WEST BENGAL STATE COUNCIL OF TECHNICAL & VOCATIONAL EDUCATION AND SKILL DEVELOPMENT

(A Statutory Body under West Bengal Act XXVI of 2013)

(Technical Education Division)

Karigari Bhavan, 4th Floor, Plot No. B/7, Action Area-III, Newtown, Rajarhat, Kolkata–700 160

WBSCTVESD Curriculum for Diploma Courses in Engineering and Technology

Sl. No.	Category of Course	Course Title	Hours per week			Total contact hrs/ week	Credits	Marks	Examination Scheme			
			L	T	P							
	Theory Subjects								External Assessment 60	Internal Assessment-40		
									End Sem. Examination	Mid Sem. Test	Quizzes, viva-voce, Assignment	Class Attendance
1.	Basic Science	Mathematics-II	3	1	0	4	4	100	60	20	10	10
2.	Basic Science	Applied Physics-II	2	1	0	3	3	100	60	20	10	10
3.	Engineering Science	Introduction to IT Systems	2	0	0	2	2	100	60	20	10	10
4.	Engineering Science	Fundamentals of Electrical & Electronics Engineering	2	1	0	3	3	100	60	20	10	10
5.	Engineering Science	Engineering Mechanics	2	1	0	3	3	100				
	Practical Subjects								Continuous Assessment-60			End Sem Assessment-40
									Assignments in classes	Class Performance	Class Attendance	Assignment on the day of grand viva	Viva-voce (Before board of Examiners)
6.	Basic Science	Applied Physics-II Lab	0	0	2	2	1	100	30	20	10	20	20
7.	Engineering Science	Introduction to IT Systems Lab	0	0	4	4	2	100	30	20	10	20	20
8.	Engineering Science	Fundamentals of Electrical & Electronics Engineering Lab	0	0	2	2	1	100				
9.	Engineering Science	Engineering Mechanics Lab	0	0	2	2	1	100	30	20	10	20	20
	AUDIT COURSES-Mandatory non-credit											
10.	Audit	Indian Constitution	2	0	0	2	0	100	30	20	10	20	20
	Total		13	4	10	27	**20**	**1000**				

Syllabus of Mathematics-II

Course Title:	Engineering Mathematics-II
Course Code:	BS102/M-II
Number of Credits:	4(L: 3+T: 1) P: 0
Pre-Requisites:	Knowledge of the basic Co-ordinate Geometry, Statistics & Differential calculus
Total Contact Hours:	60 hrs.

Aim: Mathematics is the backbone of engineering students. The curriculum of mathematics has undergone changes from time to time in accordance with the need of engineering branches. The syllabus has been designed in keeping view the emerging needs of all categories of students. Great emphasis has been given on the application of various contents. This course will develop analytical abilities to make exact calculations and provide a continuing educational base for the students.

Course Objectives: After the completion of the course, the students will be able to
i) apply the knowledge of Cramer's rule and matrix inversion for finding the solutions of Linear Simultaneous Equations.
ii) apply the equations of a straight line, circle, conic section in solving the practical problems.
iii) apply the various techniques of evaluating integration and various methods of finding complete primitive of ordinary differential equations of 1st order and second order for solving engineering problems.
iv) use the concept of partial differentiation in solving physical problems.
v) analyze the Statistics and Probability in a real situation.

Unit-1

Determinants & Matrices   **10 Hours**

1.1 Determinant: **4**
1.1.1 Definition and expansion of determinants of order 2 & 3. Minors and cofactors
1.1.2 Elementary properties of Determinants (statements only) & simple problems
1.1.3 Chios Method for 4th order determinant
1.1.4 Solution of linear simultaneous equations (up to 3 unknowns) by Cramer's Rule.

1.2 Matrix:
1.2.1 Definition of Matrix and its order.   **6**
1.2.2 Different types of Matrices.(rectangular, square, row, column, upper triangular, lower triangular, diagonal, scalar, identity, null)
1.2.3 Equality of two matrices
1.2.4 Addition, subtraction, multiplication of a matrix by a scalar and multiplication of two matrices
1.2.5 Transpose of a matrix, symmetric & skew symmetric matrices, simple problems
1.2.6 Singular & non-singular matrices, adjoint and inverse of a matrix of order 3

Syllabus of Mathematics-II

Unit-2

Co-ordinate Geometry (only 2-dimension)   **13 Hours**

2.1 Coordinate System   3
2.1.1 Cartesian & Polar Coordinate system & their relations.
2.1.2 Distance between two points, internal & external division of a line segment & simple problems.
2.1.3 Area of a triangle and condition of collinearity.

2.2 Straight Line   4
2.2.1 Gradient (slope) of a straight line
2.2.2 Equations of straight line in various standard forms (no proof) (slope-intercept form, slope-point form, intercept form, two point form) & simple problems
2.2.3 Angle between two straight lines- conditions of parallelism and perpendicularity & simple problems
2.2.4 Perpendicular distance from a given point to a line, perpendicular distance between two parallel lines

2.3 Circle: 2
2.3.1 Equation of a circle - centre-radius form, diameter form, simple problems
2.3.2 General equation of a circle and its centre and radius. Simple problems

2.4 Conic Section: 4
2.4.1 Definition of conic section, vertex, axis, eccentricity, focus, directrix, latus rectum & problem
2.4.2 Standard equations of parabola and ellipse, simple problems

Unit-3

Integral Calculus   **15 Hours**

3.1 Indefinite integral   8
3.1.1 Definition of Integration as inverse process of differentiation.
3.1.2 Rules for integrations (sum, difference, scalar multiple)
3.1.3 Integration of standard functions
3.1.4 Integration by substitution
3.1.5 Integration by parts
3.1.6 Integration by partial fraction

3.2 Definite Integral   7
3.2.1 Definition of definite integral & simple problems
3.2.2 Properties of definite integral with simple problems.
3.2. Application of definite integral -i) area of bounded region ii) Volume and surface area of solid generated by revolving an area about x and y-axis

Syllabus of Mathematics-II

Unit-4

Ordinary Differential Equation   **10 Hours**

4.1 Definition of ordinary differential equation, order & degree.   **1**
4.2 Solution of Differential equation of First order and first degree   **5**
4.2.1 Separation of Variables
4.2.2 Homogeneous type
4.2.3 Exact type
4.2.4 Linear type

4.3 **Solution of Linear Second order Differential equations with constant coefficients**   **4**
4.3.1 Complementary Functions (C.F)
4.3.2 Particular Integral for polynomial function, e^{ax}, $\sin ax$ and $\cos ax$, $[\ F(-a^2) \neq 0]$, $e^{ax}V$ where V is a polynomial function. Simple problem.

Unit-5

Partial Differentiation   **3 Hours**

5.1 Definition & meaning of partial derivative.
5.2 Evaluation of partial derivatives.
5.3 Definition & examples of homogeneous functions.
5.3 Euler's theorem (1st order) on Homogeneous functions for 2 variables (without proof). Problems.

Unit-6

Statistics & Probability   **9 Hours**

6.1 Statistics   **5**
6.1.1 Definition & examples of frequency distribution.
6.1.2 Measure of Central Tendency (mean, median, mode) for ungrouped and grouped frequency distribution.
6.1.3 Measures of dispersion-Standard deviation, Simple problems

6.2 Probability   **4**
6.2.1 Definition of random experiment, sample space, event, occurrence of events & types of events (eg. Impossible, Mutually exclusive, Exhaustive, Equally likely)
6.2.2 Classical definition of probability, simple problems

Syllabus of Mathematics-II

Examination Scheme:

A. Semester Examination pattern of 60 marks:

1. Objective questions- 20 marks (1 mark for each question), (At least 5 questions from each **Group**)
2. Subjective questions- 40 marks (At least one question of 10 marks from each **Group**)

- **Group- A** contains Unit-1 & Unit-2 (At least 20 marks); **Group-B** contains Unit-3 (At least 20 marks); **Group-C** contains Unit-4 (At least 20 marks) , **Group-D** contains Unit-5 & Unit-6 (At least 20 marks)

N.B.- Student will answer objective type questions of 20 marks and for subjective questions of 40 marks, taking one question from each **group** of the above four **groups**.

B. For the internal Assessment 40 marks:

1. Class Test Examination/Internal Examination: 20 marks; choose best two out of three Class Test Examinations/ Internal Examinations
2. Class Attendance: 10 marks
3. Viva/ Quiz/Presentation/Assignment/Project/Report etc.: 10 marks

Syllabus of Mathematics-II

Text Books & Reference –

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Konch & Dey, Bhagabati Publication
3. Numerical Analysis, N. Islam, Academic Press
5. Introduction to Integral Calculus, rohde, Jain, Poddar,Ghosh, Wiley
6. Higher Algebra: Abstract And Linear, SK Mapa, Sarat Book House
7. Analytic Geometry Two & Three Dimensional and Vector Analysis, R. M. Khan, New Central Book Agency
8. Probability & Statistics for Engineers, Richard A. Jonson, Prentice Hall of India
9. An Introduction to Differential Equations, Ghosh, Maity, New Central Books Agency
10. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, New Delhi
11. Engineering Mathematics, A. Sarkar, Naba Publication
12. Engineering Mathematics, Konch & Dey, Bhagabati Publication
13. Engineering Mathematics, Babu Ram, Pearson
14. Diploma Engineering Mathematics, B. K. Paul, U.N.Dhar & Sons
15. Engineering Mathematics, V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Vikas Publishing House.
16. Web portal: https://www.ndl.gov.in/homestudy/science
    https://ncertbooks.ncert.gov.in/login
    https://epathshala.nic.in//
    https://webscte.co.in/
    https://en.wikipedia.org/wiki/
    https://openlibrary.org/
    https://www.youtube.com/
    http://content.inflibnet.ac.in/
    https://doabooks.org/
    https://www.oapen.org/home
    http://www.gutenberg.org/
17. Apps in Google Play Store: National Digital Library
                                  e-Granthalaya
                                  NSDC eBook Reader: Kaushal ePustakalaya
                                  ePathshala
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Course Code	:	BS104
Course Title	:	Applied Physics –II
Number of Credits	:	3 (L: 2, T: 1,P: 0)
Prerequisites	:	High School Level Physics
Course- Category	:	BS

Course Objectives

Applied Physics aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad- based engineering problems and to understand different technology based applications.

Course Content

Unit -1: Wave motion and its applications

Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc. study of vibrations of cantilever and determination of its time period, Free, **damped and forced** vibrations with examples.

Wave motion, transverse and longitudinal waves with examples (Sound and light waves) definitions of wave velocity, frequency and wave length and their relationship, equation of a plane progressive wave. Principle of superposition of waves and beat formation.

Acoustics of buildings- reverberation, reverberation time, methods to control reverberation time , noise, coefficient of absorption of sound, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.

Unit – 2: Optics

Basic optical laws: reflection and refraction, refractive index, Images and image formation by thin lenses, lens & lens maker's formula, (no deduction) power of lens, magnification simple numerical problems. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber:

Optical Instruments; simple and compound microscope, astronomical telescope (refracting, Ray Diagram and formula for magnification). Interference and diffraction of light (Qualitative ideas only).

Unit – 3: Electrostatics

Coulombs law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law (statement only) Application of Gauss law to find electric field due to a charged sphere.

Capacitor and its working, types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor (formula only), Series and parallel combination of capacitors formula (related numerical problems), dielectric and its effect on capacitance, dielectric break down.

Unit – 4: Current Electricity

Electric Current and its units, Direct and alternating current, resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistance and colour coding.

Ohm's law, Kirchhoff's laws, Wheatstone bridge, Carrey Foster Bridge and its applications, Concept of terminal potential difference and Electro motive force (EMF)

Heating effect of current, Electric power, electric energy and its units (related numerical problems)

Thermoelectric effect: Seebeck &Peltier effects.

Unit -5: Electromagnetism

Magnetic field and its origin, units

Lorentz force (force on moving charge in magnetic field).Biot- Savart law, Application to **Straight** Conductor & circular loop; concept of magnetic dipole. Force on current carrying conductor, Torque on rectangular coil placed magnetic field concept of electromagnetic induction, Faraday's Laws, Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.

Types of magnetic materials; dia, para and ferromagnetic with their properties.

Unit-6: Semiconductor Physics

Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, Diode as rectifier- half wave and full wave rectifier (Centre taped) & circuit symbol.

Transistor, Block diagram types (pnp and npn)& circuit symbol, transistor as an amplifier CE mode (Circuit diagram and concept).

Photocells, Solar cells and LED working principle and engineering application.

Unit-7: Modern Physics

Bohr's atom model and concept energy levels, ionization and excitation potentials, X-rays, Production (Coolidge tube) continuous and characteristic-X-rays, soft and hard X-rays, and use,

Laser: spontaneous and stimulated emission; Laser light; He-Ne laser elementary characteristics, applications of lasers.

Fiber Optics: Introduction to optical fibers, mechanism of light propagation, applications.

Nanoscience and nanotechnology (Introduction only).

Reference books:

1. Text books of Physics for Class XI & XII (Part I & II); N.C.E.R.T., Delhi.
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC verma, Vol.I & II, Bharti Bhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publisers.
6. A Textbook of Optics, N Subramanyam, Brij Lal,MN Avahanulu, S Chand and Company Ltd.
7. Introduction to Fiber optics, Ajoy Ghatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.
8. Nanoscience and Nanotechnology, KK Choudhury, narosa Publishing House, Pvt. Ltd. New Delhi.
9. Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd., New Delhi

Course Title :	Introduction to IT Systems Theory
Course Code	ES 102
Number of Credits :	2 (L: 2, T: 0, P: 0)
Prerequisites	NIL
Course Category	ES
Course code : General	Semester : SECOND
Duration : 16 weeks	Maximum Marks : 100
Teaching Scheme	Examination Scheme
Theory : - 2 hrs/week	Continuous Internal Assessment : 20 Marks
Tutorial: - 1 hr/week	Attendance, Assignment & Quiz : - 20 Marks
Practical : NIL	End Semester Examination : 60 Marks
Aim:	Develop basic concept of Computer Science

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 Hardware, Cyber security awareness.

Course Content:

Contents (Theory)	Hrs./Unit	Marks
UNIT 1:	10	28

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals.

Number system and codes: Binary, octal, hexadecimal and decimal Number systems and their inter conversion, BCD numbers (8421-2421), gray code, excess–3 code, cyclic code, code conversion, ASCII, EBCDIC codes. Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2's complement representation. 2. Boolean Algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, ExNOR and their truth tables,), Universal Gates, Laws of Boolean algebra, De-Morgan's theorem

General understanding of various computer hardware components – CPU, Memory(types), Display(modern), Keyboard, Mouse, HDD, SSD and

other Peripheral Devices.
Types of software

UNIT 2:	10	28

Overview of Operating Systems
- **What is an OS**
- **Brief history.**

Background and Basics
- **Computer System review**
- **Types of OS**
- **Architecture**
- **Basic Oss**
- **Batch**
- **Multi-programmed batch**
- **Timesharing**
- **Computer System Structures**
- **Operating System Structures**

UNIT 3:	2	8

Algorithm and Flowcharts
- **Algorithm**
- **Definition**
- **Characteristics**

Advantages and disadvantages
- **Flowchart**
- **Definition**
- **Define symbols of flowchart**
- **Advantages and disadvantages**

Examples

UNIT 3:	7	20

HTML 5: ● 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

CSS: CSS Introduction ● CSS Syntax ● CSS Id & Class ● CSS How CSS Styling ● Styling Backgrounds ● Styling Text ● Styling Fonts ● Styling Links ● Styling Lists ● Styling Tables CSS Box Model ● CSS Border ● CSS Outline ● CSS Margin● CSS Display ● CSS Positioning ● CSS Floating ● CSS Navigation Bar ● CSS Image Gallery ● CSS Image Opacity ● CSS Align **JavaScript:** Introduction ● JavaScript Overview ● JavaScript Syntax ● Type of JavaScript ● Embedding Script In HTML File ● Variable Operators ● Arithmetic ● Logical ● Comparison ● Assignment ● Conditional Conditional Statement & Looping Statement ● If ● If. Else ● Switch ● While ● Do/while		
UNIT 5:	**3**	16
(Network Utilities and devices tools/project) 1: Introduction to Computer Security Chapter 2: Networks and Internet (DoS Tools & Techniques – Tracert, Visual Route) 3: Cyber Stalking, Fraud, and Abuse 4: Denial of Service Attacks (Scanning – WireShark) 5: Malware Chapter 6: Techniques Used by Hackers.		
Reference Book		
1. Computer Fundamentals by Goel, Pearson; 2. Computer Architecture and Maintenance. By - Dr. Sachin Publisher - Shroff Publisher; 3. Introduction to Computer Science, ITL Education Solutions Limited, Pearson. 4. FUNDAMENTALS OF COMPUTERS by E Balagurusamy. McGraw Hill Education; 5. Express Learning - Computer Fundamentals and Programming, By Ashok Kamthane/ITL ESL. Pearson;		
Course outcomes: At the end of the course student will be able to comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, basic design of web page, protect information and computers from basic abuses/attacks.		

Fundamental of Electrical & Electronics Engineering (FEEE)

Sl. No.	Code No.	Course Title	Hours per week			Semester	Credits
1.	ES 104	FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING (FEEE)	2	1	0	II	3
2.	ES 110	FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING (FEEE) (Laboratory)	0	0	2	II	1

Course Outcomes:

After completion of this course students will be able to

- Realize the concept and use of different Electrical and Electronics components.
- Understand the basics of electrical and electronics engineering principles.
- Understand the basics of AC circuits, Transformers and Machines.
- Realize the fundamental principle of Semiconductor, P-N junction Diode and Transistor.
- Know the basic working principle of OPAMP.
- Understand the functions of basic Digital Logic Gates.

Units	Theory Content (Name of topic)	Total nos. of period/ hours required
	Overview of Electrical Components	3
Unit 1	1.1 Concept of Passive Components: Resistors, Capacitors, Inductors. 1.2 Different types of signal waveforms: DC and AC, periodic and non-periodic. 1.3 Concept of Ideal and practical Voltage and current sources and their transformation.	
	Electric and Magnetic Circuits	7
Unit 2	2.1 Concept of EMF, Current, Potential Difference, Power and Energy 2.2 M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor, BH curve and hysteresis loss, Eddy current loss. Analogy between electric and magnetic circuits 2.3 Electromagnetic induction: Faraday's laws, Lenz's law Dynamically induced emf; Statically induced emf; Principle of self and mutual inductance 2.4 Flemming's Left Hand Rule and Right Hand Rule	
	A.C. Circuits	8
Unit 3	3.1 Concept of Angular speed, Cycle, Frequency, Periodic time, Amplitude, RMS value, Average value, Form Factor, Peak Factor, impedance, phase and phase difference. 3.2 Expressions of voltage and current through pure resistance, inductance and capacitance with sinusoidal Excitation and phasor representation. 3.3 Study of simple R-L, R-C, R-L-C series and parallel circuits with sinusoidal excitation and phasor representation.	

	3.4 Concept of impedance, impedance triangle, power factor, active, reactive and apparent power, power triangle. 3.5 Voltage and Current relationship in Star and Delta connections (no deductions) and simple problems.	
	Transformer and Machines	6
Unit 4	4.1 Basic working principle of two winding transformers 4.2 EMF equation and transformation ratio of transformers 4.3 Basic working principle and applications of AC and DC motors 4.4 Simple problems on transformer and electrical motors	
	Overview of Basic Semiconductor Devices	6
Unit 5	5.1 Energy level diagram of Insulator, Conductor and Semiconductor, Concept of Intrinsic and Extrinsic semiconductor 5.2 Formation of P-Type and N-Type semiconductor and their properties. 5.3 Formation of P-N junction Diode, Forward and Reversed biased characteristics. 5.4 Concept of PNP and NPN Transistor with their applications in CE mode.	
	Overview of Analog Circuits	5
Unit 6	6.1 Features of an ideal OPAMP, Pin configuration of 741C, Concept of Virtual Ground 6.2 Inverting and non-inverting OPAMP amplifiers and their gain calculation. 6.3Applications of OPAMP Amplifiers, adder	
	Overview of Digital Electronics	5
Unit 7	7.1. Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables), Universal Logic Gates. 7.2 Postulates of Boolean Algebra 7.3 De-Morgan's theorem, Minterm (SOP), Maxterm (POS)	
	Total Periods/Hours	**40**

	Practical Outcome	**Total nos. of period/ hours required**
1.	Measure voltage, current and power in a 1-phase circuit with resistive load.	2
2.	Visualize phase difference between voltage and current in series R-Land R-C circuits with the help of oscilloscope and plot the phasor diagram.	2
3.	Measure voltage, current, power and power factor in a R-L series circuit.	2
4.	Identify different parts of a single-phase transformer, A.C./D.C. Motor.	2
5.	Determine the transformation ratio of a single-phase transformer and measure no load current of it.	2
6.	Identify various active and passive electronic components in a given circuit.	2
7.	Familiarization with multimeter to measure the value of given resistor and to verify with colour code.	1
8	Use of LCR-Q meter to measure the value of a given capacitor and inductor.	2
9.	Test the PN-junction diodes using digital multimeter and find out their V-I characteristics in forward biased circuit.	2
10.	Identify three terminals of a transistor by using digital multimeter	2
11.	Use of Op-Amp as Inverting and non-inverting amplifier.	2
12.	Realization of Truth Table of different Logic Gates and verification of De-	2

	Morgan's theorem.	
	Total Periods/ Hours	**23**

● **List of Recommended Books:**

(1). Basic Electricals and Electronics--------- S.K. Bhattacharya (Pearson Education)
(2). Fundamental of Electrical and Electronics Engineering------ Samarjit Ghosh (PHI)
(3). Basic Electrical and Electronics Engineering------ J.B. Gupta (S.K. Kataria & Sons)
(4). Basic Electrical and Electronics Engineering------- R. Math Subramanian & S. Salivahanan (McGraw Hill Education)
(5). Principle of Electrical Engineering and Electronics-------- V. K. Mehta & Rohit Mehta (S.Chand)

Course Objectives:

Followings are the objectives of this course:
1. To obtain resultant of various forces
2. To understand basic laws of motion and their applications
3. To understand role of friction in equilibrium problems
4. To know fundamental laws of machines and their applications to various engineering problems
5. To know fundamental laws of motions and their applications to various engineering problems

Course Contents:

Group A

Unit – I Basics of Mechanics and Force System   [4L+2T]

Concept of Engineering Mechanics – Statics & Dynamics; Space, time, mass, particle, flexible body and rigid body. Scalar Quality and Vector Quality; Addition & Subtraction of Vectors – Basic units – Derived Units – SI units.

Force: Definition, unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force. Force systems and its classification with special emphasis of Co-planar Force System.

Co-planar Con-current Force System: Composition of Forces: Parallelogram Law, Triangle Law and Polygon Law of Forces. Determination of resultant by Analytical and Graphical method. Vector diagram. Resolution of Forces: Orthogonal components of a force. Simple problems on composition and resolution of forces

Unit – II Moments and Couples   [4L+2T]

Moment: Definition of moment of a force about a point – Physical significance of moment – Resultant of a system of parallel and inclined forces – Varignon's Theorem. Simple Problems

Couples: Definition of moment of a couple – Physical significance of Couples Equivalent couples – Resultant of any number of coplanar couples – Replacement of a force about a point by an equal like parallel force together with a couple. Simple Problems

Unit – III Condition of Equilibrium   [5L+3T]

Equilibrium of Co-planar Con-current Force System: Lami's Theorem. Triangle Law & Polygon Law of equilibrium Concept of Free Body diagram. Simple problems

Equilibrium of Co-planar system of non-concurrent forces: Conditions of equilibrium of co-planar system of non-concurrent parallel forces (Like and Unlike) Simple problems excluding statically in-determinant

Types of beams, supports (simple, hinged, roller and fixed) and loads. Beam reaction for simply supported beam with or without overhang subjected to combination of Point Load and Uniformly Distributed load. Simple Problems

Unit – IV Friction   [4L+3T]

Friction and its relevance in engineering, Types and Laws of friction, Limiting Friction, Co-efficient of friction, Angle of friction, Cone of Friction, Angle of Repose, Relation between co-efficient of friction and angle of friction.

Equilibrium of bodies on horizontal surface subjected to force parallel and inclined to plane.

Equilibrium of bodies on inclined plane subjected to force parallel and inclined to plane. Simple Problems

Group B

Unit– V Centroid and Centre of Gravity   [4L+2T]

Concept & definition.

Determination of Centroid of Plane Figures like (i) Uniform triangular lamina, (ii) Uniform rectangular lamina, (iii) Uniform circular lamina, (iv) Uniform semi-circular lamina, and, (v) Uniform lamina of quadrant of a circle.

Determination of Centroid of Composite sections composed of not more than three plane figures like (i) T-section, (ii) equal and unequal angle-sections, (iii) equal and unequal I-sections, (iv) Channel-sections, (v) Z-sections, (vi) different cut-out sections, and, (vii) Built-up sections (Data of individual sections given). Simple Problems

Concept of Centre of Gravity of Simple Solids. Determination of Centre of Gravity of Simple Solids like (i) Cube (ii) Cuboid (iii) Cylinder (iv) Sphere. Determination of Centre of Gravity of composite solids composed of not more than two simple solids. No Problem

Unit– VI Simple Lifting Machines   [5L+2T]

Definition of Lifting Machine, Applications and Advantages.

Load, Effort, Mechanical Advantage, Velocity Ratio, Efficiency of Machines and their relationships. Law of machine.

Ideal Machine, Friction in Machine, Maximum Mechanical Advantage and Efficiency, Reversible and non-reversible machines, conditions for reversibility. Simple Problems

Velocity ratios of (i) Simple and Differential Axle and Wheel (ii) Worm and worm wheel (iii) Single purchase and Double Purchase Crab Winch (v) Simple Screw Jack (vi) Simple Pulley Block. Simple numerical problems

Group C

Unit– VI Motion in a Plane   [4L+2T]

Rectilinear Motion

Displacement- Time and Velocity-Time diagrams, Motion equations (with deduction). Newton's Second Law of linear motion P = ma and momentum of a body. Conservation of momentum of a body. Simple numerical problems

Curvilinear Motion

Concept and definition of Angular displacement, Angular velocity, relation between Linear & Angular velocity. Definition of Angular acceleration, Relation between linear & angular acceleration Concept, definition and deduction of expression for Centripetal and centrifugal force (numerical problems

Work, Power, Energy

Concept, definition and mathematical expression of Work, Power and Energy. Discussion on their units in SI System.

Suggested Learning Resources:
1. S.S. Bhavikatti, Engineering Mechanics, New Age International (P) Ltd., Publishers
2. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
3. Bansal R K, A Text Book of Engineering Mechanics, Laxmi Publications
4. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
5. A.R.Basu, A Text Book of Engineering Mechanics
6. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi
7. D.P. Sharma, Engineering Mechanics, Pearson Publications
8. S. Timosenko and D.H. Young, Engineering Mechanics, McGRAW-HILL Book Company
9. Meriam, J. L., Kraige, L.G., Engineering Mechanics, Wiley Publication, New Delhi

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.Course outcomes:

After completing this course, student will be able to:

1. Identify the force systems for given conditions by applying the basics of mechanics.
2. Determine unknown force(s) of different engineering systems.
3. Apply the principles of friction in various conditions for useful purposes.
4. Find the centroid and centre of gravity of various components in engineering systems.
5. Select the relevant simple lifting machine(s) for given purposes
6. Apply the basic laws of motion in engineering practices

Course Objectives::   **Course Code: ES 112**

Followings are the objectives of this course:

1. To obtain resultant of various forces
2. To calculate support reactions through conditions of equilibrium for various structures
3. To understand role of friction in equilibrium problems
4. To know fundamental laws of machines and their applications to various engineering problems

List of Practicals to be performed:

[Total Six Practicals out of which any three from Sl. No. 1to 5 and any three from the rest]

1. To find the M.A., V.R., Efficiency and law of machine using Single purchase crab winch
2. To find the M.A., V.R., Efficiency and law of machine using Double purchase crab winch.
3. To find the M.A., V.R., Efficiency and law of machine using Worm and worm wheel.
4. To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
5. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
6. To determine coefficient of friction for motion on horizontal plane.
7. To determine coefficient of friction for motion on inclined plane.
8. To determine resultant of concurrent force system applying Law of Polygon of forces
9. To determine resultant of concurrent force system graphically.
10. To determine resultant of concurrent force system graphically.
11. To determine resultant of parallel force system graphically.
12. To verify Lami's theorem graphically
13. To determine centroid of geometrical plane figures
14. Study forces in various members of Jib crane.

Course outcomes:

After completing this course, student will be able to

1. Identify the force systems for given conditions by applying the basics of mechanics.
2. Determine unknown force(s) of different engineering systems.
3. Apply the principles of friction in various conditions for useful purposes.
4. Find the centroid and centre of gravity of various components in engineering systems.
5. Select the relevant Simple Lifting Machine(s) for given purposes

Examination Scheme:

A. Semester Examination : 60 marks

1. Objective questions: 20 marks (1 mark for each question)
   Questions should be set in a ratio of 5:3:2 from Group A, B and C.
   Objective questions are compulsory for the students

2. Subjective questions:40 marks
   10 questions [5 questions from Group A, 3 from Group B and 2 from Group C] each of 8 marks
   are to set.
   Students will answer 5 (five) questions taking at least 2 from Group A, 1 from Group B and 1
   from Group C.

B. Internal Assessment: 40 marks:

1. Class Test Examination/Internal Examination: 20 marks
   Best two out of three Class Test Examinations/Internal Examinations each of 20 marks

2. ClassAttendance:10marks

3. Viva/ Quiz/Presentation/Assignment/Project/Report etc.:10 marks

Course Code	:	BS106
Course Tittle	:	Applied Physics II Lab
Number of Credits	:	1 (L:0, T:0, P:2)
Prerequisites	:	NIL
Course Category	:	BS

Course Objectives:

Concrete use of physical principles and analysis in various fields of engineering and technology is very prominence. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

List of Practicals/Activites: (To perform minimum 8 Practicals)

1. To determine and verify the time period of **oscillation of** a cantilever.
2. To verify laws of refraction (Snell's law) using a glass slab.
3. To determine focal length and magnifying power of a convex lens by **u-v method**.
4. To verify Ohm's law by plotting graph between current and potential difference.
5.a. To verify laws of resistances in series by P.O.box.
5.b. To verify laws of resistances in parallel by using Ammeter and Volt meter.
6. To verify Kirchhoff's law using electrical circuits.
7. To find resistance of a galvanometer by half deflection method.
8. To convert a galvanometer into an ammeter.
9. To convert a galvanometer into a voltmeter.
10. To verify inverse square law of radiations using a photo-electric cell.
11. To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee voltage.
12. To study the dependence of capacitance of a parallel plate capacitor on various factors and determine **the** permittivity of air at a place.

Recommended Books:

1. Text Books of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Comprehensive Practical Physics, Vol-I & II, JN Jaiswal, Laxmi Publication(P)Ltd., New Delhi
3. Practical Physics by C.L. Arora, S. Chand & Company Ltd.

Course Title : Introduction to IT Systems Lab	
Course Code	ES 108
Number of Credits :	2 (L:, T: 0, P: 3)
Prerequisites	NIL
Course Category	ES
Course code : General	Semester : SECOND
Duration : 16 weeks	Maximum Marks : 100
Teaching Scheme	Examination Scheme
	Continuous Internal Assessment: 40 Marks
	Attendance, Assignment & Quiz : - 20 Marks
Practical : 4 hrs/week	End Semester Examination: 40 Marks
Aim:	Develop basic concept of Computer Science
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 COMPUTER FUNDAMENDALS Computer and operating system-fundamentals of computer-components of computer system-Input and Output Devices-Memory handling-Storage devices	
4 Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognise various ports/interfaces and related cables, etc.	
5 Install Linux and Windows operating system on identified lab machines, explore various options, do it multiple times	
6 Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.	
7 Practice HTML commands with CSS try them with various values, make your basic own Webpage	
8 MS Excel	
Apply Custom Formats and Layouts	A Learner is able to apply skills in Advanced Excel, is able to – • Format Cells, • Apply Custom Values and predefined Formats • Apply Borders, • Design Borders • Custom Formatting
Create advanced formulas	A Learner is able to Use Simple and Advanced Formulas like – • Nested if, • Reference formulas like –

	• lookup, vlookup, hlookup, • count formula with conditions • Index, Match, • Conditional Loops, etc
Use Scenarios	A Learner is able to seek use Goal Seek function, alter scenarios and values in a cell to reach a goal.
Create Advanced Charts	A Learner can tell where to use what type of charts, and obtain graphical Charts in various scenarios 3D-Graphs, Bar Charts, Pie Chart, Histograms, Line Graph, Sparklines, trend, etc.
Pivot tables & charts	A Learner is able to Apply • Pivot Tables, • Design Pivot Table, • Customize Values,
Manage and Share Workbooks	A Learner is able to Share Workbook Online, email, save on cloud, edit it Online in Google Sheets, Add Collaborators etc.
9 MS PowerPoint	

Create a Power Point presentation using slide template.
Create a Power Point presentation using animation.
Create a Power Point presentation using transition
Create a Power Point Presentation with Adding movie and sound.
Create a Power Point Presentation with Adding tables and chart etc.
Changing slide colour scheme in presentation.
Viewing the presentation using slide navigator.
Create, Save, Run and Print the Power Point Presentation.

10

Create and share files/folders in Google drive
Create and share Google docs.
Create and share Google sheets.
Create and share Google Forms.
Create and share Google slides.

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

Reference Book

1. My Office 2016, Pearson
2. Head First Excel : A Brain-Friendly Guide. Publisher: Shroff/O'Reilly
3. My Excel 2016, Pearson

INDIAN CONSTITUTION

Course Code	AU302
Course Title	Indian Constitution
Number of Credits and L-T-P	0 [L – 2, T – 0, P - 0]
Prerequisites	None
Course Category	AU

Course Content

Unit 1 – The Constitution – Introduction
- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

Unit 2 – Union Government
- Structure of the Indian Union
- President – Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and Rajya Sabha

Unit 3 – State Government
- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit 4 – Local Administration
- District Administration
- Municipal Corporation
- Zila Panchayat

Unit 5 – Election Commission
- Role and Functioning
- Chief Election Commissioner
- State Election Commission

Suggested Learning Resources:

Sl. No.	Title of Book	Author	Publication
1	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3	Introduction to the Constitution of India	DD Basu	Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:

a. https://www.constitution.org/cons/india/const.html
b. http://www.legislative.gov.in/constitution-of-india
c. https://www.sci.gov.in/constitution
d. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/