

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

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**FINAL DRAFT SYLLABUS OF 2<sup>nd</sup> SEMESTER**

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# 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:

Sl. 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 /oremerging 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

**INDUCTION PROGRAM**

Please refer Appendix IV for guidelines.

The Essence and Details of Induction program can also be understood from the 'Detailed Guide on Student Induction program', as available on AICTE Portal, although that is for UG students of Engineering & Technology (Link:<https://www.aicteindia.org/sites/default/files/Detailed%20Guide%20on%20Student%20Induction%20program.pdf>).

<b>Induction program (mandatory)</b>	<b>Two-week duration</b>
Induction program for students to be offered right at the start of the first year.	Physical activity Creative Arts Universal Human Values Literary Proficiency Modules Lectures by Eminent People Visits to local Areas Familiarization to Dept./Branch & Innovations

**F. Mandatory Visits/Workshop/Expert Lectures:**

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

**G. Evaluation Scheme for 1<sup>st</sup> 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.

### H. 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
91-100	AA/A <sup>+</sup>
81-90	AB/A
71-80	BB/B <sup>+</sup>
61-70	BC/B
51-60	CC/C <sup>+</sup>
46-50	CD/C
40-45	DD/D
< 40	FF/F (Fail due to less marks)
-	F <sup>R</sup> (Fail due to shortage of attendance and therefore, to repeat the course)

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

#### a) Credit Distribution:

#### Semester-II

S. No.	Course Code	Course Title	L	T	P	Credit
1	BS-201	Mathematics-II	3	1	0	4
2	BS-202	Applied Physics-II	2	1	0	3
3	ES-202	Introduction to IT Systems	2	0	0	2
4	ES-204	Fundamentals of Electrical and Electronics Engineering	2	1	0	3
5	ES-206	Engineering Mechanics	2	1	0	3
6	BS-207	Applied Physics Lab– II	0	0	2	1
7	ES-208	Introduction to IT Systems lab	0	0	4	2
8	ES-209	Fundamentals of Electrical and Electronics Engineering lab	0	0	2	1
9	ES-210	Engineering Mechanics lab	0	0	2	1
10	AU-201	Environmental Science	2	0	0	0
TOTAL CREDIT=						20
Total Hours per week = 27						[L=13; T=4; P=10]



## b) Marks Distribution

Semester – II

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-201	Mathematics-II	40	16	60	24	-	-	-	-	100	40
2	BS-202	Applied Physics-II	40	16	60	24	-	-	-	-	100	40
3	ES-202	Introduction to IT Systems	40	16	60	24	-	-	-	-	100	40
4	ES-204	Fundamentals of Electrical and Electronics Engineering	40	16	60	24	-	-	-	-	100	40
5	ES-206	Engineering Mechanics	40	16	60	24	-	-	-	-	100	40
6	BS-207	Applied Physics Lab– II	-	-	-	-	60	24	40	16	100	40
7	ES-208	Introduction to IT Systems lab	-	-	-	-	60	24	40	16	100	40
8	ES-209	Fundamentals of Electrical and Electronics Engineering lab	-	-	-	-	60	24	40	16	100	40
9	ES-210	Engineering Mechanics lab	-	-	-	-	60	24	40	16	100	40
10	AU-201	Environmental Science	-	-	-	-	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	<b>40</b>

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)**

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

- d) Grading System proposed is Absolute Grading System.
- e) Conversion factor from Cumulative Grade Point Average (CGPA) to Percentage (%) is 10.



# **Detailed Second Semester Curriculum Contents (Common to all Branches)**

# 1. Course Title: Mathematics-II

1. **SUBJECT/ COURSE CODE: BS-201**

2. **Semester: Second semester**

3. **Objectives:** The main objectives of this course are:

- i) To learn about the circle and conic section.
- ii) To learn about the three dimensional Co-ordinate geometry.
- iii) To learn about measures of central tendency of statistical Data.
- iv) To learn about relations and functions of variables and their derivatives.
- v) To learn about integration methods and its applications for measuring areas.

4. **Course Outcome:** On completion of the course, students will be able to

CO -1. Recognise and differentiate between closed and open curves under different conditions

CO -2. Locate and object in space and calculate its distance with reference to other objects.

CO - 3. Understand several numerical methods belonging to measure of central tendency to describe the characteristics of a data set.

CO – 4. Obtain Derivative of a function and its application.

CO- 5. Obtain Integration of a function and its application using properties of Definite Integral.

5. **Teaching scheme(in hours):**

Teaching scheme(in hours)		
Lecture	Tutorial	Total per week
3	1	4

6. **Detailed course content:**

Chapter No	Chapter Title	contents	Intended learning outcomes	Hour (Theory)
Group - A : <b>CO-ORDINATE GEOMETRY ( TWO and three DIMENSION)</b> Hours: 8 Marks: 10				
A1	<b>Co-Ordinate geometry of two dimensions</b>	1.1 Circle: Standard equation , Equation of a circle under different conditions. Introduction to the concepts of Parabola , Ellipse	1. Define and explain the concept of a circle. 2. Define conic section.	5

		and hyperbola (related simple problems)		
A2	<b>Co-Ordinate geometry of three dimensions</b>	<b>2.1 Three dimensions Co- Ordinate system . Distance formulae, Section formulae, direction cosines, direction ratios.</b>	Locate a point in space , find its locus, distance from other points , objects(linear as well as angular)	3
<b>GROUP- B Statistics</b> <b>HOURS : 4      MARKS : 5</b>				
B1	Measure of Central Tendency .	Mean,    Median and        Mode. (simple problems.) Relation between mean median and Mode.	Understand Basic measures of Central Tendency.	4
<b>GROUP- C DIFFERENTIAL CALCULUS</b> <b>HOURS : 19      MARKS : 25</b>				
C1	<b>Function</b>	1.1. Definition of Function and type of functions. Odd and even function , Periodic , composite , explicit , implicit and Parametric functions .  1.2. Domain , Range, and co- domain of function .	Understand the different type of functions and their . Domain and Range.	3
C2	Limit of a function	2.1. Definition , standard limits .  2.2. Evaluation of limits.	Understand Limit of a function under different conditions.	3
C3	Continuity of a function .	3.1. Definition , testing of continuity problems .	Learn behaviour of continuous and discontinuous functions .	2
C4	Differentiation or Derivative of a function.	4.1. Differentiation of some Standard	1. Understand the meaning of	3

		<p>functions using first Principle of derivative.</p> <p>4.2. Derivative of function of a function, implicit function and Parametric functions . Engineering application problems.</p> <p>4.3. Geometrical interpretation of first order derivative . Equation of Tangent, normal.</p> <p>4.4. Second order derivative. Maxima, Minima , Engineering application of Second order derivative .</p>	<p>differentiation.</p> <p>2. Learn to obtain derivatives of different type of functions.</p> <p>3. Understand the Geometrical significance of derivatives.</p> <p>4. Learn to find higher order Derivative and their application.</p>	<p>3</p> <p>2</p> <p>3</p>
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**GROUP- D INTEGRAL CALCULUS**  
**HOURS : 14      MARKS : 20**

D1	INTEGRATION	1.1 Integration as inverse process of differentiation . List of formulae .	Understand the meaning of integration .	2
D2	Method of Integration	2.1. Integration by method of substitution . 2.2. Integration by parts . 2.3. Integration by algebraic fractions.	Learn the different methods of integration.	5
D3	Definite Integral	3.1 Definition, Fundamental theorem on Definite Integral. Properties of Definite Integral . 3.2. Evaluation of Definite Integrals using fundamental laws and properties .	Learn and apply different properties of Definite Integral to solve problems .	5
D4	Application of	4.1. Area under	Know the	2

	Integration	curve .	application of Definite Integral .	
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**7 . Distribution of Marks :**

Chapter no.	Chapter Title	Type of question			Total
		Objective Type	Short questions	Descriptive questions	
A1	<b>Co-Ordinate geometry of two dimensions</b>	1	2	3	
A2	<b>Co-Ordinate geometry of three dimensions</b>	1	.....	3	
B1	Measure of Central Tendency .	2	.....	3	
C1	Functions	2	2	.....	
C2	Limit of a function	2	.....	3+3	
C3	Continuity of a function .	1	2	.....	
C4	Differentiation or Derivative of a function.	2	2	3+3+3	
D1	Integration	1	.....	.....	
D2	Method of Integration	2	2	3	
D3	Definite Integral	1	2	3	
D4	Application of Integration	.....	.....	3	
		15	12	33	60

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

10. Suggested learning resources :

**4. Text Books (T1, T2):**

1. An Introduction to Polytechnic Mathematics Vol- II by Geetali Das , Ajanta Choudhury, Parbin Ahmed.
2. Engineering mathematics by H.K Das .
3. Applied Mathematics (Vol I & II) by RD Sharma.
4. Calculus for beginners by R.K Chakravorty .

## Annexure – 1

**TABLE OF SPECIFICATION FOR THEORY:**

Sr. no	Topic (a)	Time allotted in hours (b)	Percentage weightage(c)	k	C	A	HA
1	<b>CO-ORDINATE GEOMETRY ( TWO and</b>	8	17.8%	2	2	6	

	<b>three DIMENSION)</b>						
2	<b>Statistics</b>	4	8.9%	2	...	3	
3	<b>DIFFERENTIAL CALCULUS</b>	19	42.2%	7	6	15	
4	<b>INTEGRAL CALCULUS</b>	14	31.1%	4	4	9	
	Total	45	100	15	12	33	

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-II

1. Course Title: Applied Physics - II
2. Course code: BS-202
3. Prerequisites: High School Level Physics
4. **Rationale of the subject:** Physics is a foundation of all core technology subjects. Study of Physics is essential for Diploma holders in engineering and technology to develop in them proper understanding of physical phenomenon, scientific temper and engineering aptitude. Curriculum of Applied Physics includes fundamental concepts used in industrial applications. So, physics is taught in the 1<sup>st</sup> and 2<sup>nd</sup> semester in all disciplines of Diploma Engineering.
5. **LEARNERS OBJECTIVES:** After completion of the course learners will be able to:
  - a) learn and understand different physical quantities.
  - b) learn and understand different laws of light, magnetism,
  - c) understand about properties of matter, transmission of heat, wave and oscillation,
  - d) learn about photo electric effect, radioactivity, X-ray and laser.
  - e) tackle engineering problems in their chosen area of application.
6. **Course outcome:** After completion of the course, students will be able to:
 

C.O.1: apply core concept in materials like properties of matter, heat transmission etc. for different engineering tasks.

C.O.2: identify different factors affecting acoustical planning of building.

C.O.3. understand the laws of light and apply the knowledge of total internal reflection to comprehend the principle and working of Optical Fiber.

C.O.4. understand and apply the core concept of magnetism.

C.O.5: use the properties of laser, X-rays, Becquerel rays and photoelectric effect for various Engineering applications.

### 7. Teaching Scheme (in hours):

Theory			Practical	Total
<b>Lectures</b>	<b>Tutorial</b>	<b>Class Test</b>	<b>30</b>	93
30	30	<b>3</b>		

### 8. Teaching scheme (in hours)/ week

Lectures	Tutorial	Practical	Credit point
2	1	0	3

### 9. Examination Scheme:

Theory				Practical				Total Marks
Examination		Sessional		Practical Exam		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	

**10. DETAILED COURSE CONTENTS:**

Chapter	Title of Chapter	Topics and Sub-topics	Teaching Hours	Marks
1	PROPERTIES OF MATTER	<p>1.1 Elasticity, definition of deforming force, restoring force, Elastic and plastic body stress and strain and their types, modulus of elasticity (Young's modulus, Bulk modulus and Rigidity modulus) and their units; Hooke's law, significance of stress-strain curve. (numerical problems)</p> <p>1.2 Definition of thrust, pressure and their units, pressure inside a liquid, Pascal's law of transmission of liquid pressure and its application to Hydraulic press and Hydraulic brakes. Buoyancy, Archimedes principle, density and specific gravity (relative density) their relation. Determination of Specific gravity, numerical problems.</p> <p>1.3 Surface Tension: Definition and its units, Viscosity: Definition, coefficient of viscosity and its unit.</p>	4	9
2	WAVE AND OSCILLATION	<p>2.1: Periodic motion, oscillatory motion, Definition of Simple harmonic Motion, Its geometrical representations, Expression for amplitude, velocity, acceleration, time period, frequency etc. Simple Pendulum, expression for its time (derivation not required),</p>		



		<p>second's pendulum. Free and forced vibrations, Resonance.</p> <p>2.2: Wave motion, Characteristics, Types of wave motions (longitudinal and transverse waves) with examples, Definitions of parameters related to wave motion (time period, frequency, amplitude, wavelength, wave velocity) and their relations.</p> <p>Stationary wave, properties of stationary wave, Difference between progressive and stationary wave.</p> <p>2.3. Propagation of sound, Newton's formula velocity of sound in air and Laplace's correction, factors affecting velocity of sound in air.</p> <p>2.4. Audible range, ultrasonic and infrasonic sound, application of ultrasonic to calculate the depth of an ocean.</p> <p>2.5. Reflection of sound, echo, minimum distance of the reflector to produce echo, reverberation, reverberation time, Sabine's law, acoustic requirements of a good auditorium. Doppler's effect (details not required)</p>	6	10
3	<b>LIGHT</b>	<p>3.1: Recapitulation of laws of light (Reflection and refraction of light), idea of real and virtual image, reflection from plane mirror and spherical mirror, mirror formula, (mirror formula to be assumed), sign convention, ray diagram, nature, position and size of images for different positions of object.</p> <p>Applications of mirrors.</p> <p>Refractive index, apparent depth, critical angle, total internal</p>	6	10

		<p>reflection, relation between critical angle and refractive index,</p> <p>3.2: Optical Fiber: Introduction, Basic principle of optical fibre, structure and classification, acceptance angle and numerical aperture, applications of optical fibres.</p> <p>3.3: Refraction through prism, minimum deviation. Relation between R.I. and angle of minimum deviation, numerical.</p> <p>3.4: Refraction through lens, lens formula (to be assumed), sign convention, magnification, nature, position and size of images for different positions of object, power of a lens, numerical.</p> <p>Optical instruments: Telescope (Terrestrial and Astronomical), magnifying power.</p>		
4	<b>MAGNETISM</b>	<p>4.1: Recapitulation of magnetism, properties of magnet, magnetic field, and magnetic lines of force, theory of magnetism, induced magnetism, properties of magnetic lines of force.</p> <p>4.2: Inverse Square law of magnetism, its explanation with mathematical expression, permeability, types of substances (paramagnetic, diamagnetic and ferromagnetic), magnetic potential &amp; magnetic intensity, calculation of magnetic intensity due to a dipole on end-on &amp; broad-side on position, magnetic moment, couple on a magnet in a uniform magnetic field,</p>	3	<b>8</b>

		<p>Tangent law and its mathematical expression, Deflection Magnetometer.</p> <p>4.3: Terrestrial magnetism, elements of terrestrial magnetism, explanation of declination, dip/inclination, and horizontal component of earth's magnetic field.</p>		
5	<b>MODERN PHYSICS</b>	<p>5.1. Photo Electric Emission: Planks quantum theory, photo electric effect, Characteristics of photoelectrons, Einstein Photo Electric equation, Photo electric cells (Photo emissive cell, Photo-Conductive cell and photo voltaic cell) and its applications</p> <p>5.2. Radioactivity, Becquerel Rays, Binding Energy and Mass Defect, natural and artificial radioactivity, Radioactive Disintegration, Applications of radioactivity (nuclear fission, nuclear fusion, and nuclear fuel)</p> <p>5.3.X-rays, properties, application in industry and medical field (Production apparatus not necessary).</p> <p>5.4. LASER, Stimulated or induced absorption, spontaneous and stimulated or induced emission, principle of laser, metastable state, population inversion and pumping, components of laser, Properties of laser, different types of lasers (details not required), applications of laser.</p>	4	9
		<p>6.1: Concept of heat and temperature and their units, heat capacity, specific heat, water equivalent; Principle of calorimetry, measurement of specific heat of a substance. (numerical problems)</p>		

6	HEAT AND THERMODYNAMICS	<p>6.2: Different scales of temperature measurement, their relationship and numerical examples, thermometers (Mercury thermometer, Platinum resistance thermometer &amp; Pyrometer) basic idea.</p> <p>6.3: Modes of heat transfer (conduction, convection, and radiation with examples), thermal conductivity, its unit.</p> <p>6.4: Change of state of a body, Fusion/melting, laws of fusion, effect of pressure on melting point, Regelation, Vaporization, boiling point, Laws of ebullition, latent heat, numerical problems. Evaporation, difference between vaporization and evaporation, factors on which rate of evaporation depend.</p> <p>6.5: Expansion of solids, liquids and gases; coefficient of linear, areal and cubical expansions and relation amongst them (deduction not required), expansion of liquid, co-efficient of real and apparent expansion, Anomalous expansion of water (experiment determination not necessary). Expansion of gases, gas laws, Boyle's law, verification of Boyle's law</p> <p>6.6: Thermodynamic system, Zeroth law of thermodynamics, Thermal equilibrium, Concept of heat; internal energy, First</p>	6	12
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		and Second law of thermodynamics significances and limitations, basic idea of heat engines.		
7	Nano physics	7.1. Introduction to nanomaterial, nature and types of nanomaterials and their applications.	1	2

**11. Distribution of Marks:**

Chapter No.	Chapter Title	Hours	Type of Question			Total Marks
			Objective type Compulsory	Short Question	Descriptive Question/numerical	
1	Properties of matter	4	3	2	4	9
2	Wave and Oscillations	6	3	1	6	10
3	LIGHT	6	2	2	6	10
4	MAGNETISM	3	2	2	4	8
5	MODERN PHYSICS	4	2	2	5	9
6	Heat and Thermodynamics	6	2	3	7	12
7	Nano physics	1	1	1	-	2
TOTAL:		30	15	13	32	60

**12. DETAILED TABLE OF SPECIFICATIONS FOR THEORY**

N O. Sr.	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE				
		K	C	A	T	K	C	A	HA	T	K	C	A	H A	T
1	Properties of matter	1	1	1	3	1	1	-	-	2	1	1	2	-	4
2	Wave and Oscillations	1	1	1	3	-	-	1	-	1	2	1	3	-	6
3	LIGHT	1	1	-	2	1	-	1	-	2	1	2	3	-	6
4	MAGNETISM	1	1	-	2	1	-	1	-	2	1	1	2	-	4
5	MODERN PHYSICS	1	-	1	2	1	1	-	-	2	1	1	2	-	4
6	Heat and Thermodynamics	1	-	1	2	1	1	1	-	3	2	2	3	-	7
7	Nano physics	1	-	-	1	-	-	1	-	1	-	-	-	-	-



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

### 13. TABLE OF SPECIFICATIONS FOR THEORY

Sl. No:	Topics (a)	Time allotted in hours (b)	Percentage Weightage (c) %	K	C	A	HA
1	Properties of matter	4	13.33	4	3	3	
2	Wave and Oscillations	6	20	2	2	5	
3	LIGHT	6	20	3	3	4	
4	MAGNETISM	3	10	3	2	3	
5	MODERN PHYSICS	4	13.33	3	3	3	
6	Heat and Thermodynamics	6	20	4	3	5	
7	Nano physics	1	3.33	1	-	1	
TOTAL		30 □ b	100%	20	16	24	

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

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## 3. Course Title: Introduction to IT Systems

### Course Title - Introduction to IT Systems

Course Code : ES - 202

Credits- 2 (L: 2, T: 0, P: 0)

### Course Objectives:

- This course is intended to make new students comfortable with computing environment
- Learning basic computer skills
- Learning basic application software tools
- Understanding Computer Hard-ware and Cyber security awareness

### Course outcomes (Theory):

At the end of the course student will be able to :

CO 1 Explain the basic components and functions of computer hardware and software.

CO 2 Solve problems related to number systems.

CO 3 Work on computer with ease.

CO 4 Protect information and computer from basic abuses/attack

### Detailed Course Content

Unit	Unit Title	Content	Hours
I	Introduction to computer systems:	Definition of Computer System, Block Diagram of Computer System. Component of Computer System - Hardware and Software. Hardware components – CPU, Memory (types), Display Units (types), Key-board, Mouse, HDD, SSD and other Peripheral Devices. Software: Types of Software – Application Software, System Software and Utilities Software. Overview of Operating Systems - What is an OS? OS Functions, Brief history on Evolution of OS. Types of OS. OS Processing – (Batch, Multi-programming, Multitasking, Real-time, Timesharing), Operating System Structures. OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.	7
II	Basics of Number system and codes	Binary, octal, hexadecimal and decimal Number systems and their inter conversion, Different types of Codes - BCD Code, gray code, ASCII code, EBCDIC codes, Unicode, ISCII.	4
III	Basic Internet skills	Understanding browser, types and efficient use of search engines, IP address, http, https, Cookies, how to delete browser data, downloads, emails and Awareness about Digital India portals (state and national portals) and college portals.	3

IV	HTML 4, CSS and Scripting basics	<p>HTML – Introduction □ HTML – Elements □ HTML – Tags □ HTML – Text □ HTML – Formatting □ HTML – Pre □ HTML – Attributes □ HTML – Font □ HTML – Text Links □ HTML – Comments □ HTML – Lists □ HTML – Images □ HTML Image Links □ HTML – Tables □ HTML – Bgcolor □ HTML – Color Codes □ HTML Color Chart □ HTML – Background □ Web Forms □ HTML – Forms □ HTML – Input □ HTML – Text Fields □ Hidden Fields □ HTML – Password □ HTML – Reset HTML – Submit □ HTML – Checkboxes □ HTML – Radio □ HTML – Select □ HTML – Hidden Fields □ HTML – Upload □ HTML – Textarea □ Special Tags □ HTML – Body □ HTML – Meta □ HTML – Style □ HTML – Div □ HTML – Layouts □ HTML – Frames □ Formatting Tags □ HTML – Bold □ HTML – Paragraphs □ HTML – Headings □ HTML – Line Breaks</p> <p>CSS: CSS Introduction □ CSS Syntax □ CSS Id &amp; Class □ CSS Styling □ Styling Backgrounds □ Styling Text □ Styling Fonts □ Styling Links □ Styling Lists Styling Tables □ CSS Border □ CSS Margin □ CSS Display □ CSS Positioning □ CSS Align □ CSS Types - Inline, Internal and External.</p> <p>Brief Introduction to JavaScript □ JavaScript Syntax and data □ Type of JavaScript Embedding Script In HTML File □ Validation of HTML forms. Making Personal Homepage/ Webpage.</p>	7
V	Office Tools	<p>OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress. MS Office Tools: Introduction to Word – Page setup, Table, Insertion of Pictures, Page Layout, Bullets, Insertion of objects and symbols, Header, Footer, Page Number, etc., Excel- Cell, format cell properties, formula, sort and filters chart, pivot table, etc. , Power Point – Addition and Deletion of Slides, Design, Animation, Slide Show etc.</p>	3



VI	Information security best practices	What is Information Security & Why do you need it? – Basics Principles of Confidentiality, Integrity and Availability Concepts, Policies, procedures, Guidelines, Standards Administrative Measures and Technical Measures, People, Process, Technology. Threats to Cybersecurity - Viruses, Worms, Phishing, Malware, Trojans, Spyware, Adware, Rootkits, Email hijacking. Methods to protect your personal computers – What is Antivirus? Types of Antivirus. Firewalls.	6
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### Teaching Scheme

Teaching Scheme		
Lecture	Tutorial	Total
2	-	2

Total No. Of classes	30
Lecture	30
Tutorial	-

### Assessment Scheme

	Internal	ESE	Total
Full Marks	40	60	100
Pass Marks	16	24	40

### Distribution of marks

Unit No.	Unit Title	Type of Question			Total marks
		Objective	Short	Descriptive	
I	Introduction to computer systems	4	5	5	14
II	Basics of Number system and codes	2	2	4	08
III	Basic Internet skills	1	2	3	06
IV	HTML 4, CSS and Scripting basics	4	5	5	14
V	Office Tools	1	2	3	06
VI	Information security best practices	3	4	5	12
	Total	15	20	25	60

**References:**

- R.S. Salaria, Computer Fundamentals, Khanna Publishing House
- Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House
- Online Resources, Linux man pages, Wikipedia
- Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett.

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## 4. Course Title: Fundamentals of Electrical and Electronics Engineering

Course Code	:	ES-204
Course Title	:	Fundamentals of Electrical and Electronics Engineering
Number of Credits	:	3 (L: 2, T: 1, P: 0)
Prerequisites	:	NIL
Course Category	:	ES

### **Aim:**

To provide students with foundational knowledge of electrical and electronic principles, essential components, and circuit analysis techniques, enabling them to understand, design, and troubleshoot basic systems, and preparing them for advanced studies in engineering.

### **Course Objectives:**

To provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.

### **COURSE OUT COME (CO):**

#### **On completion of the course, the student will be able to:**

- CO<sub>1</sub> - To provide basic knowledge of current, voltage, insulator, conductor, Diodes, Transistors, FET, MOS and CMOS etc.
- CO<sub>2</sub> - to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications.
- CO<sub>3</sub> - To learn basics of Digital Electronics and their applications
- CO<sub>4</sub> - To learn basics of Electric and Magnetic circuits.
- CO<sub>5</sub> - Explain briefly the alternating current and R-L, R\_C and R-L-C circuits.
- CO<sub>6</sub> - Explain briefly about transformer and DC machines
- CO<sub>7</sub> - Explain the use of semiconductor and transistor and its applications.
- CO<sub>8</sub> - Guide house wiring.

**Course Content:**

Chapter No.	Chapter Title	Course Content	Duration Hours
1	Overview of Electrical and Electronic Components & Signals	Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources. Signals: periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms.	06
2	Overview of Analog Circuits	Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.	04
3	Overview of Digital Electronics	Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach, Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).	05
4	Electric and Magnetic Circuits	EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.	06
5	AC circuit	Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits; Power in A. C. Circuits, power triangle.	06
6	Transformer and Machines	General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations and characteristic of DC motors.	05
7	Semiconductor	Definition of semiconductor, energy band diagram, intrinsic and extrinsic semiconductor, doping, P-type, N-type semiconductor, PN junction diode, forward and reverse biased diode,	06

		diode characteristics, application of PN junction diode like Half-wave, Full-Wave rectifier. Transistor: Physical construction of bipolar PNP and NPN transistor, biasing circuit configuration (CE, CB, CC). Application of transistor as an amplifier.	
8	House wiring	Introduction to house wiring, Methods of house wiring, Safety and precautions measures against electrical hazard.	04
9	Class Test		03

### Distribution of Marks/ Table of specifications

#### TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	HA
1	Overview of Electrical and Electronic Components & Signals	6	14	4	2	1	
2	Overview of Analog Circuits	4	9	4	2	0	
3	Overview of Digital Electronics	5	11	4	0	0	
4	Electric and Magnetic Circuits	6	13	3	1	0	
5	AC circuit	6	13	3	1	4	
6	Transformer and Machines	5	11	5	3	3	
7	Semiconductor	6	13	5	2	4	
8	House wiring	4	9	4	0	5	
9	Class test	3	7				
	<b>Total</b>	□ b=45	100	32	11	17	

K = Knowledge      C = Comprehension

A = Application

HA = Higher Than Application (Analysis, Synthesis, Evaluation)

#### Detailed Table of Specification for Theory

Sr. No	Topic (a)	Objective Type				Short Answer Type					Long Answer Type					
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T	
1	Overview of Electrical and Electronic Components & Signals	2	1		3	2	1			3	3					3

2	Overview of Analog Circuits	1			1	2	1			3	3				3
3	Overview of Digital Electronics	1			1	2				2	4				4
4	Electric and Magnetic Circuits	1			1	1				1	3				3
5	AC circuit	1		1	2	1		1		2			4		4
6	Transformer and Machines	1	1		2	1	1			2		3			3
7	Semiconductor	1	1	1	3	1		1		2			4		4
8	House wiring	1		1	2	1		1		2			4		4
	<b>Total</b>				<b>15</b>					17					28

K = Knowledge

C = Comprehension

A = Application

HA = Higher Than Application (Analysis, Synthesis, Evaluation)

T = Total

- N.B.:-
1. The question pattern will be as per the instruction of SCTE or as per existing rules.
  2. The objective type questions may be in the form of multiple choice, fill up the blanks, write in one sentence and match the following type.

Suggested Implementation Strategies: - Teacher will use Black board, OHP, LCD Projector, Smart board, Video etc for effective teaching learning process.

### References:

1. Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
4. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN:9788121924405
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN:9788121924375
6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi,



2015, ISBN : 97881236529513

7. Sedha, R.S., A text book of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978-8121927833
8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015,ISBN-13: 0070634244-978
9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014,ISBN-13-9788121924504
10. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239

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## 5. Course Title: Engineering Mechanics

Course Code	ES - 206				
Category	Engineering Science Course				
Course Title	Engineering Mechanics				
Scheme and Credits	L	T	P	Credits, C	Semester-II
	2	1	0	3	
Pre-requisites (if any)	Physics, Mathematics, Engineering Drawing				

### LEARNING OBJECTIVES:

At the end of the lessons the students will be able to:

LO1	Calculate magnitude and direction of the resultant of coplanar concurrent and non-concurrent forces applying parallelogram law, method of resolution of force.
LO2	Establish triangle law of force, polygon law of force by the aid of Bow's notation, space diagram, vector diagram for calculating graphically magnitude and direction of coplanar concurrent and non concurrent forces.
LO3	Compute moment, couple and find the position of the resultant force analytically by applying Varignon's theorem for coplanar concurrent and non-concurrent forces and graphically for parallel forces.
LO4	Construct free body diagram of a body to compute equilibrant, individual forces for a system of coplanar concurrent and non-concurrent forces analytically and graphically by applying the Lami's theorem, algebraic conditions of equilibrium
LO5	Determine support reactions of simply supported beam with vertical point load, inclined point load, uniformly distributed load and uniformly varying load by analytical and graphical methods.
LO6	Examine truss with the aid of method of section, method of joints and graphical method.
LO7	Compute centroid and centre of gravity of plane lamina, composite sections of not more than three geometrical figures and composite solids of not more than two simple solids.
LO8	Compute moment of inertia of simple geometrical figure and composite sections, section



	modulus, radius of gyration by applying general formula, method of integration, theorem of parallel and perpendicular axis.
LO9	Determine friction, co-efficient of friction and employ Coulomb's law of friction to study equilibrium of a body on a rough horizontal plane, rough inclined plane, ladder friction and wedge friction
LO10	Establish the law of machine and compute reversibility, irreversibility, M.A, V.R and efficiency of various simple lifting machines.

### **COURSE OUTCOMES:**

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

CO1	Solve simple engineering problems by making use of the concepts and principles of statics as applied to coplanar concurrent, non-concurrent and parallel forces and force system.
CO2	Solve simple problems on equilibrium of a body, static friction, ladder friction and wedge friction under the influence of coplanar concurrent and non-concurrent forces as applicable by utilizing the concepts of free body diagram, Lami's theorem, algebraic conditions of equilibrium, Coulomb's law of friction or suitable principles of statics.
CO3	Analyze a truss by applying method of joints and section and also calculate support reactions of a beam subjected to various load conditions.
CO4	Identify the centroid or centre of gravity of simple and composite plane lamina or solids and calculate the moment of inertia of simple and composite plane lamina by applying suitable methods, law, principles and theorems.
CO5	Apply the concepts and principles of lifting machine in solving problems related to simple machines, law of machine and simple lifting machines.

### **Detailed Syllabus:**

Units	Detailed Contents	Contact Hour
UNIT-I	Force vector representation, System of a force, Principle of Transmissibility, Resolution and compounding of forces, Resultant of coplanar-concurrent forces (Parallelogram law of	5

	forces, Principle of resolved parts ,Triangle law of forces and Polygon law of forces), Resultant of coplanar non-concurrent forces and parallel forces (analytical and graphical method), Bow's notation, Space diagram, Vector diagram, Funicular polygon or string polygon, Moment of force, graphical representation of moment, Varignon's theorem-law of moments, Principle of moments, Simple lever, Couple, Properties of couple (simple numerical problems from UNIT-I)	
UNIT-II	Equilibrium, Free body diagram, equilibrant, Relation between resultant and equilibrant , Algebraic conditions of equilibrium (force law of equilibrium and moment law of equilibrium), Principles of force equilibrium- Two force, Three force and Four force principle, Equilibrium of coplanar concurrent and non concurrent force system- analytical and graphical method of analysing equilibrium, Lami's theorem and its application for various engineering problems ,	4
UNIT-III	Types of beams (Simple, Cantilever, Propped cantilever, Fixed or Encastre, Continuous and Overhanging beam), Statically determinate and indeterminate beams- definitions only, Supports (Simple, Hinged, Roller and Fixed support), Loads acting on beam (vertical and inclined point load, uniformly distributed load, uniformly varying load), Beam reactions for simply supported beam with or without overhang- engineering problems subjected to point load and combination of point load and uniformly distributed load, Beam reactions graphically for simply supported beam with vertical point load- simple numerical problems on analytical and graphical methods, Plane truss and Space truss (definition only), Assumptions in plane truss analysis, Relationship between number of joints and members in simple truss, External and internal redundancy, Method of joints analysis, Method of sections analysis, Graphical methods of truss analysis- simple numerical problems by method of joints and section only.	13
UNIT-IV	Centroid and Centre of Gravity, Centroid of geometrical plane figure (square, triangular, rectangular, circle, semicircle lamina and composite figure composed of not more than three geometrical figure, Centre of gravity of simple solids (cube, cuboid, cone, cylinder, sphere, hemisphere) and composite solids composed of not more than two simple solids, Moment of Inertia, Derivation of general formula for determination of moment of inertia for area and mass, Section modulus, Radius of gyration, Theorem of Parallel and perpendicular axes, Moment of inertia of simple geometrical figure (square, rectangle, circle, triangle) and composite sections .	8

UNIT-V	Definition of friction, Static and dynamic friction, Coulomb's Laws of friction , Types of friction, , Limiting friction, Coefficient of friction, Angle of friction, Angle of repose, Cone of friction, Equilibrium of bodies on level surface subjected to a force parallel and inclined to the plane, Equilibrium of bodies on an inclined plane subjected to a force parallel to the plane only, Simple engineering problems on ladder friction and wedge friction.	8
UNIT-VI	Machine, Simple machine and compound machine, Basic concepts and definition, Derivation of relation between M.A, V.R and efficiency, Ideal machine, Derivation of relation between M.A and V.R in ideal machine, Reversible and irreversible machine, Derivation of conditions for a machine to be reversible and irreversible, Maximum mechanical advantage and efficiency, Compound efficiency, Simple numerical problems on the concepts and topics on lifting machine, Velocity ratio of Simple wheel and axle, differential wheel and axle , worm and worm wheel, Simple screw jack, Single purchase and double purchase crab winch, Weston's differential pulley block, First system of pulleys- simple numerical problems	7
Total Contact Hours		45

**Table of Specification for Engineering Mechanics**

Sl No	Contact Hours	Units	Objective			Short Answer Type				Long Answers Type						Total Marks
			R	U	A P	R	U	A P	A N	R	U	A P	A N	E	C	
1	3	Unit I	0	1	1	0	2	0	0	0	0	5	0	0	0	9
2	3	Unit II	0	1	0	2	2	0	0	0	0	4	0	0	0	9
3	7	Unit III	0	1	1	0	2	2	0	0	0	6	0	0	0	12
4	7	Unit IV	0	1	1	0	2	0	0	0	0	6	0	0	0	10
5	4	Unit V	0	1	0	0	2	0	0	0	0	5	0	0	0	8
6	6	Unit VI	0	1	1	0	2	2	0	0	0	6	0	0	0	12
<b>Total Marks</b>			<b>0</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>12</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>60</b>

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

Annexure-I (Engineering Mechanics)										
Sl No.	Units	Time Allotted (Hrs)	Percentage Weightage	R	U	AP	AN	E	C	Total Marks
1	Unit I	5	15.00%	0	3	6	0	0	0	9
2	Unit II	4	15.00%	2	3	4	0	0	0	9
3	Unit III	13	20.00%	0	3	9	0	0	0	12
4	Unit IV	8	16.66%	0	3	7	0	0	0	10
5	Unit V	8	13.33%	0	3	5	0	0	0	8
6	Unit VI	7	20.00%	0	3	9	0	0	0	12
<b>Total Marks</b>				<b>2</b>	<b>18</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>60</b>

**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 Mechanics, Statics and Dynamics	J.L. Meriam and L.G. Kraige	John Wiley & Sons, Inc., 7 <sup>th</sup> edition, Vol I &II, 2012, ISBN: 978-0-470-61473-0 and 9780470614815
2	Engineering Mechanics	S.P. Timoshenko, D.H. Young and J.V. Rao	Tata McGraw Hill, New Delhi, 5 <sup>th</sup> edition, 2017, ISBN 9781259062667
3	Engineering Mechanics: Statics and Dynamics	R.C. Hibbler	Pearson publication, 14 <sup>th</sup> edition, 2015, ISBN978-0133915426
4	Engineering Mechanics	K.L. Kumar and Veenu Kumar	Tata McGraw Hill, New Delhi, 4 <sup>th</sup> edition, 2017, ISBN 978-0070681811
5	Engineering Mechanics: Statics	I.H. Shames and	Pearson publication, 4 <sup>th</sup>

	and Dynamics	G.K.M. Rao	edition, 2011, ISBN 978-8177581232
6	A Text Book of Engineering Applied Mechanics	Dr S.N. Saluja	Satya Prakashan, New Delhi
7	A Text Book of Applied Mechanics	R.K.Rajput	Laxmi Publications (P) Ltd., New Delhi
8	Engineering Mechanics	S.Ramamrutham	Dhanpat Rai Publishing Company (P) Ltd., New Delhi
9	A Text Book of Engineering Mechanics	R.S.Khurmi	S. Chand & Company Limited, New Delhi

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## 6. Course Title: Applied Physics Lab-II

COURSE TITLE: APPLIED PHYSICS LAB-II

COURSE CODE: BS-207

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:

CO1: demonstrate the laws of light, find refractive index of material and focal length of lense.

CO2: find out magnetic poles and draw magnetic lines of force of bar magnet.

CO3: apply different apparatuses to find the values of different physical quantities (acceleration due to gravity, specific gravity, atmospheric pressure, water equivalent, velocity of sound and frequency of tuning fork).

Teaching scheme (in hours)/ week

Lectures	Tutorial	Practical	Credit point
0	0	2	1

Chapter Title	Content
Properties of Liquid	1.Measurement of Specific gravity of solid, liquid, using Nicolson hydrometer, Hare's apparatus and specific gravity bottles etc.
Simple Harmonic Motion	2.To determine the value of acceleration due to gravity (g) of a place with Simple pendulum.
Wave & Sound	3. To measure the velocity of sound in Resonance tube. 4. To determine the frequency of a tuning fork using a Sonometer.
Light	5.0 To verify the laws of reflection using a plane mirror and to study the characteristics of image formed.
	6.0 To determine the refractive index of the material of the glass slab by pin method.
	7.0 To determine the focal length of a convex lens by U-V method.
	8.0 To determine the focal length of a convex lens by plane mirror method.
	9.0 To draw I-D curve and to determine the refractive index of the material of a prism.



MAGNETISM	10.0 To locate the poles of a bar magnet and to measure the magnetic length.
	11. To plot magnetic lines of force of a bar magnet with north pole pointing north and to locate the neutral point/to plot magnetic lines of force of a bar magnet with south pole pointing north and to locate the neutral point.
Heat	12. To determine the atmospheric pressure by using Boyle's law apparatus.
	13. To determine water equivalent of a calorimeter by method of mixture.

**Suggested learning Resource:****A. Book list:**

Sl. No.	Title	Author	Publisher
1	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
7	Introduction to nano technology	C. P. Poole, Jr., and Frank. J. Owens,	Wiley- Interscience.

**B. Websites:**I. <http://hyperphysics.phy-astr.gsu.edu/>II. <http://physics.info>**C. By using Models, Video etc.**

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## 7. Course Title: Introduction to IT Systems Lab

Course : Introduction to IT Systems Lab

Course Code: ES-208

Credits -2 (L: 0, T: 0, P: 4)

### Course Objectives:

This Lab course is intended to practice whatever is taught in theory class of 'Introduction of IT Systems' and become proficient in using computing environment - basic computer skills, basic application software tools, Computer Hardware, cyber security features, etc.

### Course outcomes:

At the end of the course student will be able to comfortably work on computer, install and configure OS, connect a PC to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/attacks.

### Course Content:

Sl. No.	Topics for Practice
1	Browser features, browsing, using various search engines, writing search queries
2	Visit various e-governance/Digital India portals, understand their features, services offered
3	Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4	Install Linux and Windows operating system on identified lab machines, explore various options, do it multiple times
5	Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6	Practice HTML commands, try them with various values, make your own Webpage
7	Explore features of Open Office tools, create documents using these features, do it multiple times
8	Explore security features of Operating Systems and Tools, try using them and see what happens.

This is a skill course. More you practice, better it will be.

### References:

1. Online resources, Linux man pages, Wikipedia.
2. R.S. Salaria, Computer Fundamentals, Khanna Publishing House.
3. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett.
5. IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, CISC Press, Pearson Education
6. PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).

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## 8. Course Title: Fundamentals of Electrical and Electronics Engineering Lab

Course Code	:	ES110
Course Title	:	Fundamentals of Electrical and Electronics Engineering Lab
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	NIL
Course Category	:	ES

### Suggested Practical/Exercises:

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

### Course Outcomes:

At the end of the course student will be able to:

1. Understand basic principle and operation of electric circuits and machines.
2. Solve basic problems related to electrical circuits and machines. Explain the operation of different electrical technologies.
3. Demonstrate an understanding of the control systems.
4. Understand the basic circuit elements
5. Understand different types of signal waveforms.
6. Understand logic gates and apply them in various electronic circuits.
7. Understand the basic concepts of op-amps, and their applications.
8. Use relevant electric/electronic protective devices safely.

S. No.	Practical Outcomes (PrOs)	Approx. Hrs.
1.	Determine the permeability of magnetic material by plotting its B-H curve.	01
2.	Measure voltage, current and power in 1-phase circuit with resistive load.	01
3.	Measure voltage, current and power in R-L series circuit.	02
4.	Determine the transformation ratio (K) of 1-phase transformer.	01
5.	Connect single phase transformer and measure input and output quantities.	01
6.	Make Star and Delta connection in induction motor starters and measure the line and phase values.	02
7.	Identify various passive electronic components in the given circuit	02
8.	Connect resistors in series and parallel combination on bread board and measure its value using digital multimeter.	02
9.	Connect capacitors in series and parallel combination on bread board and measure its value using multimeter.	02
10.	Identify various active electronic components in the given circuit.	02

11.	Determine the value of given resistor using digital multimeter and then also to confirm the value with colour code.	01
12.	Use LCR-Q tester to measure the value of given capacitor and inductor.	01
13.	Test the PN-junction diodes using digital multimeter.	01
14.	Test the performance of PN-junction diode.	01
15.	Test the performance of Zener diode.	01
16.	Test the performance of LED.	01
17.	Identify three terminals of a transistor using digital multimeter.	01
18.	Test the performance of NPN transistor.	01
19.	Determine the current gain of CE transistor configuration.	01
20.	Test the performance of transistor switch circuit.	01
21.	Test the performance of transistor amplifier circuit.	01
22.	Test Op-Amp as amplifier and Integrator	01
23.	Hands on activity on house wiring (Mini project work on simple house wiring involving one light point, one fan point, one power socket, one MCB on a wooden or ply board)	02
	<b>Total</b>	<b>30</b>

## References:

1. Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House, 2018
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
4. Theraja, B. L., Electrical Technology Vol – I, S. Chand publications, New Delhi, 2015, ISBN: 9788121924405
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand publications, New Delhi, 2015, ISBN: 9788121924375
6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
7. Sedha, R.S., A text book of Applied Electronics, S.Chand ,New Delhi, 2008, ISBN-13: 978-8121927833
8. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13: 0070634244-978

9. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504
10. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN: 780195425239

Suggested softwares/ Learning Websites:

- b. [en.wikipedia.org/wiki/Transformer](https://en.wikipedia.org/wiki/Transformer)
- c. [www.animations.physics.unsw.edu.au/~jw/AC.html](http://www.animations.physics.unsw.edu.au/~jw/AC.html)
- d. [www.alpharubicon.com/altenergy/understandingAC.htm](http://www.alpharubicon.com/altenergy/understandingAC.htm)
- e. [www.electronics-tutorials](http://www.electronics-tutorials)
- f. [learn.sparkfun.com/tutorials/transistors](http://learn.sparkfun.com/tutorials/transistors)
- g. [www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf](http://www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf)
- h. [www.technologystudent.com/elec1/transis1.htm](http://www.technologystudent.com/elec1/transis1.htm)
- i. [www.learningaboutelectronics.com](http://www.learningaboutelectronics.com)
- j. [www.electrical4u.com](http://www.electrical4u.com)

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## 9. Course Title: Engineering Mechanics Lab

Course Code	ES - 210				
Category	Engineering Science Course				
Course Title	Engineering Mechanics Laboratory				
Scheme and Credits	L	T	P	Credits	Semester-II
	0	0	2	1	
Pre-requisites (if any)	Physics, mathematics				

### Learning Objectives:

Students will be able to:

LO1	Examine triangle law of forces graphically and calculate resultant, percentage error with the aid of Gravesand's apparatus.
LO2	Examine polygon law of forces graphically and calculate resultant, percentage error with the aid of Gravesand's apparatus or Universal Force Table.
LO3	Compare actual, analytical and graphical values of support reactions at the two ends of a simply supported beam on a Beam apparatus.
LO4	Calculate co-efficient of friction between two contact surfaces on a rough horizontal plane.
LO5	Calculate co-efficient of friction, angle of repose, mechanical advantage and efficiency of an inclined plane.
LO6	Examine the law of moments with the aid of Bell Crank Lever.
LO6	Calculate mechanical advantage, velocity ratio and efficiency of simple screw jack, worm and worm wheel, single purchase crab winch and first system of pulleys.

### Course Outcomes:

On successful completion students will be able to:

CO1	Examine triangle law of forces, parallelogram law of forces and polygon law of forces with the aid of Gravesand's apparatus and Universal Force Table.
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CO2	Compare actual values of support reaction with analytical and graphical values of support reactions at two ends of a simply supported beam.
CO3	Calculate co-efficient of friction, angle of repose, mechanical advantage, velocity ratio of a body lying on horizontal and vertical plane.
CO4	Examine law of moment with the aid of Bell Crank Lever.
CO5	Calculate mechanical advantage, velocity ratio and efficiency of a simple lifting machine.

**List of Practices:**

Sl. No.	Topics For Practices	Periods (Hrs)
1	To verify triangle law of forces and parallelogram law of forces with the help of Gravesand's apparatus.	3
2	To verify the polygon law of forces with either Gravesand's apparatus or Universal Force Table.	3
3	To verify the reactions at the support of a simply supported beam	3
4	To find co-efficient of friction between two surfaces on a rough horizontal plane.	3
5	To find co-efficient of friction, angle of repose, M.A and efficiency of an inclined plane.	3
6	To verify the Law of Moments using a bell crank lever.	2
7	To find the mechanical advantage, velocity ratio and efficiency of a simple screw jack.	3
8	To find the mechanical advantage, velocity ratio and efficiency of a worm and worm wheel.	3
9	To find the mechanical advantage, velocity ratio and efficiency of a single purchase crab winch.	3
10	To find the mechanical advantage, velocity ratio and efficiency of the	3

	<b>first system of pulleys.</b>	
<b>Total Practices in Hrs</b>		<b>29</b>

**Reference Book Lists:**

<b>Sl No.</b>	<b>Book Name</b>	<b>Author Name</b>	<b>Publishing House, Volume, ISBN</b>
<b>1</b>	<b>Engineering Mechanics, Statics and Dynamics</b>	<b>J.L. Meriam and L.G. Kraige</b>	<b>John Wiley &amp; Sons, Inc., 7<sup>th</sup> edition, Vol I &amp;II, 2012, ISBN: 978-0-470-61473-0 and 9780470614815</b>
<b>2</b>	<b>Engineering Mechanics</b>	<b>S.P. Timoshenko, D.H. Young and J.V. Rao</b>	<b>Tata McGraw Hill, New Delhi, 5th edition, 2017, ISBN 9781259062667</b>
<b>3</b>	<b>A Text Book of Applied Mechanics</b>	<b>R.K.Rajput</b>	<b>Laxmi Publications (P) Ltd., New Delhi</b>
<b>4</b>	<b>Engineering Mechanics</b>	<b>K.L. Kumar and Veenu Kumar</b>	<b>Tata McGraw Hill, New Delhi, 4<sup>th</sup> edition, 2017, ISBN 978-0070681811</b>
<b>5</b>	<b>Engineering Mechanics: Statics and Dynamics</b>	<b>I.H. Shames and G.K.M. Rao</b>	<b>Pearson publication, 4<sup>th</sup> edition, 2011, ISBN 978-8177581232</b>

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## 10. Course Title: Environmental Science

Course Code	AU-201				
Course Title	Environmental Science				
Scheme and Credits	L	T	P	Credits, C	Semester- II
	2	0	0	0	
Pre-requisites	High School Chemistry/Basic science				

### Learning Objectives:

<b>LO-1</b>	Acquire knowledge for solving various engineering problems by applying ecosystem to produce eco – friendly products.
<b>LO-2</b>	Gain fundamental knowledge of air, noise, radiation, water and soil pollution control methods for solving domestic and industrial problems.
<b>LO-3</b>	To recognize relevant energy sources required for domestic and industrial applications.
<b>LO-4</b>	Gain skills for solving local solid and e-waste problems.

### Course Outcomes: After the completion of the course the student will be able to understand:

<b>CO-1</b>	The ecosystem and terminology for solving various engineering problems applying ecosystem knowledge to produce eco – friendly products.
<b>CO-2</b>	The air, radiation and noise pollution along with their control measures and acts for solving domestic and industrial problems.
<b>CO-3</b>	The water and soil pollution along with their control measures and acts for solving domestic and industrial problems.
<b>CO-4</b>	Different renewable energy resources and efficient process of harvesting.
<b>CO-5</b>	Solid Waste Management, ISO 14000 & Environmental Management.

### Detailed Course Content:

Unit	Topic/Sub-Topics	Hours
<b>UNIT-I</b>	<b>1.0. Introduction to Environmental Studies and Ecosystems</b> 1.1. Scope and importance of Environmental Science, environmental components. 1.2. Definition, principle and scope of ecology, definition and concept of Ecosystem, Structure of ecosystem, Biotic & Abiotic components. 1.3. Functions of Ecosystem: Physical (energy flow), Biological	<b>5</b>

	(food chains, food web, ecological succession), and Biogeochemical (nutrient cycling) processes. 1.4. Types of Ecosystems - Freshwater ecosystem (Lentic and Lotic) and terrestrial ecosystem (Forest, Grassland, Desert and <b>Mountain Ecosystem</b> )	
<b>UNIT-II</b>	<b>2.0. Air, Noise and Radiation Pollution</b> 2.1. Air Pollutions: Definition, types and sources of air pollution, air pollutant and its types, impact of air pollution on human health, environment and assets. 2.2. Global warming and greenhouse effect, ozone layer depletion and acid rain. 2.3. Air quality standards – NAAQS, AQI, Bharat Stage - VI Emission standards, Air pollution control measures. Air quality standards – NAAQS, AQI, Bharat Stage - VI Emission standards. Air pollution control measures. 2.4. Radiation pollution: Definition and types of radiation, sources, effects and control of radiation pollution. 2.5 Noise pollution: Definition, types, sources of pollution, measurement of pollution level, Effects of Noise pollution.	<b>6</b>
<b>UNIT-III</b>	<b>3.0. Water and Soil Pollution</b> 3.1. Definition, properties and Sources of freshwater. 3.2. Definition, Sources of water pollution, Types of water pollutants. 3.3. Characteristics of water pollutants, Physical, chemical and biological parameters for assessment of water quality. 3.4. Effect of water pollution on human health and environment. 3.5. Control of water pollution 3.6. Waste water treatment – Primary, secondary and tertiary methods. 3.7. Soil pollution - Causes, Effects and Preventive measures of Soil Pollution.	<b>7</b>



<b>UNIT-IV</b>	<p><b>4.0. Renewable sources of Energy</b></p> <p>4.1. Definition and type of renewable energy sources.</p> <p>4.2. Solar Energy: Basics of Solar energy. Flat plate collector (Liquid &amp; Air). Theory of flat plate collector. Importance of coating. Advanced collector.</p> <p>4.3. Solar pond, Solar water heater, solar dryer, Solar stills.</p> <p>4.4. Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel, Anaerobic digestion. Biogas production mechanism. Utilization and storage of bio-gas.</p> <p>4.5. Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.</p> <p>4.6. New Energy Sources: Need of new sources. Different types new energy sources.</p> <p>4.7. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.)</p> <p>4.8. Concept, origin and power plants of geothermal energy.</p>	<b>7</b>
<b>UNIT-V</b>	<p><b>5.0. Solid Waste Management, ISO 14000 &amp; Environmental Management</b></p> <p>5.1. Definition and type of waste.</p> <p>5.2. Solid waste generation- Sources and characteristics of: Municipal and domestic solid waste, electronic waste (E-waste): Sources and types, constituents of e-wastes, recycling of e-waste and its environmental consequences, biomedical waste. Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries.</p> <p>5.3. Collection and disposal of different types of solid wastes.</p> <p>5.4. Waste Air quality act 2004, air pollution control act 1981, water pollution and control act 1996. Noise pollution (Regulation and Control) Rules, 2000.</p> <p>5.5. Environmental management in fabrication industry. ISO14000: Implementation in industries, Benefits.</p>	<b>5</b>
	<b>Total contact Hours</b>	<b>30</b>

Table of Specification for Environmental science (Theory)																
Sl No	Contact Hours	Units	Objective			Short Answer Type				Long Answers Type						Total Marks
			R	U	A P	R	U	A P	A N	R	U	A P	A N	E	C	
1	5	Unit I	1	1	1	2	1	0	0	0	2	2	0	0	0	10
2	6	Unit II	1	1	1	2	1	0	0	0	2	2	0	0	0	10
3	7	Unit III	1	1	0	0	3	2	1	0	3	3	0	0	0	14
4	7	Unit IV	1	1	0	0	0	2	1	3	3	3	0	0	0	14
5	5	Unit V	1	1	1	0	2	0	1	0	3	3	0	0	0	12
	30	Total marks	5	5	3	4	7	4	3	3	13	13	0	0	0	60

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

Annexure-I: Environmental science (Theory)										
Sl No.	Units	Time Allotted (Hrs)	Percentage Weightage	R	U	AP	AN	E	C	Total Marks
1	I	5	16.67	3	4	3	0	0	0	10
2	II	6	20.00	3	4	3	0	0	0	10
3	III	7	23.33	1	7	5	1	0	0	14
4	IV	7	23.33	4	4	5	1	0	0	14
5	V	5	16.67	1	6	4	1	0	0	12
<b>Total</b>		<b>30</b>	<b>100.00</b>	<b>12</b>	<b>25</b>	<b>20</b>	<b>03</b>	<b>00</b>	<b>00</b>	<b>60</b>

#### Reference Book List:

Sl No	Book Name	Author Name	Publisher
1	Environmental Studies	S.C. Sharma & M.P. Poonia	Khanna Publishing House, New Delhi
2	Understanding Chemistry	C.N. R. Rao	Universities Press (India) Pvt. Ltd., 2011
3	Elements of	O.P. Gupta,	Khanna Publishing House, New

	Environmental Pollution Control		Delhi
4	Air Pollution & Control	Keshav Kant	Khanna Publishing House, New Delhi (Edition 2018)
5	Waste Water Treatment for Pollution Control and Re-use	Arceivala, Soli Asolekar, Shyam	Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099
6	Environmental Engineering Science	Nazaroff, William, Cohen, Lisa	Willy, New York, 2000, ISBN 10: 0471144940.
7	Environmental Pollution Control and Engineering	Rao, C. S.,	New Age International Publication, 2007, ISBN: 81-224-1835-X.
8	Air Pollution	Rao, M. N. Rao	Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07-451871-8.
9	Principles of Solar Engineering	Frank Kreith, Jan F Kreider	McGraw-Hill, New York ; 1978, ISBN: 9780070354760.
10	Fundamentals of renewable energy processes	Aldo Vieira, Da Rosa	Academic Press Oxford, UK; 2013. ISBN: 9780123978257.
11	Industrial Solid Waste	Patvardhan, A. D	Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6
12	Waste Water Engineering	Metcalf & Eddy	Mc-Graw Hill, New York, 2013, ISBN: 077441206
13	Perspective in Environmental Studies	Anubha Kaushik and C P Kaushik	New Age International Publisher, New Delhi ISBN: 978-93-86418-63-0
14	National Environmental Policy 2006	Govt. of India, Ministry of Environment and Forest.	Approved by the Union Cabinet on 18 May, 2006
15	National Green Tribunal Act, 2010	Ministry of Law and Justice (Legislative Dept.),	The Gazette of India New Delhi, Wednesday, June 2, 2010.

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