	0	0	0	7
2	12	Unit II	0	0	0	0	0	2	0	0	0	8	0	0	0	10
3	9	Unit III	0	0	0	0	0	2	0	0	0	8	0	0	0	10
4	6	Unit IV	0	0	0	0	0	2	0	0	0	4	0	0	0	6
5	9	Unit V	0	0	0	0	0	2	0	0	0	5	0	0	0	7
Total	45															
Total Marks			**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**30**	**0**	**0**	**0**	**40**

NB:R: Remember, **U:**Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

Annexure-I (Engineering Graphics)										
Sl No.	Units	Time Allotted (Hrs)	Percentage Weightage	R	U	AP	AN	E	C	Total Marks
1	Unit I	9	17.5 %	0	0	7	0	0	0	7
2	Unit II	12	25.0 %	0	0	10	0	0	0	10
3	Unit III	9	25.0%	0	0	10	0	0	0	10
4	Unit IV	6	15.0 %	0	0	6	0	0	0	6
5	Unit V	9	17.5 %	0	0	7	0	0	0	7
Total Marks										**40**

NB:R: Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

REFERENCE BOOK LIST:

Sl No.	Book Name	Author Name	Publishing House, Volume, ISBN
1	Engineering Graphics	N. D. Bhatt	Charotar Publishing House, 50th edition, 2011, ISBN 978-93-80358-17-8
2	Engineering Graphics	V Lakshminarayanan	Jain Brothers, 2007, ISBN 978-8183600750
3	Engineering Graphics	A.M. Chandra and S. Chandra	Narosa publishers, 3rd edition, 2010, ISBN 978-8184870664
4	Engineering Graphics	P.J. Shah	S. Chand & Company, 2012, ISBN 978-8121932356
5	Text Book of Engineering Graphics	P.H. Jain	Soham Publishers, 2018, ISBN 978-8192659862

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6. Course Title: Engineering Workshop Practice

Course code	**ES-103**
Course title	**ENGINEERING WORKSHOP PRACTICE**
Semester	**FIRST SEMESTER**
Number of credit	**3 (L:T:P= 0:0:6)**
Total contact hours	**90 Hours**
Pre requisite	**Basic science, mathematics, engineering drawing.**

RATIONALE OF THE SUBJECT:

Workshop practice is indeed the backbone of the real industrial environment. It provides an invaluable opportunity for students to develop and enhance their technical hand skills, which are essential for success in various engineering industries and workshops. Here's why workshop practice is so crucial:

1. **Technical Hand Skills Development**: Workshop practice allows students to gain hands-on experience with various hand tools and equipment used in manufacturing. This practical experience helps them develop the necessary skills required to excel in their chosen field.
2. **Problem Solving Skills**: Engaging in workshop practices exposes students to real-life scenarios and challenges they may encounter in industrial settings. By working through these problems, students learn how to troubleshoot and find solutions, which are essential skills in any engineering profession.
3. **Understanding of Industrial Jobs**: Workshop experiences provide students with insight into the complexity of industrial jobs, including the time and skill requirements involved. This understanding prepares them for the realities of working in the industry and helps them make informed career decisions.
4. **Foundation for Further Learning**: Workshop curriculum lays the groundwork for learning more advanced manufacturing processes and production technology courses in subsequent semesters. The hands-on experiences gained in the workshop serve as a solid foundation for building upon as students progress in their studies.
5. **Practice Makes Perfect**: As the saying goes, "practice makes perfect." Regular practice in the workshop allows students to refine their skills and become proficient in their craft. It's through hands-on experience that students truly master the techniques and processes taught in the classroom.
6. **Attitude of Enquiry**: Encouraging students to approach workshop practices with an attitude of enquiry fosters curiosity and a deeper understanding of the why and how behind various instructions and practices. This attitude encourages critical thinking and ensures that students grasp the underlying principles behind the techniques they're learning.

In summary, workshop practice is an essential component of engineering education, providing students with the practical skills, problem-solving abilities, and foundational knowledge they

need to succeed in the industrial environment. Encouraging students to approach workshop experiences with curiosity and a willingness to learn ensures that they get the most out of their hands-on training.

LEARNING OBJECTIVES:

At the end of the course the students will be able to. –

LO1: Tell the meanings of different terminology and manufacturing process used in workshop.

LO2: Choose different hand tools, machine tools, equipment and recall their functions and applications.

LO3: Demonstrate different skills practiced in a work shop.

LO4: Illustrate manufacturing methods/ procedure that are specific to a particular shop.

LO5: Explain the methods of setting up a job and operating a equipment /machine.

LO6: Demonstrate the practice of safety, hygiene, precaution and ethics in a workshop.

LO6: Choose the methods of manufacturing a job.

LO7: Build a model by complying with a standard working procedure.

LO8: Inspect defects in a build model.

COURSE OUTCOMES:

At the end of the course the students will be able to. –

CO1: Show equipment parts, manufacturing processes / technology practiced in workshop.

CO2: Choose different hand tools, machine tools, equipment and demonstrate their applications and operating procedure in shop practices.

CO3: Illustrate different skill, methods, techniques, job set up, machine set up practiced in a workshop.

CO4: Build a model as per working procedure adhering to safety, precautions and safety.

CO5: Inspect visually different defects that emerge in the build model.

GUIDANCE FOR THE SHOP INSTRUCTOR:

- To prepare a digital copy of workshop journal / report selecting the most relevant topics from the available contents of a shop leaving blank pages for hand writing of home assignment and class assignment.
- To provide standard working procedure, design / drawings required for making different jobs as mentioned in the syllabus.
- To demonstrate all tools, equipment and operating procedures required for workshop practices.
- To demonstrate practical skill and techniques necessary to practice in the shop.

- To exercise internal assessment and end semester evaluation of students based on course outcome and on individual performance.
- To adhere to the safety, precaution and ethics necessary to be followed in the shop.

ASSESSMENT CRITERIA:

(a) INTERNAL ASSESSMENT:

Sl No.	Internal Assessment criteria	Marks = 60
1	Identification, demonstration of manufacturing process , tools, equipments, parts of tools and equipment etc.	2 X 6 = 12
2	Demonstration of skill, methods, job setting, machine setting, working and operating procedure of tools and equipments to build a model.	4 X 6 = 24
3	Demonstration of defect if any on models, practices of safety, precautions and ethics in shop.	2 X 6 = 12
4	Adherence to working procedure and report submission	2 X 6 = 12
Total Marks (10 marks allotted for each shop)		**10 X 6 = 60**

(b) END SEMESTER EVALUATION:

Sl No.	End Semester Evaluation criteria for evaluation of individual performance	Marks = 40
1	Identification, demonstration of manufacturing process , tools, equipments, parts of tools and equipment etc.	5
2	Demonstration of skill, methods, job setting, machine setting, working and operating procedure of tools and equipments to build a model.	10
3	Demonstration of defect if any on models, practice of safety, precautions and ethics in shop.	5
4	Workshop Viva	20
Total Marks		**40**

WORKSHOP MODULES:

Institute may select any one module from the suggest modules for Engineering Workshop Practice course.

MODULES	SHOP NAMES		MODULES	SHOP NAMES
MODULE – 1	1. Machine Shop		**MODULE – 2**	1. Carpentry Shop
	2. Fitting Shop			2. Electrical Shop
	3. Electrical Shop			3. Welding Shop
	4. Moulding Shop			4. Machine Shop
	5. Black Smithy Shop			5. Fitting Shop
	6. Welding shop			6. Black Smithy Shop

MODULE – 3	1. Carpentry Shop		**MODULE – 4**	1. Carpentry Shop
	2. Sheet Metal Shop			2. R.C.C Shop
	3. Pattern making Shop			3. Painting Shop
	4. Moulding Shop			4. Electrical Shop
	5. Fitting Shop			5. Welding Shop
	6. Turning Shop			6. Plumbing Shop
MODULE – 5	1. Welding Shop		**MODULE – 6**	**ANY SIX SHOP FROM THE SUGGESTED LIST OF WORKSHOPS.**
	2. Machine Shop			
	3. Black Smithy Shop			
	4. Moulding Shop			
	5. 3D Printing Shop			
	6. Pattern Making Shop			

WORKSHOP DETAILS, COURSE CONTENTS AND PRACTICES:

1. CARPENTRY SHOP

LEARNING OBJECTIVE:

The students will be able to

LO1: Choose different tools, equipment and manufacturing process as required in the shop.

LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the fitting shop.

LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS | **CONTACT HOURS : 15 Hrs**

Basic materials used in carpentry shop (timber & plywood), Auxiliary materials, Classification of wood and timber, Seasoning and its methods, Demonstration of marking and measuring tools, cutting tools, planning tools, boring tools, striking tools, holding tools, Carpentry joints (lap joints-(half lap, mitred half lap, cross lap, dovetail crossed lap), mortise and tenon joints, dovetail joints, bridle joint etc..

* Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc.
* Demonstration of operating plaining tool for plaining a wooden member to required sizes as per the drawings provided.
* Demonstration of nail sizes and nailing practices.
* Demonstration of different tools and equipments along with their usages.
* Safety, precaution and ethics required in this shop

Job practices:

1. Lap joints- half lap, mitred half lap, cross lap
2. Mortise and tenon joints
3. Dovetail joints and bridle joints.
4. Craft a wooden sign board frame with appropriate joints and nail a plain G.I sheet. (Sizes of frame, wooden member, gauge size of plain sheet, nail size as recommended by shop instructor)

2. FITTING SHOP

LEARNING OBJECTIVE:

The students will be able to

LO1: Choose different tools, equipment and manufacturing process as required in the shop.

LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the fitting shop.

LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Fitting tools – (i) Marking and measuring tools (surface plate, try square, angle plate, scriber, universal scribing block, odd leg caliper, dividers, calipers, dot punch, vernier caliper) (ii)Holding and supporting tools (bench vice, V-block, C-clamp) (iii) Cutting, filing and scrapping tools (iv) Striking tools (v) Drilling, dieing, reaming and tapping tools (vi) Miscellaneous tools (ball peen hammer, screw driver, spanner). Types of file – hand file (flat file, square file, half round file, round file) Art of filing, filing methods. Fitting operations- (i) Chipping (ii) Filing (iii)Scrapping (iv) Grinding (v) sawing (vi) Marking (vii) Drilling (viii) Reaming (ix) Tapping (x) Dieing. Power tools-bench drilling machine, grinding machine etc..

* Demonstration of fitting tools.
* Demonstration of different types of files, art of filing and methods of filing.
* Demonstration of different fitting operations.
* Demonstration of power tools used in fitting shop.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Make dovetail fit from a given mild steel pieces.
2. Make square fit from a given mild steel pieces.
3. Make V-fit from a given mild steel pieces.
4. Make semicircular fit from a given mild steel pieces.

3. WELDING SHOP

LEARNING OBJECTIVE:

The students will be able to

LO1: Choose different tools, equipment and manufacturing process as required in the shop.

LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the welding shop.

LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Various welding process - Arc welding, Gas Welding, TIG welding, MIG welding, Demonstration of arc welding equipments and their functions, Types of electrodes, Electrode size, Specifications of electrode, Edge preparation, Different welding positions. Types of welding joints – Lap joints, Butt joints, T-joints, Corner joint, Edge joints, Plug joints. Gas welding equipments and their functions, Types of gas flames, Gas welding techniques, Flux, Filler, TIG welding, MIG welding, Spot welding, Seam welding, Thermit welding, Resistance welding. Welding defects. Work holding devices, marking and measuring tools, Essential welding tools and accessories.

* Demonstration of arc welding, gas welding, TIG and MIG welding equipments and parts.
* Demonstration of the techniques of arc and gas welding in different joints.
* Demonstration of different types of flames, electrode / filler material used in arc and gas welding.
* Demonstration of different types of tools and equipment used in this shop.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Preparation of lap joint using a given mild steel plate by arc or gas welding.
2. Preparation of butt joint using a given mild steel plate by arc or gas welding.
3. Preparation of T- joint using a given mild steel plate by arc or gas welding.
4. Preparation of corner joint using a given mild steel plate by arc or gas welding.

4. MACHINE SHOP

LEARNING OBJECTIVE:

The students will be able to

LO1: Choose different tools, equipment and manufacturing process as required in the shop.

LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the machine shop.

LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Lathe machine-Types of lathe machine, Parts of lathe machine, specification of lathe, Various operation performed on lathe machine- facing, rough turning, shouldering, radius turning, thread cutting, chamfering, knurling etc., Different methods of taper turning, **Shaper machine-**Types of shaper, Parts of shaper, Specification of shaper, Quick return mechanism, Feed mechanism, Shaper operations-horizontal flat surface, vertical surface, angular surface, cutting slots and key ways, machining splines or cutting gears, **Drilling machine-** Types of drilling machine, Parts of drilling machine, Specification of drilling machine, Operations on a drilling machine- drilling, boring, counter boring, counter sinking, reaming, tapping, spot facing, Drill nomenclature, **Milling machine-**Types of milling machine, size and specifications, Parts of milling machine, Milling methods-up milling & down milling, Milling operations, **Grinding machine-** Types of grinding machine, abrasives, grit, grade and structure, shapes and types of grinding wheels, dressing and truing, grinding methods, selection of grinding wheels.

*Demonstration of parts of Lathe, Shaper, Drilling, Milling and Grinding machines, Demonstration of machine set-up of Lathe, Shaper, Drilling, Milling and Grinding machines,
*Demonstration of various machining operations in Lathe, Shaper, Drilling, Milling and Grinding machines. *Demonstration of different cutting tools, work holding devices, measuring and marking tools, attachments, jigs and fixture etc of Lathe, Shaper, Drilling, Milling and Grinding machines.
* Safety, precaution and ethics required in this shop.

Job practices:

1. Performing operations of facing, plain turning, step turning, taper turning, chamfering, thread cutting, knurling and drilling in centre lathe on a given cylindrical work-piece.
2. Machining of V-Groove and Square Groove on a given square block in a shaper machine.
3. To perform operations of drilling, reaming, boring, counter boring, counter sinking and tapping on a given cylindrical work-piece.
4. Form milling of spur gear teeth on a circular blank in a milling machine.
5. To grind a single point cutting tool as per given specifications.

5. PATTERN MAKING SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the pattern making shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Pattern materials, Types of pattern, Pattern making allowance- shrinkage allowance, draft allowance or taper allowance, machining allowance, distortion or camber allowance, rapping allowances or shaking allowance, Core box, Types of core boxes, Colour coding for pattern and core boxes.
Wooden pattern and core boxes making tools- Measuring and layout tools, sawing tools, planning tools, boring tools, clamping tools, miscellaneous tools- screw driver, hammers, chisel, rasp, file, cornering tool, brad pusher, bradawl etc., Wood pattern and core box making machines- wood turning lathe, abrasive disc machine, abrasive belt machine, circular saw, jig or scroll saw, jointer, drill press, grinder, wood trimmer, wood shaper, wood planer, tennoner, mortise

* Demonstration of models of various types of pattern.
* Demonstration of wooden pattern and core box making tools
* Demonstration of wood pattern and core box making machines.
* Demonstration of wooden pattern making on a lathe machine.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Make a single piece pattern (two step cone pulley) on wooden material keeping necessary allowances. (Job specification as given by shop instructor)
2. Make a two piece pattern (dumb bell) on wooden material keeping necessary allowances.(Job specification as given by shop instructor)
3. Make a wooden pattern of solid flange (single piece pattern) keeping necessary allowances. (Job specification as given by shop instructor)
4. Make a wooden pattern of 6 toothed wooden gear patterns for casting keeping necessary allowances. (Job specification as given by shop instructor)
5. Make a wooden multi-piece pattern. (Job specification as given by shop instructor)

6. MOULDING SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the moulding shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Types of moulds, Moulding process- bench moulding, floor moulding, pit moulding, machine moulding, Types of sand moulding- green sand moulds, dry sand moulds, skin-dried moulds, loam moulds, metal moulds, Moulding boxes- cope, drag, snap flask, box flask, tapered slip flask, Moulding tools and equipments, Moulding sands, Types of moulding sand, Grain shape and size of sand, Sand additives, Properties of moulding sand, Sand preparation, Sand testing,

Cores and core making- core sand preparation, core moulding, core baking, core finishing, Riser and Runner system, Special moulding process- cement sand moulding, shell moulding, plaster moulding,

* Demonstration of moulding tools and equipments.
* Demonstration of different moulding process.
* Demonstration of different types of sand moulding.
* Demonstration of special moulding process.
* Safety, precaution and ethics required in this shop.

Job practices:

1. Prepare green sand moulds ready for pouring using two moulding boxes (hand cut moulds).
2. Prepare green sand moulds ready for pouring using single piece pattern (single step pulley).
3. Prepare green sand moulds ready for pouring using a split pattern (dumb bell).
4. Prepare one casting (aluminum/ cast iron / wax material) using already prepared moulds.

7. PLUMBING SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the plumbing shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Pipes and its types and materials, Pipe joints, Types of pipe joints – hydraulic pipe joint, flange joint, union joint, spigot and socket joint, expansion joint, screw pipe joint, glued pipe joint, Screw threads-internal and external, Tools- clamping tools (pipe vice), pipe wrenches, pipe cutter, measuring and marking tools, cutting tools, threading tools (taps, die and diestock), Pipe fittings- nipple, bends, elbows, reducer elbows, socket, tee, reducer tee, crosses, male and female plug, coupler, reduser coupler, Valves and meters- water tap, water cock, glove valve, gate valve, ball valve, non-return valve, foot valve

* Demonstration of different types of pipes and pipe joints.
* Demonstration of different types of tools- clamping, measuring and marking, cutting and threading
* Demonstration of different types of pipe fittings.
* Demonstration of different types of valves and meters.
* Safety, precaution and ethics required in this shop.

Job practices:

1. To cut the threads at the end of a given PVC pipe by using a pipe die and connect two different diameter PVC/ GI pipe with pipe fittings like reducer, valves, bends union joint, socket and tap.

2. Prepare line diagram and perform pipe line connections from water tank to wash basin.
3. Prepare line diagram and perform pipe line connections from water tank to washing machine.
4. Prepare a line diagram and perform pipe line connection from water tank to heater and shower.

8. SHEET METAL SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the sheet metal shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS | **CONTACT HOURS : 15 Hrs**

Metals used in sheet metal work- black iron sheet, G.I. sheet, stainless steel, tin, aluminum, copper, Sheet metal tools- hand shear or snips (straight, universal and curved hand shear), Hammers - (smoothing, stretching, creasing, hollowing, riveting, planishing, soft hammer or mallets), Stakes- (beak horn, funnel, half moon, round button, bick iron, hatchet, creasing with horn, needle case, candle mold, blow horn conductor, double seaming), stake holder, Cutting tools- files, chisel, scrapers, hacksaws, Measuring tools – folding rule, circumference rule, steel rule, Vernier caliper, micrometer, thickness gauge, Miscellaneous hand tools- steel square, straight edge, divider, scriber, trammel points, soldering iron, pliers, groover, hand seamer,Types of - edges, seam, notches, sheet metal joints, Sheet metal operations, sheet metal allowance, Layout a pattern, riveting in sheet metal. Fastening methods – Riveting, soldering, brazing, welding, Machine used- shearing, bending, folding, grooving, peining machine, beading, swaging, burring, double seaming machine.

* Demonstration of different sheet metal tools, hammers, stakes, cutting tools, measuring tools, miscellaneous tools.
* Demonstration of edges, seam, notches, sheet metal joints.
* Demonstration of important sheet metal operations and method of laying out a pattern
* Demonstration of different types machines used in sheet metal shop.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Marking out of simple developments, flaps for joints, straight lines, circles, profiles, various geometrical shapes and cutting the given 26G G.I sheets with snips.
2. Make various joints: Hem – single hem, double hem, wired edge. Seam – lap seam, grooved seam double seam, dovetail seam, flanged seam to make a cylindrical object , joint / fitting for 26 G G.I sheet water pipe line.
3. Make a simple square table tray with folding edge and fix handle with riveting from a 26G G.I sheet.

4. Make a conical funnel with folding edges and without handle or mug with folding edges and fixed handle from a given 26G G.I sheet. (riveting and soldering as per requirements)

9. BLACKSMITHY SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the blacksmithy shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS | **CONTACT HOURS : 15 Hrs**

Smithing and forging, Heating furnaces – Box or batch type furnaces, rotary hearth furnace, continuous or conveyor furnaces, induction furnaces, resistance furnace, open fire and stock fire, Forging temperature, Hand tools – anvil, swages, swage block, tongs, hammer (hand hammer, sledge hammer, power hammer), chisels (hot chisel, cold chisel, hardie set), swages, fullers, flatters, set hammer, punches, drifts, clamping vice, beak iron, Forging process- Smith dieforging (hand forging - upsetting, drawing down, setting down, bending, fullering, swaging, flattering, punching, drifting , forge welding, Power forging- hammer forging, press forging), Impression die forging- drop forging, press forging, machine forging, Hot working process and cold working process, annealing, hardening, tempering, case hardening, normalizing.

* Demonstration of different parts of box type furnace.
* Demonstration of different types of hand tools.
* Demonstration of different hand forging operations.
* Demonstration of power forging and impression die forging equipment.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Make a hexagonal headed bolt from a given mild steel rod. (Length and diameter as specified).
2. Make a cold flat chisel from a given mild steel bar. (Size, shape, length as specified by shop instructor)
3. Make a chain with links (03 Nos.) and chain ring (01 Nos.) from a give mild steel rod. (size of link and ring as specified by shop instructor)
4. To make a square prism using a given cylindrical mild steel rod. (length, breadth and height as specified by shop instructor)
5. To make a S-hook from a given cylindrical rod by following hand forging operation. (Size as specified by shop instructor)

10.TURNING SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the turning shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Lathe machine-Types of lathe machine, Parts of lathe machine, specification of lathe, Various operation performed on lathe machine- facing, rough turning, shouldering, radius turning, thread cutting, chamfering, knurling etc., Different methods of taper turning. **Drilling machine-** Types of drilling machine, Parts of drilling machine, Specification of drilling machine, Operations on a drilling machine- drilling, boring, counter boring, counter sinking, reaming, tapping, spot facing, Drill nomenclature.

* Demonstration of different parts of a lathe and drilling machine.
* Demonstration of different types of machining operations that can be performed on a lathe and drilling machine.
* Demonstration of different types of hand tools, attachments and accessories used in a lathe and drilling machine.
* Demonstration of different types of cutting tools used in lathe and drilling machine.

* Safety, precaution and ethics required in this shop.

Job practices:

1. To perform step, knurling, taper turning, RH thread cutting and chamfering operation on a cylindrical bar in a lathe machine as per drawing provided by the shop instructor.
2. Performing boring operation using a boring bar in a centre lathe and cut BSW/ Metric internal thread on a lathe machine. (Drawing as provided by the instructor)
3. To perform operations of drilling, reaming, boring, counter boring, counter sinking and tapping for drilling 4 nos. of hole on a given square mild steel plate.
4. To make a machine element (taper mandrel) on a lathe machine. (specification and drawing as provided by the shop instructor)

11.PAINTING SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the painting shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Introduction, Composition of paints-base, vehicle or binder, colouring pigments and fillers,

solvents or thinners, drier, inert filler or extender. Types of paints- enamel, aluminium, cellulose, rubber based, bituminous, cement based, asbestos paint, casein paint, bronze paint, anti-corrosive paint. Painting process- preparation, sanding, knotting, priming, stooping, surface coat or undercoat, finished coat. Paint application techniques- Manual methods (brush, roller), spray techniques (air spray, HVLP, airless, air assisted, electrostatic - air spray, air assisted) Alternative coating methods – (electroplating, galvanizing, powder coating). Varnishes, composition of varnishes- resins, solvents, driers. Types of varnish – oil varnish, asphalt varnish, turpentine varnish, spirit varnish water varnish. Application of varnish, French polish or spirit varnish. Painting tools and equipments – water colour brush, , oil painting brush, roller, sand paper, measuring tape, hand masker and painters tape, screw driver, caulking and gun, putty knife, paint tray, stir stick, drop cloth, scrapper or wire brush, step ladder, spray gun, air compressor, air supply hoses, paint pump, paint line, paint line whip hose, drum for mixing paint, mixer/ stirrer. Powder coatings, Types of powder coatings- thermoplastic powder coating, thermosetting powder coatings, Powder coating process- part preparations, powder applications, curing. Painting work material - wooden work, iron and steel surface, plastered surface, concrete surface.

* Demonstration of different composition of paints and types of paints..
* Demonstration of painting process on wooden, iron and steel, plastered and concrete surfaces.
* Demonstration and uses of different painting tools, equipments and different parts of spray painting equipments.
* Demonstration of powder coating process.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Paint a name plate on different materials (wood, tin, acrylic) board by sketching in gothic letters, roman letters etc.
2. Prepare wooden surface properly of any object with wood primer, putty and paint with brush.

   Or

   Follow varnish and polish procedure on wooden surface (cleaning, knotting, stooping, staining preparation) to varnish and polish wooden objects.
3. Prepare wall surface (plastered or concrete) with wall putty or POP and apply lime or distemper or emulsion or enamel paint with brush and roller.

   Or

   Prepare iron and steel surface following standard procedure (cleaning, sanding, priming etc.) to paint iron and steel object.
4. Prepare paint as per requirement and job specification (stirring, mixing etc.), adjust air pressure and flow of paint on spray gun (size of droplet, width of spray, sprinkle thickness) and carry out coating and painting process in accordance with operatingprocedure, safety and component specification requirements.

12.RCC SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the RCC shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	**CONTACT HOURS : 15 Hrs**

Concrete making ingredients -
Cement: Field test of cement, normal consistency of cement, initial setting time,
Aggregate :

(c) Fine aggregate (sand): Physical observation, checking of impurities – soft material, foreign material etc.
(d) Coarse aggregate (stone chips): Size, Physical observation for checking impurities.

Making of concrete: Hand mixing of concrete for a particular proportion (weight basis), control of quantity of water, fine aggregates and coarse aggregates,
Bricks masonry work:
Brick – Field test of brick to check the suitability – colour, shape, size, weight, strength (without machine), water absorption, efflorescence, etc., Mortar: Hand mixing of mortar in given proportion (wet basis), specific time of using mortar after mixing, laying of mortar as per thickness, laying of brick – Stretcher, Header, English, Flemish bond, Knowledge of header, stretcher, closer, queen closer, king closer, beveled closer, keys and frogs.
RCC work:
Definition, Difference between Plain Cement Concrete (PCC) and Reinforced Cement Concrete (RCC), Steel reinforcement bar – mild steel, TOR steel, high yield strength deformed bar(HYSD), Cold twisted deformed bar, corrosion resistant steel bar. Thermo Mechanically Treated (TMT). Knowledge of shuttering, centering and prop, Knowledge of compaction of concrete – necessity of compaction, hand compaction, Vibration compaction. Curing of concrete and brick work – necessity, water for curing, time period of curing, curing methods – water
Immersion, spraying, surface covering, etc.,
Concreting works: Preparation for placing of concrete in RCC work, compaction of concrete.
Reinforcement work – cutting of reinforcement, bending and placing of reinforcement, introduction of stirrups (ties), function of stirrups (ties), making of stirrups (ties) – Based on shape, knowledge of hook, hook length, placing of stirrups (ties), knowledge of cover, necessity of cover,

Tools and equipment – Trowels (brick, nyla, margin, gauging trowel), mortar making tools, spirit level, level tube, chisels, hammer, cove corner, portable circular saw, jointers (concave, convex, Vee, grapevine), floats (wooden, metal), plumb bob, mason's square, measuring tape, sand screen, pan, spade, shovel. stirrup bending bench.

* Demonstration of field testing of cement, field test of bricks, hand Mixing of mortar and concrete, visual inspection of impurities.
* Demonstration of different types of hand tools and equipment.
* Demonstration of different types of bonds.

* Demonstration of cutting, bending and binding of stirrups.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Preparation of a Portland cement paste of standard consistency and determine the initial setting time of cement as per IS 4031.

   Or

   Sieve analysis of coarse aggregate and fine aggregate as per IS 383 and IS 2386.
2. Making of mortar and concrete as per given proportion (weight basis)
3. Cutting and bending of 5/6 mm diameter rod to build square, rectangular, triangular and circular stirrups as per I.S standard.
4. Build a half brick thick wall in stretcher bond or header bond one end stopped and the other end raked baked six courses height keeping provision for chases or holes.
5. Bending of required numbers of square stirrups for binding of 4 Nos. primary TMT reinforcement bars with 24G black binding wire for a beam or column of specified length or height keeping the spacing between stirrups or ties not more than recommended value.

13.ELECTRICAL SHOP

LEARNING OBJECTIVE:

The students will be able to

LO1: Choose different tools, equipment and manufacturing process as required in the shop.

LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the electrical shop.

LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Basics knowledge:

Circuit, Types of circuit (A.C circuit, D.C circuit, open circuit, closed circuit, short circuit), voltage, current, power, energy, A.C current, D.C current, cycle, frequency, single phase supply, two phase supply, three phase supply, insulators, resistances, inductance, capacitance, ohm's law, connections of cells – series connections, parallel connections, series and parallel connections.

Domestic wiring:

Planning for wiring, load estimation, wattage of domestic appliances, wire selection chart,symbols. Switches – single pole one way switch, single pole two way switch, intermediate switch, push buttons switch, double pole switch, double pole iron- clad main switch, triple pole iron clad main switch. Fuse, Types of fuse – Kitkat fuse, circular fuse, cartridge fuse, H.R.C fuse, Circuit breaker – manual circuit breaker (MCB), automatic circuit breaker (ACB). Plug sockets – two pin sockets, three pin sockets, three pin plug top. Lamp holder – bayonet cap lamp holder, pendent lamp holder, batten lamp holder, angle lamp holder, Edison screw cap lamp holder, swivel lamp holder. Lamp connection – Tree connections, looping in connections, General accessories – adapters, ceiling rose (two plate ceiling rose, three plate ceiling rose),

connectors, distribution board, neutral link. Types of electrical joints – pigtail or rat tail joint, married joint, scarfed joint, tap joint (plain tap, knotted tap, duplex cross tap joint). Selection of

wiring, Types of wiring – Cleat wiring, TRS or CTS (batten) wiring, Casing or capping wiring, conduit wiring, lead sheathed wiring. Method of marking the layout for wiring – marking true vertical run, marking true horizontal runs, marking cable runs on ceiling. Method of connections in domestic installation – looping- back method, joint box method. Measuring of wire sizes. Executing PVC casing – capping wiring. Earthing procedure. Estimating the cost of house wiring.
Testing of domestic installation:
Polarity test, testing polarity of socket, continuity test, earth leakage current test, insulation resistance test.
Tools and equipments – screw driver, pliers, knife, poker, nail puller or claw hammer, mallet, hacksaw, hand drill, drilling machine, wire gauge, test pen, test lamp, voltmeter, ammeter, multi-meter, galvanometer, megger.

* Demonstration of different types of circuit, insulators, resistances, capacitance, connections of cells, tools and equipment and their application.
* Demonstration of wire laying planning, load estimation, switches, fuse, circuit breaker, sockets, lamp holder, lamp connections, types of wiring.
* Demonstration of different methods of joining electric wires and cables, casing or capping wiring, conduit wiring.
* Demonstration of earthing procedure, wire size measuring, different testing techniques.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Prepare test boards / extension boards and mount accessories like lamp holders, various switches, sockets, fuse relays, MCB etc.
2. Wire up PVC conduit wiring on given wooden wiring board to control one lamp from two different places.
3. Estimate the cost, bill of material, lay out drawing keeping provision of points for two numbers of lamp, one ceiling fan, one TV, one charging point, one extra point for minimum 15 metre length.
4. Practice wiring on a given wooden wiring board for godown lighting.
5. Prepare pipe earthing / plate earthing and measure earth resistance with earth tester / megger.

14. 3D PRINTING SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the 3D printing shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Prototyping, Product life cycle, CAD design – solid modeling, surface modeling, sculpting. CAD for 3D printing – CAD data, data translation, data loss , STL format. Generic process of CAD to PRODUCT (CAD, conversion to STL, File transfer to machine, machine set up, build, remove, post process application).3D model file formats (STL, OBJ etc.), Slicing a 3D model, Slicing software , Knowledge on Brims, Skirt, Raft, support, orientation, layer height, printer speed, bridging, perimeters, infill, retraction, stringing. Types of 3D printing process – Binder jetting (BJ), direct energy deposition (LENS, LBMD), materials extrusion (FFF, FDM), materials jetting (MJ, DOD), powder bed fusion (SLS, DMLS, SLM, EBM), sheet lamination (UAM, LOM, Vat polymerization (SLA – stereolithography, DLP – Direct Light Processing). Components of 3D printer – axes, extruder, nozzle, hot end, build surface /print bed, filament, cooling device, control panel.3D printing materials – Polymers (plastics, thermo plastics, thermosetting) , metals, others (ceramics, ccomposites). Printer characteristics of different 3D printing process.3D scan – laser scanning, CT scanning. Post processing process – support removal, sanding, cleaning, debarring, polishing etc. Tools and equipments – Spatula, glue stick, debarring tool / knife and cutting mat, pliers, blue tape, digital caliper, tweezers, sand paper, screw driver, hex key screwdrivers, adhesion sheet, desiccant and re-sealable bags, permanent markger, advanced 3D printing kit, paper towels, wire cutter, dremel, extra filament, dissolving kit (bucket of water and pump).

* Demonstration of CAD design of a model for 3D printing.
* Demonstration of different parts of 3D printer available in the shop.
* Demonstration 3D scanning and conversion to printable 3D format.
* Demonstration of printing of a simple job in 3D printer and performing post processing operation.

* Safety, precaution and ethics required in this shop.

Job practices:

1. Modeling a 3D model of a box or dice or any simple utility objects in CAD software and conversion to STL format .
2. Slicing of STL file and study the effect of process parameter like layer thickness, orientation and infill on build time using software.
3. Printing of a CAD modeled 3D object on the available 3D printer with materials as applicable to the printer and perform post processing operation.i
4. Modeliing of a component using 3D scanner of real life object and conversion to STL format.

15. CUTTING AND SEWING SHOP

LEARNING OBJECTIVE:

The students will be able to
LO1: Choose different tools, equipment and manufacturing process as required in the shop.
LO2: Demonstrate various skill and techniques, safety, precaution and ethics desired in the cutting and sewing shop.
LO3: Build different jobs as per drawing and estimation and adhering to standard working procedure and safety practices.

CONTENTS	CONTACT HOURS : 15 Hrs

Fabrics – Cotton, wool, silk, linen, synthetic, textured knitted fabrics, lining fabrics parts and functions of sewing machine, operation of sewing machines. Bobbin winding, Threading, Tension adjustment, Basic care & maintenance of sewing machines, sewing machine types & parts, cutting & layout plans, Marketing pattern, Basic Care & maintenance of sewing machines, Practice sewing on muslin, Sewing on straight lines, Zig-Zag lines, Wavy lines, Fabric Grain lines & how to differentiate the right side of the fabric from the wrong side before cutting & sewing. Sewing machines for domestic use, industrial use, specialized sewing machines, Tools & equipments – Pins, needles, Scissors, seam ripper, marking tools, measure tape, ruler, French curve, marking chalk etc. How to do minor &mechanical adjustment while sewing problems of stich formation & damage to the fabric, Basic Hand stiches, procedure for sewing, finish sewing.

* Demonstration of different fabrics & grain line.
* Demonstration of different types of cutting tools, measuring tools, sewing machine parts etc.
* Demonstration of pattern making, hand sewing techniques & machine techniques.
* Demonstration of sewing techniques on Muslin fabric.
* Safety, precaution and ethics required in this shop.

Shop practices: (All jobs to be practiced)

1. Practice and make samples of different types of hand stitches and machine stitches. following safety precautions.
2. Practice appropriate body measurement, prepare measuring chart.
3. Practice sewing (machine stitching/ hand stitching) and prepare samples for different stiches on Muslin.

Book References:

1. Workshop Technology, S.K. Hajara Chaudhary,Media Promoters and Publishers, New Delhi, 2015.
2. Workshop Technology, B.S. Raghuwanshi, Dhanpat Rai and sons, New Delhi 2014.
3. Workshop Practice Manual, K. Venkat Reddy, BS Publications, Hyderabad 2014.
4. Kents Mechanical Engineering Hand book, John Wiley and Sons, New York.
5. A Text Book of Manufacturing Technology, R.K.Rajput, Laxmi Publications (p) Ltd., New Delhi
6. The 3D Printing Handbook Technologies, design and applications, Ben Redwood, Filemon,
7. Schoffer and Brian Garret, Coers & Roest @ #D Hubs B.V. 2017
8. Additive Manufacturing Technologies, Rapid Prototyping to Direct Digital Manufacturing, I. Gibson, D.W.Rosen, B. Stucker, Springer Science, LLC 2010.
9. Sewing for fashion designers, Anette Fisher, Laurence King Publishing Ltd. 2015.
10. Dress Pattern Designing, Natalie Bray, BSP Professional Books, 1986.
11. Practical Pattern Making, F.W. Barrows, The Norman w. Henley Publishing Co. 1913.
12. Masonry and Concrete, A.V. Dasare, Railway Engineering Technical Society, 2008, Pune, India.

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7. Course Title: Applied Physics Lab-I

COURSE CODE: BS-107
Total Marks:100
Practical Examination:40
Practical Sessional Marks:60

Learning Objectives: The main objectives are:

(i) To provide an experimental foundation for the theoretical concepts introduced in the theory class.
(ii) Demonstrate the principles taught in the class.
(iii) Develop the habit of honesty, patience and teamwork.

Course outcomes:

On completion of this practical course, the students will be able to:

i) apply the concepts of precisions and errors in measurements by using different micrometers.
ii) recognize, use and handle different basic electrical instruments.
iii) arrange different electrical components to perform basic electrical experiments.

Teaching scheme (in hours)/ week

Lectures	Tutorial	practical	Credits
0	0	2	1

DETAILED COURSE CONTENTS:

Chapter Title	Content
Unit & measurements	1. Linear measurement by Vernier Callipers to determine: a. Volume of a Wooden/ metallic Cube b. Volume of a Wooden/ metallic solid and hollow cylinder c. Volume of a Wooden/ metallic sphere d. Thickness of a metallic washer
	2. Linear measurement by Screw Gauge to determine: a. cross sectional area of a wire b. thickness of a glass piece
	3. Linear measurement by Spherometer to determine: a. Thickness of glass piece

	b. Radius of curvature of concave mirror c. Radius of curvature of convex mirror d. Depth of a hole.
ELECTRICITY	4.To verify Ohm's law by Ammeter-voltmeter method.
	5.To find equivalent resistance using voltmeter with I. Three resistances connected in series. II. Three resistances connected in parallel.
	6.To measure the unknown resistance of the material of a wire by meter bridge using Wheatstone bridge principle.
	7. To convert a given galvanometer into an ammeter of given range.
	8. To convert a galvanometer of given resistance into a voltmeter of given resistance. 9. To compare the e.m.f. s of two cells using a potentiometer.

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8. Course Title: Applied Chemistry Lab-I

1. Course Title: Applied Chemistry Lab-I
2. Course Code:BS-109
3. Semester:1st Semester
4. Objective: At the end of the program the students will be able to

a. Prepare Standard Solution and determine the strength of Acid and Bases by volumetric titration.
b. Understand and differentiate various methods of qualitative and quantitative analysis.
c. Use various apparatus for precise measurements.

5. Course Outcome: After completion of the course, students will be able to

CO-1: Use safely various laboratory equipment and chemicals.

CO-2: Prepare a standard solution and find out the strength of acids / bases by titration against prepared standard solution.

CO-3: Analyse various water quality parameter and estimate hardness of water by complexometric titration.

CO-4: Learn detection of cation and anion in a given salt following standard procedure.

6. Teaching Scheme:

Hours/ Week	Hours/Semester
2	30

7. Teaching scheme (per week):

Lecture	Tutorial	Practical
0	0	2

8. Distribution of Marks:

Units	Topic	Marks
1	Preparation of standard solution	5
2	Titration	10
3	Salts analysis	20
4	Viva	5
Total		40

9. Detailed Course Content:

Units	Topics	Duration (In Hours)
1	1.1 Discussion and demonstration on safety protocols in the laboratory. 1.2 Hands on training on various laboratory equipments.	2
1	1.1 Preparation of standard solution of Na_2CO_3 1.2 Preparation of standard solution of Oxalic acid	2
2	2.1 Determination of strength of H_2SO_4 by titration against N/10 Na_2CO_3 2.2 Determination of strength of NaOH by titration against N/10 HCl 2.3 Redox Titration- $KMnO_4$Vs $H_2C_2O_4$ 2.4 Estimation of hardness of water by EDTA.	8
3	3.1 To identify the acidic radicals by Dry and Wet Test (CO_3^{2-} ,Cl^- ,Br^- , SO_4^{2-} ,S^{2-} ,NO_3^-) 3.2 To identify the basic radicals by Dry and Wet Test— (,Pb^{2+}, Cu^{2+}, Fe^{3+} ,Al^{3+} ,Zn^{2+},Co^{2+} ,Ni^{2+} ,Ba^{2+} , Sr^{2+},Ca^{2+} ,Mg^{2+} ,NH_4^+, K^+)	18

10. Suggested learning Resources:

a. Higher Secondary Practical Chemistry, NCERT.
b. Experiments in Applied Chemistry, Sunita Rattan, S.K. Kataria and Sons Publications.
c. Elementary Practical Chemistry by G.D. Sharma and Arun Baht.
d. Elements of Practical chemistry by Sudarsan Barua, S. Chand & Co.
e. Senior Secondary Practical Chemistry, Dr. Kamalesh Choudhury& Dr. Satyendra Kumar Choudhury, Bina Library

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9. Course Title: Sports and Yoga

Course Code	:	HS-103
Course Title	:	Sports and Yoga
Number of Credits	:	1(L:0, T:0, P:2)
Prerequisites	:	NIL
Course Category	:	HS

Course Objectives:

- To make the students understand the importance of sound health and fitness principles as they relate to better health.
- To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, health and fitness.
- To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.

Course Outcomes:

On successful completion of the course the students will be able to:

(i) Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.

(ii) Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.

(iii) Learn breathing exercises and healthy fitness activities.

(iv) Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.

(v) Perform yoga movements in various combination and forms.

Course Content:

- **Physical Fitness, Wellness & Lifestyle**
  - 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
- **Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga**
  - Define Anatomy, Physiology & Its Importance
  - Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)
- **Postures**
  - 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.
- Corrective Measures for Postural Deformities

- **Yoga**
  - 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

- **Yoga & Lifestyle**
  - Asanas as preventive measures.
  - Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana.
  - Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana.
  - Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana.
  - Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana.
  - Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

- **Psychology & Sports**
  - Definition & Importance of Psychology in Physical Edu. & Sports
  - Define & Differentiate Between Growth & Development
  - Adolescent Problems & Their Management
  - 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

References:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light On Yoga by B.K.S. Iyengar.
3. Health and Physical Education–NCERT(11^{th} and 12^{th} Classes)

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10. Course Title: Communication Skills in English Lab

Course Title	Communication Skills in English - Lab
Course Code	HS 105
Prerequisites	Class X
Number of Credits	1 (L:0, T:0. P:2)

RATIONALE

Effective Spoken English is indispensible for any career in the global market. This course introduces the science of the spoken language through a guided Language Lab program which works on pronunciation of English from the word level to the sentence level and finally to the Discourse Level. This course will enhance the personality of the diploma student and better prepare him/her to face the challenges of the competitive market.

COURSE OBJECTIVES

This course aims at helping students to attain the following

1. **To equip the students with good communication skills.**
2. **To emphasize the need of English in the technical world.**
3. **To prepare them for interviews and future job environments.**
4. **To train the students in the art of conversation and discussion.**

COURSE OUTCOME

This course aims at helping the students to attain the following industry identified competencies through various teaching learning experiences:

1. CO1 = The student will be able to identify common errors in spoken and written communication
2. CO2 = The student will be able to pronounce words in English with fluency with confidence
3. CO3 = The student will have a better word stock from the Entry Level

Teaching Scheme (in hours) Lecture Tutorial/Class Test Practical Total

Lectures	Tutorial	Practical	Credits
0	0	3	1.5

Course Content:

UNIT 1 - Listening Skills Listening Process and Practice				
Chapter No.	**Chapter Title**	**Chapter Content**	**Intended Learning Outcome**	**Duration in Hours**
1.	Phonetic Definitions	Introduce the definitions of important terms in phonetics viz.	The student will be able to recognise	**1**

	and Vocabulary formation	phonetics, syllable, accent, transcription, articulators, phoneme, allophone, aspiration	phonemes, allophones, syllables, accent etc.	
2.	Important concepts	Introduce the consonants, vowels and diphthongs	The students will be able to recognise the consonants, the vowels and the diphthongs	**1**
3.	Basics of Phonetics	Basic idea of use of Phonemes, word stress, sentence stress	The students will be able to identify the phonemes in passages and sentences. The students will also have an idea of word stress and sentence stress in isolation and in context	**1**
4.	Stress and Intonation	Definition of Intonation Voice modulation with an idea of stress, tones in the English language Use of different tones in different situations – focus of change in meaning	The student will be able to introduce intonation in speech and use tones for change in meaning of sentences	1

UNIT 2: Listening Skills, Listening Process and Practice				
Chapter No	Chapter name	Chapter content	**Intended Learning Outcome**	**Duration in hours**
1.	Phonemes and allophones in isolation	Introduction to Phonemes and allophones in isolation and listening self tests of the same	The student will be able to identify the different phonemes in allophones in the English language and also produce the same	4
2.	Phonemes in sentences and listening	Introduction to Phonemes in sentences and listening self tests of the same	The student will be able to identify the phonemes in sentences and produce them	4
3.	Phonemes in context	Introduction to phonemes in sentences and listening self	The student will be able to identify	3

		tests of the same	and produce the phonemes in sentences	
4.	Recorded lectures, poems, interviews and speeches	Introduction to phonetically correct recorded lectures, poems, interviews and speeches	The student will be able to recognise the differences between a phonetically correct conversation and a normal conversation	3
5.	Dialogues and passages	Introduction of phonetically correct dialogues and passages and listening self-tests	The student will be able to produce effective dialogues and passages in real life situations	2
6.	Role plays	The student will be given real life situation role plays	The student will be able to use the knowledge gained from language lab classes and listening tests to role play in real life situations	5
7.	Basic Interview skills with respect to spoken English **Springboard** 1. **INTERVIEW QUESTIONS** TOC - INTERVIEW QUESTIONS | Infosys Springboard (onwingspan.com) 2. Interview questions TOC - Interview Questions | Infosys Springboard (onwingspan.com) 3. Cracking Interviews TOC - Cracking Interviews | Infosys Springboard (onwingspan.com)	The student will be introduced to basic interview skills – facing an interview	The student will be able to face an interview and interact with the peers in a more confident manner with the proper and effective use of the English language	5

8.	Springboard Better Spoken – Introduction TOC - Better Spoken - Introduction | Infosys Springboard (onwingspan.com)	The student will get a video presentation of the entire concept of spoken English in general	The student will be able to know the basics of ideas surrounding spoken English in general.	50 mins
9.	Springboard **Stage Manners** Stage Manners - Viewer Page | Infosys Springboard (onwingspan.com)	The student will get an idea of how to present oneself in a presentation following 4 criteria	The student will be able to know about proper presentations with grooming and dress, eye contact, body language with proper voice modulation.	50 mins
10.	Springboard Interview 01 Introduction - Viewer Page | Infosys Springboard (onwingspan.com)	The student will get an idea on how to attend an interview	The student will be able to attend an interview with full preparation	25 mins
11.	Project Work	The student will have to work on project of a given topic as a part fulfillment of the course in English language lab	The students will be able to work together in a group, draft a script and confidently present the same on individual terms.	5

Prescribed Book:

A Handbook on Communication Skills in English and Language Lab for Polytechnics *by* Dr Papori Rani Barooah

An Outline of English Phonetics by Daniel Jones

English Pronouncing Dictionary 14th Edition by Daniel Jones References from Springboard

1. Job Interviews Tips and Skills
   TOC - Job Interviews Tips and Skills | Infosys Springboard (onwingspan.com)

2. **Using Business Etiquette to Increase Your Professionalism**

   TOC - Using Business Etiquette to Increase Your Professionalism | Infosys Springboard

   (onwingspan.com)

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3	Dr. Mrinalini Das	Controller of Examinations, State Council for Technical Education, DTE, Assam
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