INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY
DIPLOMA IN HANDLOOM AND TEXTILE TECHNOLOGY

REGULATION 2021

SEMESTER I

BS101 : MATHEMATICS I

L	T	P	C
2	1	0	3

COURSE OBJECTIVES

This course is designed to give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus, permutations, combinations and Basics of Probability and statistics.

Unit 1   TRIGONOMETRY   9

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

Unit 2   DIFFERENTIAL CALCULUS   9

Definition of function; Concept of limits. Four standard limits $\lim_{x \to a} (\frac{x^n - a^n}{x-a})$, $\lim_{x \to 0} (\frac{\sin x}{x})$, $\lim_{x \to a} (\frac{a^x - 1}{x})$,and $\lim_{x \to a} (1 + x)^{\frac{1}{x}}$, Differentiation by definition of x^n , $\sin x$, $\cos x$, $\tan x$, e^x and $\log_a x$. Differentiation of sum, product quotient of functions. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

Unit 3   PERMUTATIONS & COMBINATIONS   9

Value of ^nP_r and ^nC_r. Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems.

Unit 4   PROBABILITY & RANDOM VARIABLE   9

Axioms of Probability - Conditional Probability - Total Probability – Baye's theorem - Definition of Random variable – and Types.

Unit 5   STATISTICAL QUALITY CONTROL   9

Concept of samples – types of samples - Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to
- CO1 Appreciate the importance of the geometric study as well as the calculation and the mathematical analysis, by applying trigonometric concepts.
- CO2 Find the effects of changing conditions on a system
- CO3 Solve simple counting problems using permutations and combination concept
- CO4 Apply the concept of probability and random variable in solving real life problems.
- CO5 Analyse the quality of samples by applying sampling technique

TEXT BOOK
1. B.S.Grewal,Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9thEdition,1995.
3. ReenaGarg,EngineeringMathematics,KhannaPublishingHouse,NewDelhi(Revised Ed.2018)

REFERENCE BOOK
1. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e., Vi-kas Publishing House.
2. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi
3. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
4. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014

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BS105: APPLIED CHEMISTRY

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

To understand, ascertain and analyze and properties of natural raw materials require for producing economical and eco-friendly finished products.
1. Solve various engineering problems applying the basic knowledge of atomic structure and chemical bonding.
2. Use relevant water treatment method to solve domestic and industrial problems.
3. Solve the engineering problems using knowledge of engineering materials and properties.
4. Use relevant fuel and lubricants for domestic and industrial applications
5. Solve the engineering problems using concept of Electrochemistry and corrosion.

Unit 1	ATOMIC STRUCTURE, CHEMICAL BONDING &SOLUTIONS	9

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, He is enbergun certainty principle,Quantumnumbers–orbitalconcept.Shapesofs,panddorbitals,Pauli'sexclusion

principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.

Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond (H_2, F_2, HF hybridization in $BeCl_2$, BF_3, CH_4, NH_3, H_2O), coordination bond in NH_4^+, and anomalous properties of NH_3, H_2O due to hydrogen bonding, and metallic bonding.

Solution–idea of solute, solvent and solution, methods to express the concentration of solution molarity (M=mole per liter), ppm, mass percentage, volume percentage and mole fraction.

Unit 2   WATER   9

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness.

Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measurement of water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation.

i). Water softening techniques – soda lime process, zeolite process and ion exchange process.

ii). Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.

Water for human consumption for drinking and cooking purposes from any water sources and enlist Indian standard specification of drinking water (collect data and understand standards).

Unit 3   ENGINEERING MATERIALS   9

Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag, metallurgy – brief account of general principles of metallurgy.

Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.

Generalchemicalcomposition,compositionbasedapplications(elementaryideaonlydetails omitted):

Port land cement and hardening, Glasses Refractory and Composite materials.

Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon – 6, nylon-6,6 and Bakelite), rubber and vulcanization of rubber.

Unit 4   CHEMISTRY OF FUELS ANDLUBRICANTS   9

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula.

Proximate analysis of coal solid fuel

Petrol and diesel - fuel rating (octane and cetane numbers),

Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and bio gas.

Lubrication – function and characteristic properties of good lubricant, classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication, physical properties (viscosity and viscosity index, oiliness, flash and fire point, could and pour point only) and chemical properties (coke number, total acid numbers a pontification value) of lubricants.

Unit 5   ELECTROCHEMISTRY   9

Electronic concept of oxidation, reduction and redox reactions.
Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems.
Industrial Application of Electrolysis

- Electrometallurgy
- Electroplating
- Electrolyticre fining.

Application of redox reactions in electrochemical cells –
- Primary cells – dry cell,
- Secondary cell- commercially used lead storage battery, fuel and Solar cells.
  Introduction to Corrosion of metals–
- Definition, types of corrosion (chemical and electrochemical), H_2 liberation and O_2 absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.
  Internal corrosion preventive measures –
- Purification, alloying and heat treatment and External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors.

Total: 45 Hour

COURSE OUTCOMES:
At the end of the study of this course, the students will be able to
  CO1   Describetheclassificationandgeneralpropertiesofengineeringmaterialssuchasmetal, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding.
  CO2   Assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.
  CO3   Qualitatively analyze the engineering materials and appreciate their properties and

applications.

CO4 Choose fuel and lubricants suitable for economical industrial processing to obtain eco-friendly finished products.

CO5 a) Ascertain construction, mechanism efficiency of electrochemical cells, solar cell fuel cells

b) Explain corrosion and develop economical prevention techniques.

TEXT BOOK

1 TEXT BOOK of Chemistry for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi,2017-18.

2 Agarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi,2015.

3 C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd.,2011.

4 Dara,S.S.&Dr.S.S.Umare, Engineering Chemistry,S. Chand. Publication, NewDelhi, 2015.

5 Jain&Jain, Engineering Chemistry, Dhanpat Raiand Sons;NewDelhi,2015.

REFERENCE BOOK

1 Dr.Vairam,S.,EngineeringChemistry,WileyIndiaPvt.Ltd.,NewDelhi,2013.

2 Dr. G. H. Hugar & Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol.II, NITTTR, Chandigarh, Publications,2013,14.

3 Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd.,2014.

4 www.chemguide.co.uk/atommenu.html (Atomic structure and chemicalbonding)

5 www.visionlearning.com (Atomic structure and chemicalbonding)

6 www.chem1.com (Atomic structure and chemical bonding)

7 https://www.wastewaterelearning.com/elearning/ (WaterTreatment)

8 www.capital-refractories.com (Metals, Alloys, Cement, and RefractoryMaterials)

9 www.em-ea.org/guide%20books/book /2.1%20fuels%20and%20combustion.pdf (Fuel andCombustion)

10 www.chemcollective.org (Metals,Alloys)

11 www.wqa.org(Water Treatment)

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HS101: COMMUNICATION SKILLS IN ENGLISH

	L	T	P	C
COURSE OBJECTIVES	2	0	0	2

Communicationskillsplayanimportantroleincareerdevelopment.Thiscourseaimsatintroducing basic concepts of communication skills with an emphasis on developing personality of the students. Thus, the main objectives of this course are:

1 To develop confidence in speaking English with correct pronunciation.

2 To develop communication skills of the students i.e. listening, speaking, reading and writing skills.

3 To introduce the need for personality development- Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc.

Unit 1   COMMUNICATION: THEORY AND PRACTICE   5

- Basics of communication: Introduction, meaning and definition, process of communication etc.

- Types of communication: formal and informal, verbal, non-verbal and written Barriers to effective communication.

- **7** Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).

- Art of Effective communication,
  - ➢ Choosing words
  - ➢ Voice
  - ➢ Modulation
  - ➢ Clarity
  - ➢ Time
  - ➢ Simplification of words
  - ➢ Technical Communication.

Unit 2   SOFT SKILLS FOR PROFESSIONAL EXCELLENCE   5

- Introduction: Soft Skills and Hard Skills.

- Importance of soft skills.

- Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligence and empathy etc.

- Applying soft skills across cultures.

- Case Studies.

Unit 3   READING COMPREHENSION   6

Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts:

Section-1

Malgudi Days: R.K. Narayan
The Room on Roof: Ruskin Bond "The Gift of the Magi" by O. Henry
"Uncle Podger Hangs a Picture" Jerome K. Jerome

Section-2

Night of the Scorpion by Nissim Ezekiel,
Stopping by Woods on a Snowy Evening by Robert
Frost, Where the Mind is Without Fear by
Rabindranath Tagore, Ode to Tomatoes by Pablo
Neruda,

Unit 4   PROFESSIONAL WRITING   7

The art of précis writing, Letters: business and personnel,
Drafting e-mail, notices, minutes of a meeting etc.

Filling- up different forms such as banks and on-line forms for placement etc.

Unit 5   VOCABULARY AND GRAMMAR   7

Total: 30 Hour

COURSE OUTCOMES:
At the end of the study of this course, the students will be able to

CO1   Develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.

CO2   Communicate effectively in presentations, interviews and other forms of oral communication

CO3   Draft emails and letters professionally

CO4   Develop non-verbal communication such as proper use of body language and gestures.

TEXT BOOK
1   J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980.
2   Lindley Murray, An English Grammar: Comprehending Principles and Rules. London: Wilson and Sons, 1908.
3   Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Re- vised Edition 2018)

REFERENCE BOOK
1   Margaret M. Maison. Examine your English. Orient Longman: New Delhi, 1964.
2   M. Ashraf Rizvi. Effective Technical Communication. Mc-Graw Hill: Delhi, 2002.
3   John Nielson. Effective Communication Skills. Xlibris, 2008.
4   Oxford Dictionary
5   Roget's Thesaurus of English Words and Phrases
6   Collin's English Dictionary

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ES101: ENGINEERING GRAPHICS

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

1   To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.

2   To develop drafting and sketching skills, to know the applications of drawing equipment, and get familiarize with Indian Standards related to engineering drawings.

3   To develop skills to visualize actual object or a part of it, on the basis of drawings.

4   To develop skills to translate ideas into sketches and to draw and read various

engineering curves, projections and dimensioning styles.

5   Tounderstandthebasiccommandsanddevelopbasicskillsrelatedtocomputeraideddrafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD.

S. No.	Practical Exercises	Unit No.	Approx. Hrs
1	Draw horizontal, Vertical, 30 degree, 45 degree, 60 and 75 degrees lines, different types of lines, dimensioning styles using Tee and Set squares/ drafter. (do this exercise in sketch book)	I	02
2	Write alphabets and numerical (Vertical only) (do this exercise in sketch book)	I	02
3	Draw regular geometric constructions and redraw the given figure (do this exercise in sketch book) Part I	II	02
4	Draw regular geometric construction and redraw the given figure (do this exercise in sketch book) Part II	II	02
5	Draw a problem on orthographic projections using first angle method of projection having plain surfaces and slanting. Part I	III	02
6	Draw another problem on orthographic projections using first angle method of projection having slanting surfaces with slots. Part II	III	02
7	Drawtwoproblemsonorthographicprojectionsusingfirstanglemethod ofprojection having cylindrical surfaces. Part I	III	02
8	Draw two problems on Isometric view of simple objects having plain and slanting surface by using natural scale. Part I	IV	02
9	Draw some problems on Isometric projection of simple objects having cylindrical surface by using isometric scale. Part I	IV	02
10	Draw free hand sketches/ conventional representation of machine elements in sketch book such as, nuts, bolts, washers. Part I	V	02
11	Problem based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views in sketch book. Part I	III, II, V	02
12	Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD (Print out should be a part of progressive assessment). Part I	V	02
13	Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD (Printout should be a part of progressive assessment). Part II	V	02
14	Draw basic 2D entities like: Circular and rectangular array using AutoCAD (Printout should be a part of progressive assessment). Part III	V	02
15	Draw blocks of 2D entities comprises of Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using	V	02

	AutoCAD (Print out should be a part of progressive assessment). Part IV		
16	Drawbasicbranchspecificcomponentsin2DusingAutoCAD (Printout should be a part of term work). Part I	VI	02
17	Draw complex branch specific components in 2D using AutoCAD (Print should be a part of progressive assessment). Part I	VI	02
	Total		34

Unit 1   BASIC ELEMENTS OF DRAWING   8

Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications.

Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale.

Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning.

Geometrical and Tangency constructions. (Redraw the figure)

Unit 2   ORTHOGRAPHIC PROJECTIONS   8

Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination).

Introduction to orthographic projection, First angle and Third angle method, their symbols.

Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, cylindrical surfaces. (use First Angle Projection method only)

Unit 3   ISOMETRIC PROJECTIONS   8

Introduction to isometric projections. Isometric scale and Natural scale.

Isometric view and isometric projection.

Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection.

Unit 4   FREE HAND SKETCHES OF ENGINEERING   6
             ELEMENTS

Free hand sketches of machine elements: nuts, bolts, washer, (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching) Free hand sketches of orthographic view (on squared graph paper)

Unit 5   COMPUTER AIDED DRAFTING INTERFACE   7

Computer Aided Drafting: concept.

Hardware and various CAD software available.

System requirements and Understanding the interface.

Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon.

File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit.

Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.

Unit 6   COMPUTER AIDED DRAFTING   8

Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Poly Line.
Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates.
Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers.
Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions.
Dim scale variable. Editing dimensions.
Text: Single line Text, Multiline text.
Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

Total: 45 Hour

COURSE OUTCOMES:
At the end of the study of this course, the students will be able to
   CO1   Select and construct appropriate drawing scales, use drawing Equipment's with Indian Standards of engineering drawing.
   CO2   Draw views of given object and components.
   CO3   Sketch orthographic projections into isometric projections and vice versa.
   CO4   Apply computer aided drafting tools to create 2D engineering drawings.

TEXT BOOK
   1   Bureau of Indian Standards. Engineering Drawing Practice for Schools and Colleges IS: Sp-46. BIS. Government of India

2   Bhatt, N. D. Engineering Drawing. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93- 80358-17-8

3   Jain & Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978- 93-86173-478)

4   Jolhe, D. A. Engineering Drawing. Tata McGraw Hill Edu. New Delhi, 2010; ISBN: 978-0-07- 064837-

5   Dhawan, R. K. Engineering Drawing. S. Chand and Company, New Delhi; ISBN: 81-219-1431-0

6   Shah, P. J. Engineering Drawing. S. Chand and Company, New Delhi, 2008, ISBN:81-219-2964-4.

7   Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. Engineering Graphics with AutoCAD. PHI Learning Pri- vate Limited-New Delhi (2010); ISBN: 978-8120337831.

    Jeyapoovan, T. Essentials of Engineering Drawing and Graphics using AutoCAD. Vikas Publishing HousePvt. Ltd, Noida, 2011; ISBN: 978-8125953005.

8   Autodesk. AutoCAD User Guide. Autodesk Press, USA, 2015.

9   Sham, Tickoo. AutoCAD 2016 for Engineers and Designers. Dreamtech Press; Galgotia Publication, New Delhi, 2015; ISBN 978-9351199113.

REFERENCE BOOK

1   https://www.youtube.com/watch?v=TJ4jGyD-WCw

2   https://www.youtube.com/watch?v=dmt6_n7Sgcg

3   https://www.youtube.com/watch?v=_MQScnLXL0M

4   https://www.youtube.com/watch?v=3WXPanCq9LI

5   https://www.youtube.com/watch?v=fvjk7PlxAuo

6   http://www.me.umn.edu/coursesme2011/handouts/engg%20graphics.pdf

7   https://www.machinedesignonline.com

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ES103 ENGINEERING WORKSHOP PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

1   To understand basic engineering processes for manufacturing and assembly.

2   To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's.

3   To understand and interpret job drawings, produce jobs, and inspect the job for specified dimensions.

4   To understand the various types of wiring systems and acquire skills in house wiring.

5   To understand, operate, control different machines and equipment's adopting safety

practices.

Unit 1   CARPENTRY   8
- i)   Demonstration of different wood working tools/machines.
- ii)   Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc.
- iii)   One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.

Unit 2   FITTING   9
- i)   Demonstration of different fitting tools and drilling machines and power tools
- ii)   Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc.
- iii)   One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.

Unit 3   WELDING   8
- i)   Demonstration of different welding tools / machines.
- ii)   Demonstration on Arc Welding, Gas Welding, of broken parts with welding.
- iii)   One simple job involving butt and lap joint.

Unit 4   SHEET METAL WORKING   8

- i)   Demonstration of different sheet metal tools / machines.
- ii)   Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, and riveting.
- iii)   One simple job involving sheet metal operations and riveting.

Unit 5   ELECTRICAL HOUSE WIRING   8
   Practice on simple lamp circuits
- i)   one lamp controlled by one switch by surface conduit wiring,
- ii)   Lamp circuits- connection of lamp and socket by separate switches,
- iii)   Connection of Fluorescent lamp/tube light,
- iv)   Simple lamp circuits-in- stall bedroom lighting. And
- v)   Simple lamp circuits- install stair case wiring.

Unit 6   DEMONSTRATION   4
- i)   Demonstration of measurement of Current, Voltage, Power and Energy.
- ii)   Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories.
- iii)   Tools for Cutting and drilling.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines.

CO2 Draw and complete jobs as per specifications in allotted time.

CO3 Inspect the job for the desired dimensions and shape.

CO4 Operate, control different machines and equipment's adopting safety practices.

REFERENCE BOOK

1 S.K. Hajara Chaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015.

2 B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi2014.

3 K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad2014.

4 Kents Mechanical Engineering Hand book, John Wiley and Sons, NewYork.

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BS107: APPLIED CHEMISTRY LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

There are numerous number of materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. The course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.

LIST OF PRACTICALS:

Perform any 12 (twelve) Laboratory Practicals.

VOLUMETRIC AND GRAVIMETRIC ANALYSIS

1. Preparation of standard solution of oxalic acid or potassium permanganate.
2. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
3. Standardization of $KMnO_4$ solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by $KMnO_4$ solution.
4. Iodometric estimation of copper in the copper pyriteore.
5. Volumetric estimation of total acid number (TAN) of given oil.
6. Volumetric estimation of
   a) Total hardness of given water sample using standard EDTA solution.
   b) Alkalinity of given water sample using 0.01M sulphuric acid
7. Proximate analysis of coal
   a) Gravimetric estimation moisture in given coal sample
   b) Gravimetric estimation ash in given coal sample

INSTRUMENTAL ANALYSIS

1. Determine the conductivity of given water sample.
2. Determination of the Iron content in given cement sample using colorimeter.

3. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
4. Determination of viscosity of lubricating oil using Red wood viscometer.
5. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.
6. To verify the first law of electrolysis of copper sulfate using copper electrode.
7. Construction and measurement of EMF of electro chemical cell (Daniel cell).
8. To study the effect of dissimilar metal combination.

Total   **45 Hour**

COURSE OUTCOMES:
At the end of the study of this course, the students will be able to

CO1   Differentiate different methods of quantitative analysis.
CO2   Perform quantitative analysis using instruments.
CO3   Use various apparatus for precise measurements.
CO4   Construct different electrochemical cells used in developing batteries.
CO5   Appreciate methods of corrosion abetments.

TEXT BOOK
1   TEXTBOOK of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi,2017-18.
2   Dr.G.H.Hugarand ProfA.N.Pathak, Applied Chemistry Laboratory Practices, Vol.I and Vol.II, NITTTR, Chandigarh, Publications, 2013-14.
3   Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd.,2014.

REFERENCE BOOK
1   Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi,2015.

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HS103: SPORTS AND YOGA

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

1   To make the students understand the importance of sound health and fitness principles as they relate to better health.
2   To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.
3   To create a safe, progressive, methodical and efficient activity based plan to enhance improvement and minimize risk of injury.
4   To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.

Unit 1   INTRODUCTION TO PHYSICAL EDUCATION
- Meaning & definition of Physical Education
- Aims & Objectives of Physical Education
- Changing trends in Physical Education

Unit 2   OLYMPIC MOVEMENT
- Ancient & Modern Olympics (Summer & Winter)
- Olympic Symbols, Ideals, Objectives & Values
- Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayan chand Award, Major Dhyan chand Khel Ratna Award etc.)

Unit 3   PHYSICAL FITNESS, WELLNESS & LIFESTYLE
- Meaning & Importance of Physical Fitness & Wellness
- Components of Physical fitness o Components of Health related fitness
- Components of wellness o Preventing Health Threats through Lifestyle Change
- Concept of Positive Lifestyle

Unit 4   FUNDAMENTALS OF ANATOMY & PHYSIOLOGY
IN PHYSICAL EDUCATION, SPORTS AND YOGA
- Define Anatomy, Physiology & Its Importance
- Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

Unit 5   KINESIOLOGY, BIOMECHANICS & SPORTS
- Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports
- Newton's Law of Motion & its application in sports.
- Friction and its effects in Sports.

Unit 6   POSTURES
- Meaning and Concept of Postures.
- Causes of Bad Posture.
- Advantages & disadvantages of weight training.
- Concept & advantages of Correct Posture.
- Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis.
- Corrective Measures for Postural Deformities

Unit 7   YOGA
- Meaning & Importance of Yoga
- Elements of Yoga
- Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas
- Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana)
- Relaxation Techniques for improving concentration - Yog-nidra

Unit 8   YOGA & LIFESTYLE
- Asanas as preventive measures.

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

Unit 9   TRAINING AND PLANNING IN SPORTS
- Meaning of Training
- Warming up and limbering down
- Skill, Technique & Style
- Meaning and Objectives of Planning.
- Tournament – Knock-Out, League/Round Robin & Combination

Unit 10   PSYCHOLOGY & SPORTS
- Definition & Importance of Psychology in Physical Edu. & Sports
- Define & Differentiate Between Growth & Development
- Adolescent Problems & Their Management
- Emotion: Concept, Type & Controlling of emotions
- Meaning, Concept & Types of Aggressions in Sports.
- Psychological benefits of exercise.
- Anxiety & Fear and its effects on Sports Performance.
- Motivation, its type & techniques.
- Understanding Stress & Coping Strategies.

Unit 11   DOPING
- Meaning and Concept of Doping
- Prohibited Substances & Methods
- Side Effects of Prohibited Substances

Unit 12   SPORTS MEDICINE
- First Aid – Definition, Aims & Objectives.
- Sports injuries: Classification, Causes & Prevention.
- Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

Unit 13   SPORTS / GAMES
Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc.

- History of the Game/Sport.
- Latest General Rules of the Game/Sport.
- Specifications of Play Fields and Related Sports Equipment.
- Important Tournaments and Venues.
- Sports Personalities.
- Proper Sports Gear and its Importance.

Total: 45 Hour

COURSE OUTCOMES:
At the end of the study of this course, the students will be able to

CO1	Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.
CO2	Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.
CO3	Learn breathing exercises and healthy fitness activities
CO4	Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.
CO5	Perform yoga movements in various combination and forms.
CO6	Assess current personal fitness levels.
CO7	Identify opportunities for participation in yoga and sports activities.
CO8	Develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc.
CO9	Improve personal fitness through participation in sports and yogic activities.
CO10	Develop understanding of psychological problems associated with the age and lifestyle. First Year Curriculum Structure Common to All Branches 34
CO11	Demonstrate an understanding of sound nutritional practices as related to health and physical performance.
CO12	Assess yoga activities in terms of fitness value.
CO13	Identify and apply injury prevention principles related to yoga and physical fitness activities.
CO14	Understand and correctly apply biomechanical and physiological principles elated to exercise and training.

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

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HS105: COMMUNICATION SKILLS IN ENGLISH LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

Communication skills play an important role in career development. This lab course aims at actively involving students in various activities to improve their communication skills with an emphasis on developing personality of the students. Thus, the objectives of this course are:

1	To develop listening skills for enhancing communication.
2	To develop speaking skills with a focus on correct pronunciation and fluency.
3	To introduce the need for Personality development-Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc. for that purpose group discussion, extempore and other activities should be conducted during lab classes.

| Unit 1 | LISTENING SKILLS | 7 |

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

| Unit 2 | INTRODUCTION TO PHONETICS | 8 |

Sounds: consonant, vowel, diphthongs, etc. transcription of words (IPA), weak forms, syllable division, word stress, intonation, voice etc.

| Unit 3 | SPEAKING SKILLS | 8 |

Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

| Unit 4 | BUILDING VOCABULARY | 7 |

Etymological study of words and construction of words, phrasal verbs, foreign phrases, idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1	Communicate effectively with an increase in their confidence to read, write and speak English fluently.
CO2	Demonstrate a significant increase in word power.
CO3	The variety of exercises and activities that will be conducted in the Language Lab will develop their skills needed to participate in a conversation like listening carefully and respectfully to others' view points; articulating their own ideas and questions clearly and overall students will be able to prepare, organize, and deliver an engaging oral presentation.
CO4	Develop non-verbal communication such as proper use of body language and gestures.
CO5	Communicate effectively with an increase in their confidence to read, write and speak English fluently.

TEXTBOOK

| 1 | Daniel Jones. *The Pronunciation of English.* Cambridge: Cambridge University Press 1956. |

2   James Hartman & etal. Ed. *English Pronouncing Dictionary.* Cambridge: Cambridge University Press, 2006.

3   Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed.2018)

REFERENCE BOOK

1   J.D.O'Connor. *Better English Pronunciation.* Cambridge: Cambridge University Press, 1980.

2   Lindley Murray. *An English Grammar: Comprehending Principles and Rules.* London: Wilson and Sons, 1908.

3   Margaret M. Maison. *Examine your English.* Orient Longman: New Delhi: 1964.

4   J.Sethi & et al. *A Practice Course in English Pronunciation.* New Delhi: Prentice Hall, 2004.

5   Pfeiffer, William Sanborn and T.V.S Padmaja. *Technical Communication: A Practical Approach*. 6th ed. Delhi: Pearson,2007.

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AU102: ENVIRONMENTAL SCIENCE

		L	T	P	C
COURSE OBJECTIVES		2	0	0	0

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

1   Solve various engineering problems applying ecosystem to produce eco – friendly products.

2   Use relevant air and noise control method to solve domestic and industrial problems.

3   Use relevant water and soil control method to solve domestic and industrial problems.

4   To recognize relevant energy sources required for domestic and industrial applications.

5   Solve local solid and e-waste problems.

Unit 1   ECO SYSTEM   9

Structure of ecosystem, Biotic & Abiotic components

Food chain and food web

Aquatic (Lentic and Lotic) and terrestrial ecosystem

Carbon, Nitrogen, Sulphur, Phosphorus cycle.

Global warming -Causes, effects, process, Green House Effect, Ozone depletion

Unit 2   AIR AND, NOISE POLLUTION   9

Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler)

Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator)

Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler

Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000

Unit 3   WATER AND SOIL POLLUTION   9

Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis).
Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

Unit 4   RENEWABLE SOURCES OF ENERGY   9

Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer, Solar stills.
Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas.
Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.
New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy

Unit 5   SOLID WASTE MANAGEMENT, ISO 14000 &   9
             ENVIRONMENTAL MANAGEMENT

Solid waste generation- Sources and characteristics of Municipal solid waste, E- waste, biomedical waste.
Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries.
Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill),
Hazardous waste
Air quality act 2004, air pollution control act 1981 and water pollution and control act1996.
Structure and role of Central and state pollution control board.
Concept of Carbon Credit, Carbon Footprint.
Environmental management in fabrication industry.
ISO14000: Implementation in industries, Benefits.

Total: 45 Hour

COURSE OUTCOMES:
At the end of the study of this course, the students will be able to
   CO1   Understand the ecosystem and terminology and solve various engineering problems applying ecosystem knowledge to produce eco – friendly products.
   CO2   Understand the suitable air, extent of noise pollution, and control measures and acts.
   CO3   Understand the water and soil pollution, and control measures and acts.

CO4	Understand different renewable energy resources and efficient process of harvesting.
CO5	Understand solid Waste Management, ISO 14000 & Environmental Management.
CO6	Different methods of teaching and media to be used to attain classroom attention.
CO7	Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
CO8	15-20% of the topics which are relatively simpler of descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
CO9	Micro-projects may be given to group of students for hand-on experiences
C10	Encouraging students to visit to sites such as Railway station and research establishment around the institution.

TEXT BOOK

1. S.C. Sharma & M.P. Poonia, Environmental Studies,Khanna Publishing House,NewDelhi
2. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011. First Year Curriculum Structure Common to All Branches 52
3. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099
4. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.
5. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi
6. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.
7. Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07- 451871-8.
8. Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978, ISBN: 9780070354760.
9. Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford, UK; 2013. ISBN: 9780123978257.
10. Patvardhan, A.D, Industrial Solid Waste, Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6
11. Metcalf & Eddy, Waste Water Engineering, Mc-Graw Hill, New York, 2013, ISBN: 077441206.
12. Keshav Kant, Air Pollution & Control, Khanna Publishing House, New Delhi (Edition 2018)
13. Open source software and website address:
    1) www.eco-prayer.org
    2) www.teriin.org
    3) www.cpcp.nic.in
    4) www.cpcp.gov.in
    5) www.indiaenvironmentportal.org.in

6) www.whatis.techtarget.com
7) www.sustainabledevelopment.un.org
8) www.conserve-energy-future.com

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SEMESTER II

BS102: MATHEMATICS - II

	L	T	P	C

COURSE OBJECTIVES   3   1   0   4

This course is designed to give a comprehensive coverage at an introductory level to the subject of matrices, Integral Calculus coordinate geometry, Basic elements of vector algebra and Testing of Hypothesis.

Unit 1   DETERMINANTS AND MATRICES   12

Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix in verse method to solve a system of linear equations in 3variables.

Unit 2   INTEGRAL CALCULUS   12

Integration as inverse operation of differentiation. Simple integration by substitution, by arts and by partial fractions (for linear factors only). Use of formulas $\int_0^{\frac{\pi}{2}} sin^n x \, dx$, $\int_0^{\frac{\pi}{2}} cos^n x \, dx$ and $\int_0^{\frac{\pi}{2}} sin^m x \, cos^n x \, dx$ for solving problems Where m and n are positive integers.

Unit 3   CO-ORDINATE GEOMETRY   12

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. General equation of a circle and its characteristics. To find the equation of a circle, given:

     i. Centre and radius,

     ii.   Three points lying on it and

     iii.   Coordinates of end points of a diameter;

Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

Unit 4   VECTOR ALGEBRA   12

Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

Unit 5   TESTING OF HYPOTHESIS   12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean -Tests based on t for single mean, Chisquare and F distributions   - Goodness of fit.

Total: 60 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1   Appreciate the importance of the Determinants are the factors that scale different parameterizations so that they all produce same overall integrals, i.e. they are capable of encoding the inherent geometry of the original shape.

CO2   Apply Integration for cumulative effect.

CO3   Relate the connection between algebra and geometry through graphs of lines and curves.

CO4   Apply the concept of testing of hypothesis for small and large samples in real life problems.

TEXTBOOK

1   B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.

2   G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.

3   S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.

REFERENCE BOOK

1   Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.

2   ReenaGarg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

3   Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

4   Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014

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BS103: APPLIED PHYSICS

L	T	P	C
2	1	0	3

COURSE OBJECTIVES

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.

Unit 1   PHYSICAL QUANTITIES AND MEASUREMENTS   9

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI

units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications, Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error estimation and significant figures.

Unit 2   PROPERTIES OF MATTER   9

Elasticity: definition of stress and strain, moduli of elasticity (definition only), Hooke's law, stress-strain curve and its significance.

Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems.

Moment of inertia and its physical significance, Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).

Friction: concept, types, laws of limiting friction, coefficient of friction, and its engineering applications

Unit 3   HEAT   9

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), scales of temperature and their relationship, Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them, Coefficient of thermal conductivity, engineering applications.

Unit 4   WAVE MOTION AND OPTICS   9

Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, amplitude, phase, phase difference, Free, damped and forced vibrations with examples, resonance.

Basic optical laws: reflection and refraction, refractive index, image formation by lenses, lens formula, magnification, Simple microscope and its uses, Total internal reflection, Critical angle and conditions for total internal reflection, Lasers: Energy levels, spontaneous and stimulated emission; population inversion, laser characteristics, applications of lasers.

Unit 5   ELECTRICITY AND ELECTRONICS   9

Electric Current and its units, Resistance and its units, Conductance, Series and parallel combination of resistances. Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications, Capacitance and its units, Series and parallel combination of capacitors.

Insulator, semi-conductor, conductor, intrinsic and extrinsic semiconductors, p-n junction, junction diode, forward and reverse biased junction diodes, Transistor; description and three terminals, Working of PnP and NpN transistor.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to

CO1 Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.

CO2 A) Explain Hooke's law and its significance.

B) Describe the viscosity of liquids, coefficient of viscosity and the various factors affecting its value and determine viscosity of an unknown fluid using Stokes' Law and the terminal velocity.

C) Describe forms of friction and methods to minimize friction between different surfaces.

CO3 A) Illustrate the terms; heat and temperature, measure temperature in various processes on different scales (Celsius, Fahrenheit, and Kelvin etc.).

B) Distinguish between conduction, convection and radiation; identify different methods for reducing heat losses and mode of heat transfer between bodies at different temperatures

CO4 Establish wave parameters: frequency, amplitude, wavelength, and velocity.

CO5 A) Illustrate the conditions for light amplification in various LASER and laser based instruments and optical devices.

B) Differentiate between insulators, conductors and semiconductors

TEXT BOOK

1 TEXT BOOK of Physics for Class XI & XII (Part-I, Part-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. NewDelhi
4 A TEXT BOOK of Optics, N.Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.

REFERENCE BOOK

1 Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, NewDelhi
2 Engineering Physics by DK Bhhatacharya &Poonam Tandan; Oxford University Press,New Delhi.
3 Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.

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ES102: INTRODUCTION TO IT SYSTEM

L	T	P	C

COURSE OBJECTIVES

3	0	0	3

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

Unit 1   9

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. General understanding of various computer hardware components — CPU, Memory, Display, Keyboard, Mouse, HDD and other Peripheral Devices.

Unit 2   9

OS Installation (Linux and MS Windows), Unix Shell and Commands,*

Unit 3   9
Basics of HTML & CSS, Making Basic Personal Web-Page.

Unit 4   9
Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.
(MS-office)

Unit 5   9
Introduction of C language: History, Basic data type, Basic conditional statement, Simple
program.

Total: 45 Hour

COURSE OUTCOMES:
At the end of the study of this course, the students 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,
  protect information and computers from basic abuses/ attacks.

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ES104: FUNDAMENTALS OF ELECTRICAL, ELECTRONICS ENGINEERING

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

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.

Unit 1   OVERVIEW OF DIGITAL ELECTRONICS,   9
           ELECTRONIC COMPONENTS & SIGNALS
Passive & Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors,
FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current,
periodic/non-periodic signals, average, rms, peak values, different types of signal
waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current
sources. Boolean Algebra & 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).

Unit 2   OVERVIEW OF ANALOG CIRCUITS   9
Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop
configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.

Unit 3   ELECTRIC AND MAGNETIC CIRCUITS   9

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.

Unit 4   A.C. CIRCUITS   9

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, Power in A. C. Circuits, power triangle.

Unit 5   TRANSFORMER AND MACHINES   9

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 motors.

Total: 45 Hour

REFERENCE BOOK

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:
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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ES106: ENGINEERING MECHANICS

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

Following 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.

Unit 1   BASICS OF MECHANICS AND FORCE SYSTEM   9

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force— Orthogonal components of a force, moment of a force, Varignon's Theorem. Composition of forces – Resultant, analytical method for determination of resultant for concurrent, co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Unit 2   EQUILIBRIUM   9

Equilibrium and, Free body and Free body diagram, Analytical and graphical methods of analyzing equilibrium. Lami's Theorem – statement and explanation, Application for various engineering problems. Types of beam, supports (simple, roller and fixed) and loads acting on beam (vertical point load, uniformly distributed load). Beam reaction for cantilever, simply supported beam without overhang – subjected to combination of Point load and uniformly distributed load.

Unit 3   FRICTION   9

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane.

Unit 4   CENTROID AND CENTRE OF GRAVITY   9

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle). Centroid of composite figures composed of not more than three geometrical figures. Centre of Gravity of simple solids (Cube, cuboid, cone, and cylinder).

Unit 5   SIMPLE LIFTING MACHINE   9

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility. Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Simple screw jack.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1   Identify the force systems for given conditions by applying the basics of mechanics.
CO2   Determine unknown force(s) of different engineering systems.
CO3   Apply the principles of friction in various conditions for useful purposes.
CO4   Find the centroid and centre of gravity of various components in engineering systems.
CO5   Select the relevant simple lifting machine(s) for given purposes.

TEXTBOOK
1   D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi(2008)
2   Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.
3   Bansal R K, A TEXT BOOK of Engineering Mechanics, Laxmi Publications
4   Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.

REFERENCE BOOK
1   Dhade, Jamadar &Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthiGruh.
2   Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cam- bridge University Press.
3   Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

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BS107: APPLIED PHYSICS LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

Study of Applied Physics aims to give an understanding of physical world by observations and predictions. 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 /ACTIVITIES (To perform minimum 10 practicals).

1. To measure length, radius of a given cylindrical object (test tube and beaker) using a Vernier Caliper and find volume of each object.
2. To determine diameter of a wire and thickness of cardboard using a screw gauge.
3. To find the co-efficient of friction between wood and glass using a horizontal board.
4. To determine force constant of a spring using Hooke's Law.
5. To find the moment of inertia of a fly wheel.
6. To find the viscosity of a given liquid (Glycerine) by Stoke's law.
7. Tomeasureroomtemperatureandtemperatureofahotbathusingmercurythermometer and convert it into different scales.

8. To determine focal length and magnifying power of a convex lens.
9. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
10. To verify Ohm's law by plotting graph between current and potential difference.
11. To verify laws of resistances in series and parallel combination.
12. To draw V-I characteristics of a semiconductor diode and determine its knee voltage.

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, etc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.

CO2 Appreciate role of friction and measure co-efficient of friction between different surfaces.

CO3 Describe and verify Hooke's law and determine force constant of spring body.

CO4 Determine M.I. of a rotating body(flywheel)

CO5 Determine viscosity of a given liquid by stoke's law

CO6 Measure temperature under different conditions and different scales of temperature measurements.

CO7 Apply knowledge of optics to determine focal length and magnifying power of optical lenses.

CO8 Work with laboratory lasers and measure the wavelength of the light emitted from a laser.

CO9 Verify Ohm's law for flow of current.

CO10 Quantify resistances and verify laws of series and parallel combination of resistances.

REFERENCE BOOK

1 TEXT BOOK 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 Publications(P)Ltd.,
3 Practical Physics by C. L. Arora, S. Chand Publication.
4 e-books/e-tools/ learning physics software/YouTube videos/websites etc.

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ES108: INTRODUCTION TO IT SYSTEMS LAB

L	T	P	C
0	0	2	1

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.

S. 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.		

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students 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, protect information and computers from basic abuses/attacks

REFERENCE BOOK

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
5   Shell programming, by Mokhtar Ebrahim, Andrew Mallett.
6   IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme,
7   CISC Press, Pearson Education.
8   PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).

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ES110: FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB

L   T   P   C

COURSE OBJECTIVES   0   0   2   1

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.

S.	Practical Outcomes (PrOs)	Approx.

No		Hrs
1	Determine the permeability of magnetic material by plotting its B-H curve	02*
2	Measure voltage, current and power in 1-phase circuit with resistive load	02*
3	Measure voltage, current and power in R-L series circuit.	02*
4	Determine the transformation ratio (K) of 1-phase transformer	02
5	Connect single phase transformer and measure input and output quantities	02
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	Use multimeter to measure the value of given resistor	02
12	Use LCR-Q tester to measure the value of given capacitor and inductor	02
13	Determine the value of given resistor using digital multimeter to confirm with colour code.	02*
14	Test the PN-junction diodes using digital multimeter.	02*
15	Test the performance of PN-junction diode.	02
16	Test the performance of Zener diode	02
17	Test the performance of LED.	02
18	Identify three terminals of a transistor using digital multimeter	02
19	Test the performance of NPN transistor.	02*
20	Determine the current gain of CE transistor configuration	02
21	Test the performance of transistor switch circuit.	02
22	Test the performance of transistor amplifier circuit	02
23	Test Op-Amp as amplifier and Integrator	02
	Total	46

Total 30 Hours

COURSE OUTCOMES:
At the end of the study of this course, the students will be able to

CO1   Understand basic principle and operation of electric circuits and machines.

CO2   Solve basic problems related to electrical circuits and machines. Explain the operation of different electrical technologies.

CO3   Demonstrate an understanding of the control systems.

CO4   Understand the basic circuit elements
CO5   Understand different types of signal waveforms.
CO6   Understand logic gates and apply them in various electronic circuits.
CO7   Understand the basic concepts of op-amps, and their applications.
CO8   Use relevant electric/electronic protective devices safely.

REFERENCE BOOK

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 Eduction,
    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
11 en.wikipedia.org/wiki/Transformer
12 www.animations.physics.unsw.edu.au//jw/AC.html
13 www.alpharubicon.com/altenergy/understandingAC.htm
14 www.electronics-tutorials
15 learn.sparkfun.com/tutorials/transistors
16 www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
17 www.technologystudent.com/elec1/transis1.htm
18 www.learningaboutelectronics.com
19 www.electrical4u.com

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ES112: ENGINEERING MECHANICSLAB

		L	T	P	C
COURSE OBJECTIVES		0	0	2	1

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 Practical to be performed:

1   To study various equipments related to Engineering Mechanics.
2   To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3   To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4   Derive Law of machine using Worm and worm wheel.
5   Derive Law of machine using Single purchase crab.
6   Derive Law of machine using double purchase crab.
7   Derive Law of machine using Weston's differential or wormed geared pulley block.
8   Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
9   Determine resultant of concurrent force system graphically.
10   Determine resultant of parallel force system graphically.
11   Verify Lami's theorem.
12   Study forces in various members of Jib crane.
13   Determine support reactions for simply supported beam.
14   Obtain support reactions of beam using graphical method.
15   Determine coefficient of friction for motion on horizontal and inclined plane.
16   Determine centroid of geometrical plane figures.

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1   Identify the force systems for given conditions by applying the basics of mechanics.
CO2   Determine unknown force(s) of different engineering systems.
CO3   Apply the principles of friction in various conditions for useful purposes.
CO4   Find the centroid and centre of gravity of various components in engineering systems.
CO5   Select the relevant simple lifting machine(s) for given purposes.

TEXT BOOK

1   Bedi D.S., Engineering Mechanics, Khanna Publishing House
2   Khurmi, R.S., Applied Mechanics, S.Chand & Co. New Delhi.
3   Bansal R K, A TEXT BOOK of Engineering Mechanics, Laxmi Publications
4   Ramamrutham, Engineering Mechanics, S.,S Chand & Co. New Delhi.

REFERENCE BOOK

1   Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
2   Ram, H. D.; Chauhan, A. K. Foundations and Applications of Applied Mechanics, Cambridge University Press.
3   Meriam, J. L., Kraige, L.G. , Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.