Semester: I

SNO	COURSE TITLE	COURSE CODE	TEACHING SCHEDULE PER WEEK				CREDITS	EVALUATION SCHEME							
			L	T	P	TOTAL		INTERNAL			EXTERNAL			All TO
								Th.	Pr.	Tot.	Th.	Pr.	Tot.	
1	English	ENGL0111	2	0	2	4	5.5	40	25	65	60	50	110	175
2	Applied Mathematics-I	MATH0138	3	1	0	4	4.0	40	00	40	60	00	60	100
3	Applied Physics-I	PHYS0117	2	1	2	5	5.5	40	25	65	60	50	110	175
4	Engineering Graphics	MECH1103	1	0	2	5	3.0	40	25	65	60	25	85	150
5	Computer Fundamentals	CSEN1108	3	0	0	3	4.0	40	00	40	60	00	60	100
6	Information Technology Lab	CSEN1109	0	0	2	2	2.0	00	50	50	00	50	50	100
		Total	11	02	08	21	24		125	325	300	175	475	800

MODULE NAME: ENGLISH
Module Code: ENGL0111

Knowledge of English Language plays an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

• Understand the importance of good communication
• Describe process of communication.
• Explain, Compare and re-write the types of communication
• Identify and match the parts of speech
• Rewrite sentences correctly
• Modify sentences and relate them with real life situations.
• Reproduce and match words and sentences in a paragraph.
• Re-write the sentences according to given situation.
• Relate and use various words using proper vocabulary and grammar.
• Write the various types of paragraphs, notices and composition on picture with appropriate format.

DETAILED CONTENTS

1. Basics of Communication
1.1. Definition and process of communication
1.2. Types of communication – Verbal (Listening, Speaking, Reading and Writing) and Non-verbal
2. Functional Grammar
2.1. Noun and Pronoun
2.2. Punctuation
2.3. Preposition
2.4. Conjunction
2.5. Tenses (verb (Main verb and Auxiliary verb)
3. Reading Skills
3.1. Unseen passage for comprehension. Based upon the passage, flowing aspects may be covered
• Questions from the passage
• One-word substitution
• Prefixes and Suffixes
• Antonyms and Synonyms etc.
4. Writing skills
4.1. Correspondence – Business and official
4.2. Notice, including Press Releases

4.3. Memos
4.4. Circular
4.5. Basics of Report Writing
4.6. Resume Writing
4.7. Writing E-mail
4.8. Paragraph writing
4.9. Picture composition

LIST OF PRACTICALS
1. Listening Exercises
2. Self and Peer Introduction
3. Debate
4. Situational Conversations: Offering - Responding to offers; Requesting –Responding to requests; Congratulating; Expressing sympathy and condolence; Apologizing and Forgiving; Complaining; Warning; Asking and giving information; Getting and giving permission; Asking for and giving opinions; Talking about likes and dislikes
5. Just a minute sessions – Extempore
6. Group Discussion
7. Newspaper reading
8. Mock Interviews: Telephonic and Personal

RECOMMENDED BOOKS
1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S.Chand & Company Ltd., Delhi.
4. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

MODULE NAME: APPLIED MATHEMATICS-I

MODULE CODE: MATH0138

L T P
3 1 0

1. Algebra

1.1 Partial fraction:- Definition of Polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, only.

1.2 Logarithms and its basic properties

1.3 Determinants and Matrices – Evaluation of determinants (up to 3 order) by Laplace method. Solution of equations (up to 3 unknowns) by Cramer's Rule. Definition of Matrices and types, addition subtraction and multiplication of Matrices (up to 2 order).

1.4 Permutation, combination formula, Values of ^nP_r and ^nC_r.

1.5 Binomial theorem for positive integral index , General term, simple problems

2. Complex numbers

Definition of complex number, real and imaginary parts of a complex number, Polar and Cartesian Form and their inter conversion, Conjugate of a complex number, modulus and amplitude, addition subtraction, multiplication and division of complex number.

3. Trigonometry

3.1 Concept of angle: measurement of angle in degrees, grades, radians and their conversions.

3.2 T-Ratios of standard angle ($0^0,30^0,45^0$etc) and fundamental Identities, Allied angles (without proof) Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa)

3.3 Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

4. Co-ordinate Geometry

4.1 Point: Distance Formula, Mid-Point Formula, Centroid of triangle and area of triangle.

4.2 Straight line: Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, normal form, general form), angle between two straight lines.

4.3 Circle: General equation of a circle and identification of centre and radius of circle. To find the equation of a circle, given:
* Centre and radius
* Coordinates of end points of a diameter

5. Differential Calculus

5.1 Definition of function; Concept of limits (Introduction only) and problems related to four standard limits only.

5.2 Differentiation of standard function (Only formulas), Differentiation of Algebraic function, Trigonometric functions, Exponential function, Logarithmic function

5.3 Differentiation of sum, product and quotient of functions.

5.4 Successive differentiation (up to 2nd order)

Application of differential calculus in:

(a) Rate measures
(b) Maxima and minima

6. Integral Calculus

6.1 Integration as inverse operation of differentiation with simple examples.

6.2 Simple standard integrals, Integrations by parts and related Simple problems

6.3 Evaluation of definite integrals with given limits.

6.4 Applications of integration: for evaluation of area under a curve and axes (Simple problems where the limits are given).

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi

2. Engineering Mathematics Vol. I & II by S Kohli, IPH, Jalandhar

3. Applied Mathematics, Vol. I & II by SS Sabharwal & Dr Sunita Jain, Eagle Parkashan, Jalandhar

4. Engineering Mathematics, Vol I, II & III by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi

5. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,

6. Applied Mathematics I, by Archana Sharma, Lords Publications, Jalandhar.

7. Engineering Mathematics by Srimanta Pal and Subodh C. Bhunia; Oxford University Press, New Delhi

8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

MODULE NAME: APPLIED PHYSICS-I
MODULE CODE: PHYS0117

	L	**T**	**P**
	2	1	2

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software.

LEARNING OUTCOMES
- After undergoing this subject, the students will be able to:
- Identify physical quantities, parameters and select their units for use in engineering solutions.
- Find units and dimensions of different physical quantities.
- Represent physical quantities as scalar and vectors.
- Use basic laws of motions,
- Analyze and design banking of roads and apply conservation of momentum principle to explain recoil of gun etc.
- Define work, energy and power and their units. Solve problems about work and power
- State the principle of conservation of energy.
- Identify forms of energy, conversion from one form to another.
- Compare and contrast the physical properties associated with linear motion and rotational motion and give examples of conservation of angular momentum.
- Describe the surface tension phenomenon and its units, applications, effects of temperature on surface tension.
- Describe the viscosity of liquids.
- Define stress and strain, modulus of elasticity.
- State Hooke's law.
- Measure temperature in various processes on different scales.
- Distinguish between conduction, convection and radiation.
- Use equipments like Vernier calliper, screw gauge, Spherometer.

DETAILED CONTENTS

1. **Units and Dimensions**
1.1 Definition of Physics, Physical quantities (Fundamental and derived),

1.2 Units: fundamental and derived units,

1.3 Systems of units: CGS, FPS, MKS, SI

1.4 Definition of Dimensions;

1.5 Dimensional formulae and SI units of physical quantities (distance, displacement, area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)

1.6 Principle of homogeneity of dimensions

1.7 Dimensional equations, Applications of dimensional equations; checking of correctness of equation, Conversion of system of unit (force, work)

2. Force and Motion

2.1 Scalar and vector quantities –(Definition and examples),

2.2 Addition of Vectors, Triangle & Parallelogram Law (Statement only),

2.3 Scalar and Vector Product (statement and formula only)

2.4 Definition of Distance, displacement, speed, velocity, acceleration

2.5 Force and its units, concept of Resolution of force

2.6 Newton's Law of motion (Statement and examples),

2.7 Linear Momentum, conservation of momentum (Statement only), Impulse

2.8 Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity.

2.9 Centripetal and centrifugal forces(definition and formula only)

2.10 Application of centripetal force in Banking of roads (derivation for angle of banking)

3. Work, Power and Energy

3.1 Work (Definition, Symbol, Formula and SI units)

3.2 Energy (Definition and its SI units), Examples of transformation of energy.

3.3 Kinetic Energy (Formula, examples and its derivation)

3.4 Potential Energy (Formula, examples and its derivation)

3.5 Law of conservation of mechanical energy for freely falling bodies (With . Derivation)

3.6 Power (definition, formula and units)

3.7 Simple Numerical problems based on formula of Power

4. Rotational Motion

4.1 Rotational motion with examples

4.2 Definition of torque and angular momentum and their examples

4.3 Conservation of angular momentum (quantitative) and its examples

4.4 Moment of inertia and its physical significance, radius of gyration (definition, derivation and formula).

5. Properties of Matter

5.1 Definition of Elasticity, Deforming force, Restoring force, example of Elastic and plastic body,

5.2 Definition of Stress and strain with their types,

5.3 Hooke's law, Modulus of Elasticity (Young's, Bulk modulus and shear)

5.4 Pressure (definition, formula, unit), Pascals Law

5.5 Surface tension: definition, its units, applications of surface tension, effect of temperature on Surface tension

5.6 Viscosity: definition, units, effect of temperature on viscosity

5.7 Fluid motion, stream line and turbulent flow.

6. Heat and temperature

6.1 Definition of heat and temperature (on the basis of kinetic theory),

6.2 Difference between heat and temperature

6.3 Principles of measurement of temperature.

6.4 Modes of transfer of heat (Conduction, convection and radiation with examples).

6.5 Properties of heat radiation

6.6 Different scales of temperature and their relationship

LIST OF PRACTICALS (To perform minimum fourteen experiments)

1. To find diameter of solid cylinder using a vernier calliper

2. To find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.

3. To find the diameter of wire using screw gauge

4. To find thickness of paper using screw gauge.

5. To determine the thickness of glass strip using a spherometer

6. To determine radius of curvature of a given spherical surface by a spherometer.

7. To verify parallelogram law of forces

8. To determine the atmospheric pressure at a place using Fortin's Barometer

9. To determine force constant of spring using Hooke's law

10. Measuring room temperature with the help of thermometer and its conversion in different scale.

11. To find the time period of a simple pendulum

12. To determine and verify the time period of Cantilever

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi

2. Applied Physics, Vol. I and Vol. II by Dr. HH Lal; TTTI Publications, Tata McGraw Hill, Delhi

3. Concepts in Physics by HC Verma, Vol. I & Vol.II, Bharti Bhawan Ltd. New Delhi

4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi

5. e-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR.

6. Practical Physics, by C. L. Arora, S Chand Publication

MODULE NAME: ENGINEERING GRAPHICS

MODULE CODE: MECH1103

L T P
1 0 2

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

Note:

1) First angle projection is to be followed.
2) Minimum 20 sheets to be prepared.
3) Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students.
4) Students should be encouraged to use engineering graph book for free hand and orthographic projection practice.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Identify and use of different grades of pencils and other drafting instruments which are used in engineering field
- Draw free hand sketches of various kinds of objects.
- Utilize various types of lines used in engineering drawing.
- Read and apply different dimensioning methods on drawing of objects.
- Use different types of scales and their utilization in reading and reproducing drawings of objects and maps.
- Draw the assembly from part details of objects
- Draw different section of various types of keys and cotter joints
- Draw various riveted joints

MODULE NAME-ENGINEERING GRAPHICS
MODULE CODE:

1. **Introduction to engineering drawing**   **(01 sheet)**
   1.1 Definition of Engineering Drawing. Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards, different grades of pencils to be used.
   1.2 Different types of lines in engineering drawing as per BIS specifications
   1.4 Free hand sketches of various kind of objects.
   1.5 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)

1.6   Dimensioning of overall sizes, circles, threaded holes, chamfered   surfaces, angles, tapered surfaces, hole.

1.7   Scales –their needs and importance (theoretical instructions), type of scales, definition of R.F. and length of scale.

2   Projections (02sheets)

2.1   Theory of orthographic projections (Elaborate theoretical instructions)

2.2   Projection of Points in different quadrant

2.3   Projection of Straight Line (1st and 3rd angle)

2.4   Fundamentals of isometric projections and isometric scale.

3   Common Symbols and Conventions used in Engineering   (01 sheet)

3.1   Civil Engineering sanitary fitting symbols

3.2   Electrical fitting symbols for domestic interior installations

3.3   Safety symbols used in engineering works.

4   Detail and Assembly Drawing   (02 sheets)

4.1   Principle and utility of detail and assembly drawings

4.2   Wooden joints i.e. corner mortise and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint,.

5.   Keys and Cotters   (02 sheets)

5.1   Various types of keys and cotters - their practical application, drawings of various keys and cotters showing keys and cotters in position.

5.2   Various types of joints
   - Gib and cotter joint
   - Knuckle joint

6.   Rivets and Riveted Joints   (02 sheets)

6.1   Types of general purpose-rivets heads

6.2   Caulking and fullering of riveted joints

6.3   Types of riveted joints
   (i)   Lap joint-Single riveted, double riveted (chain and zig-zag type)
   (ii)   Single riveted, Single cover plate butt joint
   (iii)   Single riveted, double cover plate butt joint
   (iv)   Double riveted, double cover plate butt joint(chain and zig-zag type)

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi
2. Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House Pvt. Ltd., Anand
4. Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar
5. Engineering Drawing I by DK Goel; GBD Publication.
6. CAD/CAM by J.S. Narang; Dhanpat Rai & Sons Publishers, New Delhi.

7. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.
8. Engineering Drawing with AutoCAD 2000 by T. Jeyapooran, Vikas Publishing House, Delhi
9. AutoCAD for Engineering Drawing Made Easy by P. Nageswara Rao; Tata McGraw Hill;, New Delhi.

MODULE NAME: COMPUTER FUNDAMENTALS

MODULE CODE: CSEN1108

L T P
3 0 0

The diploma holder needs to understand computer fundamentals and information technology. They should be able to operate basic software related to computer. Hence this subject is introduced in thecurriculum.

LEARNINGOUTCOMES

After undergoing the subject, students will be able to:
- Describe various component of computersystem
- Draw the block diagram of computer system showing variousunits
-
-
- List the features of the MS Word, MS-Excel &MS-PowerPoint
- Demonstrate the use of PowerPoint for seminarpresentation
- Identify various webbrowser
- Use internet and create mail ID, send and receiveEmail

DETAILED CONTENTS

1. Fundamentals ofComputer
   1.1   Draw the block diagram of aComputer.
   1.2.   ExplaintheinteractionbetweentheCPU,MemoryInput/Outputdevices.
   1.3.   Describe the function of CPU and major functional parts ofCPU.
   1.4.   Describe the function ofmemory.
   1.5   Describe the function of input/outputdevices.
   1.6   List types of memory used in aComputer.
   1.7   Generations ofcomputers.
   1.8   Know importance of binary number system for use in DigitalComputers.

2. DOS & Windows Operating Systems
   2.1   Describe the need for an operating system
   2.2   List the various operating system used presently
   2.3   DOS Prompt, Types of Commands, Internal & External Commands
   2.5   List the features of Window desktop
   2.6   List the components of Window
   2.7   State the function of each component of Window

2.8   Explain the method of starting a program using startbutton
2.9   Understand maximize, minimize, restore down and closebutton
2.10   State the meaning of afile
2.11   State the meaning of afolder
2.12   Explain the method of finding a file using searchoption
2.13   Describe installing new software using controlpanel
2.14   Describe uninstalling software using controlpanel
2.15   Explaintheprocedureforchangingresolution,colour,appearances,and screensaver option of thedisplay
2.16   Narrate the process of changing the system date andtime

3.   Fundamentals ofInternet
    3.1   Explainmeaningofacomputernetwork
    3.2   Describetheconceptofalocalareanetwork
    3.3   Explaintheconceptofwideareanetwork
    3.4   Compare internet &intranet
    3.5   Describetherelevanceofaninternetserviceprovider
    3.6   Explain the purpose of web browsersoftware
    3.7   Describe the purpose of World Wide Web, FTP, telnet andE-mail
    3.8   Explain the process of sending and receivinge-mail
    3.9   DescribeDNS
    3.10   Describetheroleofsearchengineswithexamples
    3.11   Know about social networksites

4.   Understand ProgrammingMethodology
    4.1.   Programming development cycle algorithm
    4.2   Program flowchart and types
    4.3   Differentiate algorithm andflowchart

4.4   Develop algorithms for simpleproblems

4.5   The symbols used inflowcharts

4.6   Programming Paradigms

RECOMMENDED BOOKS

1. Fundamentals of Computer by E Ba1agurusamy,Tata McGraw Hill EducationPvt. Ltd, NewDelhi
2. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., NewDelhi
3. Computer Fundamentals by RS Salaria; Khanna Book Publishing Co. (P) Ltd., New Delhi
4. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, NewDelhi
5.   Computers Today by SK Basandara, Galgotia publication Pvtltd. Daryaganj, NewDelhi.
6. A First Course in Computer by SanjaySaxena;   Vikas Publishing House Pvt. Ltd., Jungpura, NewDelhi
7. Computer Fundamentals and Programming in C by ReemaThareja; Oxford University Press, NewDelhi
8. Computer Fundamentals by PK Sinha; BPB Publication, NewDelhi
9. Computer Fundamentals and Information Technology by PreetiShrivastav, Ishan publication
10. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan,Jalandhar.
11. e-books/e-tools/relevant   software   to   be   used   as   recommended   by AICTE/HSBTE/NITTTR.

MODULE NAME:INFORMATION TECHNOLOGY
MODULE CODE: CSEN1109

L T P
0 0 2

LIST OF PRACTICALEXERCISES

1. Windows Operating System.
2. Installing various components of computer system and installing system software and applicationsoftware
3   Installation ofI/O devices, printers and installation of operating system viz. Windows
Features of Windows as an operating system
   - Start
   - Shut down andrestore
   - Creating and operating on theicons
   - Opening, closing and sizing the windows and working with windows interfacing elements (option buttons, checkbox, scrolletc.)
   - Using elementary job commands like creating, saving, modifying,   renaming, finding and deleting a file andfolders
   - Changing settings like, date,time, colour (back ground and fore ground etc.)

- Using shortcuts
- Using on linehelp

5.   Word Processing (MS Office/OpenOffice)
   a)   FileManagement:
      • Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, giving password protection for a file
   b)   Page setup:
      • Setting margins, tab setting, ruler,indenting
   c)   Editing adocument:
      • Enteringtext,cut,copy,pasteusingtool-bars
   d)   Formatting adocument:
      • Using different fonts, changing font size and colour, changing the appearance through bold/italic/underlined, highlighting a text, changing case, using subscript and superscript, using different underlinemethods
      • Aligning of text in a document, justification of document, inserting bullets and numbering
      • Formatting paragraph, inserting page breaks and column breaks, linespacing
      • Use of headers, footers: Inserting footnote, end note, use of comments,autotext
      • Inserting date, time, special symbols, importing graphic images, drawingtools
   e)   Tables andBorders:
      • Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, insertingand deleting a row in a table
      • Print preview, zoom, page set up, printingoptions
      • Using find, replace options
   fl   Using Toolslike:
      • Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops andlables
      • Using shapes and drawingtoolbar,
      • Working with more than one window.

6.   Spread Sheet Processing (MS Office/OpenOffice)

   a)   Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, save worksheet, switching between different spreadsheets
   b)   Menucommands:
      Create, format charts, organise, manage data, solving problem by analyzing data.
      Programming with Excel Work Sheet, getting information while working
   c)   Workbooks:
      Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controllingcalculations
      Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet, conditional formatting
   d)   Creating achart:

Working with chart types, changing data in chart, formatting a chart, use chart to analyze data

Using a list to organize data, sorting and filtering data in list

e) Retrieve data withquery:

Create a pivot table, customizing a pivot table. Statistical analysis of data

I) Exchange data with otherapplication:

Embedding objects, linking to other applications, import, export document.

7.   PowerPoint Presentation (MS Office/OpenOffice)

     a)   Introduction toPowerPoint

           How to start PowerPoint
-      Working environment: concept of toolbars, slide layout &templates.
-      Opening a new/existingpresentation

           Different views for viewing slides in a presentation: normal, slide sorter.

     b)   Addition, deletion and saving ofslides

     c)   Insertion of multimediaelements

           Adding text boxes

-      Adding/importingpictures
-      Adding movies andsound

        -      Adding tables and charts etc.

           Adding organizationalchart
-      Editingobjects
-      Working with ClipArt

     d)   Formattingslides
-      Using slide master

           Textformatting
-      Changing slide layout

           Changing slide colourscheme
-      Changingbackground
-      Applying designtemplate

     e)   How to view the slideshow?
-      Viewing the presentation using slide navigator

           Slidetransition

           Animation effects, timing, order etc.

8.   Internet and itsApplications

     a)   Browsing and down loading of information frominternet.

     b)   Sending and receivinge-mail
-      Creating a message

           Creating an addressbook

           Attaching a file with e-mail message
-      Receiving amessage

-        Deleting amessage

9.   Functioning ofAntivirus

    a)   Installation and updation of anantivirus.
    b)   How to scan and remove thevirus.
10.   Types of Computer Networks.
11.   Changing resolution, colour, appearances, and screensaver option of the display.
12.   Installing and uninstalling of new software using control panel.

Semester: II

SNO	COURSE TITLE	COURSE CODE	TEACHING SCHEDULE PER WEEK				CREDITS	EVALUATION SCHEME						
			L	T	P	TOTAL		INTERNAL			EXTERNAL			All TOTA
								Th.	Pr.	Tot.	Th.	Pr.	Tot.	
1	Applied Mathematics-II	MATH0139	3	1	0	4	4.0	40	00	40	60	00	60	100
2	Applied Physics-II	PHYS0118	2	1	2	5	4.5	25	15	40	60	25	85	125
3	Applied Chemistry-I	CHEM0113	2	1	2	5	4.5	25	25	50	75	25	100	150
4	Fundamental of Electrical and Electronics Engg. /Applied Mechanics	ECEN0101/ MECH1104	2	0	2	4	5.5	40	25	65	60	50	110	175
5	Internet of Things & Artificial Intelligence Lab	CSEN1110	0	0	2	2	2.5	00	50	50	00	100	100	150
6	General Workshop Practice	MECH1105	0	0	3	3	2.0	00	50	50	00	50	50	100
		Total	11	02	08	21	23		125	325	300	175	475	800

MODULE NAME:APPLIED MATHEMATICS-II
Module Code: MATH0139

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3 1 0

1. Numerical Integration

Numerical integration by Trapezoidal Rule , Simpson's $1/3_{rd}$ Rule and Simpson's $3/8_{th}$ rule.

2. Differential Equations

Definition, order, degree and linearity of an ordinary differential equation. Solution of Ist order and Ist degree differential equation by variable separable method (Simple problems).

3. Vectors

Definition of vector and scalar quantities. Addition and substraction of vectors. Dot product and cross product of two vectors. Thumb rule. Angle between two vectors, application of dot and cross product in engineering problems, scalar triple product and vector triple product.

4. Statistics

Measures of Central Tendency: Mean, Median, Mode , Measures of Dispersion: Mean deviation from mean, Standard deviation, Correlation coefficient and Coefficient of rank correlation. (Simple problems)

5. Probability

Definition and laws on probability, concept of random variable, probability distribution (Binomial, Poisson and Normal) and their applications

6. Conic Section

Definations and equations of Parabola, Ellipse and Hyperbola. Problems related to Parabola, Hyperbola and Ellipse.

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi

2. Engineering Mathematics Vol. I & II by S Kohli, IPH, Jalandhar

3. Applied Mathematics, Vol. I & II by SS Sabharwal & Dr Sunita Jain, Eagle Parkashan, Jalandhar

4. Engineering Mathematics, Vol I, II & III by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi

5. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,

6. Applied Mathematics I, by Archana Sharma, Lords Publications, Jalandhar.

7. Engineering Mathematics by Srimanta Pal and Subodh C. Bhunia; Oxford University Press, New Delhi

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MODULE NAME : APPLIED PHYSICS-II
Module code : PHYS0118

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Unit-I: Wave motion and its applications

Wave motion, transverse and longitudinal wave motion with examples, Terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length . Simple Harmonic Motion (SHM): definition, examples

Optics
Ray Optics: Reflection and refraction with laws, refractive index, lens formula (no derivation), power of lens (related numerical problems). Total internal reflection and its applications, Critical angle and conditions for total internal reflection. Microscope, Telescope (definition). Uses of microscope and telescope.

Wave Optics: Coherent Sources. Concept of Interference of light. Young's Double slit experiment. Theory of Fringes and fringe width.

Unit-II :
Electrostatics
Electric charge, unit of charge, conservation of charge. Coulombs law of electrostatics, Electric field, Electric lines of force (definition and properties), Electric field intensity due to a point charge. Definition of Electric flux, Gauss law (Statement and derivation). Capacitor and Capacitance (with formula and units), Series and parallel combination of capacitors (simple numerical problems)

Current Electricity
Electric Current and its Unit, Direct and alternating current, Resistance, Specific Resistance and Conductance (definition and units). Series and Parallel combination of Resistances. Ohm's law (statement and formula), Heating effect of current, Electric power and its units. Kirchhoff's laws (statement and formula). Meter bridge and wheatstone Bridge., .

Unit-III:Electromagnetic Induction and Alternating Currents

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PDM University, Bahadurgarh, Haryana-124507
Established under Haryana Private Universities (Amendment), Act,2015(Haryana Act No.1of2016)

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Magnetic field, magnetic intensity, magnetic lines of force, magnetic flux and their units Electromagnetic induction (definition). Laws of electromagnetic Induction. Alternating currents: RC and LC circuits.

Unit IV : Electronic and Semiconductor Devices:

Boolean Algebra: OR, NOR and NAND gates.

Semiconductor Electronics: Definition of Energy level, Energy bands, Types of materials (insulator, semi conductor, conductor) with examples, Intrinsic and extrinsic semiconductors, p-n junction diode and its V-I characteristics. Diode as rectifier – half wave and full wave rectifier (centre tap only).

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi

2. Applied Physics, Vol. I and Vol. II by Dr. HH Lal; TTTI Publications, Tata McGraw Hill, Delhi

3. Concepts in Physics by HC Verma, Vol. I &Vol.II, Bharti Bhawan Ltd. New Delhi

MODULE NAME: APPLIED CHEMISTRY-I

Module Code: CHEM0113

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Basic Concepts of Chemistry (07hrs)

1.1 Definition of chemistry and its importance

1.2 S.I. Units of pressure, volume, density, specific gravity, surface tension and viscosity

1.3 Matter element, compound and mixtures, atoms, molecules, ions, symbols and formulae (recapitulation only)

1.4 Writing chemical formula of simple chemical compounds and calculation of percentage composition of chemical compounds

1.5 Chemical Equations, thermo-chemical equations, balancing of chemical equations by HIT and Trial method

Atomic Structure and Chemical Bonding (11hrs)

2.1Introduction to atom and its constituent particles, Dalton's atomic theory, Rutherford's and Bohr's model of atom (overview only)

2.2 Atomic number, mass number, isotopes, isobars and isotones

2.3 Concept of atomic orbitals, shapes of s and p-orbitals, quantum numbers

2.4 Aufbau principle, exclusion principle, Hund's rule and electronic configuration of elements upto (Z=30)

2.5Chemical bond, types of chemical bonding: ionic and covalent(sigma and pi bonds) with suitable examples.

Water (10hrs)

3.1Sources of Water

3.2 Types of water based on dissolved salts.

3.2.1Hard water, soft water

3.2.2 Units to measure hardness in ppm(mg/l) and simple numerical, degree Clark and degree French

3.3 Disadvantages of use of hard water in domestic and industrial applications(mainly boiler feed water)

3.4 methods to remove hardness by
3.4.1 Ion exchange process
3.4.2 Lime soda process
3.4.3 Reverse Osmosis method

Solutions   (07hrs)

4.1 Concept of homogeneous solution, brief introduction in terms (i) Ionization (ii) Acidity (iii) Basicity (iv) equivalent weight abd gram equivalent weight with suitable examples
4.2 Strength of a solution (i) Normality (ii) Molarity (iii) Molality
4.3 Defination of pH, simple numerical and different industrial applications of pH.
4.4 Buffer solution and applications of buffer.

Electrolysis   (05hrs)

5.1   Electronic concept of oxidation and reduction
5.2   Definition of the terms: Electrolyte, Non Electrolyte with suitable examples
5.3   Faraday's Laws of Electrolysis and simple numerical.

List of Practicals

1.   Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
2.   Preparation of standard solution of oxalic acid or potassium dichromate
3.   Determine the strength of solution of HCl with the help of a solution of NaOH and an intermediate solution of standard oxalic acid

4.   Estimation of total dissolved solids (TDS) in water sample gravimetrically
5.   Estimation of total alkalinity of water volumetrically
6.   Determine the pH of given sample using pH meter
7.   Determine the percentage purity of commercial sample like blue vitriol, 12.5 g. of which have been dissolved per litre. Given $M/20$ $Na_2S_2O_3$.
8.   Determination of solubility of a solid at room temperature
9.   To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode)

Recommended Books

1.   Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2.   Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3.   A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4.   Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar
5.   Engineering Chemistry by Jain PC and Jain M, Dhanpat Rai Publishers, Delhi
6.   Chemistry of Engineering by Aggarwal CV
7.   Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8.   A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar

MODULE CODE: FUNDAMENTAL OF ELECTRICAL & ELECTRONICS ENGINEERING
Module Code:ECEN0101

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1. Semiconductor physics

1.1 Review of basic atomic structure and energy levels.

1.2 Concept of conductors,insulators and semiconductors.

1.3 Concept of extrinsic & intrinsic semiconductors, minority & majority charge carriers.

1.4 P&N type of semiconductors, effect of temperature on conductivity of conductors.

2. Semiconductor diode

2.1 PN junction diode.

2.2 Mechanism of current flow in PN junction diode.

2.3 Forward &Reverse biased conditions.

2.4 Drift &Diffusion currents & depletion layer.

2.5 Application of diode as half wave rectifier, full wave rectifier & bridge rectifier.

3. Electromagnetic induction

3.1 Concept of electromagnetic field produced by flow of electric current.

3.2 Magnetic circuit, concept of magneto motive force (mmf).

3.3 Flux , reluctance , permeability.

3.4 Analogy between electric & magnetic circuit.

4. AC fundamentals

4.1 Concept of alternating quantities.

4.2 Difference between AC & DC.

4.3 Concept of cycle,frequency,time period, amplitude,instantaneous value, average value

r.m.s value, maximum value, form factor and peak factor.

5. Introduction to bipolar transistors

5.1 Concept of bipolar transistors.

5.2 PNP& NPN transistors.

5.3 Mechanism of current flow in PNP&NPN transistors & their symbols.

6. **Introduction to electrical machines**

   6.1 Transformer: principal of operation, constructional details of single phase transformer, turns ratio, efficiency, losses in a transformer.

   6.2 DC machines: principal of operation, construction of DC motor& generator.

   6.3 ACmachines: principle & working of synchronous machines., single phase induction motor.

RECOMMENDED BOOKS

1. Electrical Technology by BL Theraja, S Chand and Co, New Delhi

2. Basic Electrical and Electronics Engineering by SK Sahdev; Dhanpat Rai and Sons, New Delhi

3. Experiments in Basic Electrical Engineering by SK Bhattacharya, KM Rastogi; New Age International (P) Ltd.; Publishers New Delhi .

4. Principles of Electrical Engineering by BR Gupta, S Chand and Co, New Delhi

5. Basic Electrical Engineering by JB Gupta; SK Kataria and Sons, New Delhi

6. Basic Electrical Engineering by D.R Arora, Ishan Publications

7. Basic Electronics and Linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill Publishing Co, New Delhi.

8. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi

9. Electronic Components and Materials by SM Dhir, Tata McGraw Hill Publishing Co, New Delhi

10. Electronic Devices and Circuits by Bhupinder Jit Kaur; Modern Publishers, Jalandhar

11. Electronics – I by DR Arora, North Publications, Jalandhar

MODULE NAME: APPLIED MECHANICS
Module Code: MECH1104

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The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students.

1. **Introduction**
   1.1 Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics.
   1.2 Definition, basic quantities and derived quantities of basic units and derived units
   1.3 Different systems of units (FPS, CGS, MKS and SI) and their conversion from one to another for density, force, pressure, work, power, velocity, acceleration
   1.4 Concept of rigid body, scalar and vector quantities

2. **Laws of forces**
   2.1 Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & Uniformly distributed force, effects of force, characteristics of a force
   2.2 Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position
   2.3 Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces
   2.4 Free body diagram
   2.5 Equilibrant force and its determination 2.6 Lami's theorem (concept only)

3. Moment

3.1 Concept of moment

3.2 Moment of a force and units of moment

3.3 Varignon's theorem (definition only)

3.4 Principle of moment and its applications (Levers – simple and compound)

3.5 Parallel forces (like and unlike parallel force), calculating their resultant.

3.6 Concept of couple, its properties and effects

4. Friction

4.1 Definition and concept of friction, types of friction, force of friction

4.2 Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction

4.3 Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane.

5. Centre of Gravity

5.1 Concept, definition of centroid of plain figures and centre of gravity of symmetricalsolid bodies

5.2 Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion

5.3 Determination of centre of gravity of solid bodies - cone, cylinder, hemisphere and sphere

6. Simple Machines

6.1 Definition of effort, velocity ratio, mechanical advantage and efficiency of a machine and their relationship, law of machines

6.2 Simple and compound machine (Examples)

6.3 Definition of ideal machine, reversible and self-locking machine

6.4 Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency

6.5 System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency

6.6 Working principle and application of wheel and axle, Weston's Differential Pulley Block, simple screw jack, worm and worm wheel, single and double winch crab.

APPLIED MECHANICS LAB

LIST OF PRACTICALS
1. Verification of the polygon law of forces using greaves and apparatus.
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in case of an
5. inclined plane.
6. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
7. To find the mechanical advantage, velocity ratio and efficiency of worm and
8. worm wheel.
9. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.
10. To find out center of gravity of regular lamina.
11. To find out center of gravity of irregular lamina.
12. To determine coefficient of friction between three pairs of given surface.

MODULE NAME: INTERNET OF THINGS AND ARTIFICIAL INTELLIGENCE LAB
Module Code:CSEN1110

1. Introduction to Internet of Things (IoT)
2. Applications, architecture, protocols
3. Physical Design/Logical Design of IoT
4. Functional blocks of IoT, Communication Models.
5. Basics of C language using Arduino IDE
6. Variables, datatype, loops, control statement, function
7. Interfacing Light Emitting Diode (LED)- Blinking LED
8. Interfacing Liquid Crystal Display(LCD) – display data generated by sensor on LCD
9. Interfacing Air Quality Sensor-pollution (e.g. MQ135) - display data on LCD , switch on LED when data sensed is higher than specified value.
10. Interfacing Bluetooth module (e.g. HC05)- receiving data from mobile phone on Arduino and display on LCD
11. Understanding excel for analysing data
12. Introduction to Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (DL).
13. Role of AI in IoT and its applications

REFERENCE BOOKS:
1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands On Approach, University Press

2. Yashavant Kanetkar, Shrirang Korde, "21 Internet Of Things (IOT) Experiments"

3. Neerparaj Rai , "Arduino Projects For Engineers"

4. Chandra S.S.V, "Artificial Intelligence and Machine Learning"

MODULE NAME: GENERAL WORKSHOP PRACTICE
Module Code: MECH1105

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In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at workplace, team working and development of right attitude are the other objectives.

1. Carpentry Shop
1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).
1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.
Job I Marking, sawing, planning and chiseling & their practice (size should be mentioned)
1.3 Introduction to various types of wooden joints, their relative advantages and uses.
Job II Preparation of half lap joint
Job III Preparation of Mortise and Tenon Joint
1.4 Demonstration of various methods of painting wooden items.
Job IV Preparation of wooden surface before painting including primer coating
1.5 Safety precautions in carpentry shop

2. Fitting Shop
2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. Such as Steel, Brass, Copper, Aluminium etc. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.
2.2 Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.
2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.

Job II Making a cutout from a square piece of MS Flat using hand hacksaw.

2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).

3. Welding Shop

3.1 (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g.a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.

(b) Safety precautions during welding

(c) Hazards of welding and its remedies

3.2 Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine.

Job I Welding practice on electric arc welding for making uniform and straight weld beads

3.3 Various types of joints and end preparation.

Job II Preparation of butt joint by electric arc welding.

Job III Preparation of lap joint by electric arc welding.

4. Electric Shop

4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, PVC Conduits, PVC Channels and allied items, tools along with electrical instruments such as voltmeter, ammeter and multimeter.

4.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, MCBs, ELCBs and relays including earthing.

Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.

4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan, table fan, electric mixer, electric Geyser, gas geyser, desert cooler, refrigerator, water purifier

5. Smithy Shop

5.1 Demonstration and detailed explanation of tools and equipment used. Forging

operations in smithy shop. Safety measures to be observed in the smithy shop.

5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.

5.3 Demonstration and description of tongs, fullers, swages etc.

Job I To forge a L-hook.

Job II To prepare a job involving upsetting process

6. Sheet Metal Shop

Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publishers Pvt. Ltd. Mumbai.

2. Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar.

3. Workshop Training Manual Vol. I, II by S.S. Ubhi; Katson Publishers, Ludhiana.

4. Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd., New Delhi

5. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi

MECHANICAL ENGINEERING

Semester: III

SNO	COURSE TITLE	COURSE CODE	TEACHING SCHEDULE PER WEEK				CREDITS	EVALUATION SCHEME						All TOTAL
			L	T	P	TOTAL		INTERNAL			EXTERNAL			
								Th.	Pr.	Total	Th.	Pr.	Total	
1	Strength of Materials	MECH2130	3	0	2	5	4	25	25	50	100	50	150	200
2	Thermodynamics-1	MECH 2131	3	0	2	5	4	25	25	50	100	50	150	200
3	Basics of Electrical and Electronics Engineering	ECEN2123	3	0	2	5	4	25	25	50	100	50	150	200
4	Mechanical Engineering Drawing	MECH2132	2	0	2	4	3	25	25	50	50	50	100	150
5	Workshop Technology-1	MECH2133	3	0	0	3	3	25	-	25	100	-	100	125
6	Workshop Practice-1	MECH2134	0	0	8	8	4	-	100	100	-	100	100	200
7	Soft Skills -I	VALU0151	0	0	2	2	-	-	25	25	-	-	-	25
		Total	14	00	18	32	22	150	175	300	450	300	750	1100

MODULE NAME: STRENGTH OF MATERIALS

MODULE CODE: MECH2130

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3 0 2

Diploma holders in this course are required to analyze reasons for failure of different components and select the required material for different applications. For this purpose, it is essential to teach them concepts, principles, applications and practices covering stress, strain, bending moment, shearing force, shafts, columns and springs. It is expected that efforts will be made to provide appropriate learning experiences in the use of basic principles in the solution of applied problems to develop the required competencies

UNIT- 1   Stresses and Strains

Basic concept of load, stress and strain, Tensile, compressive and shear stresses, linear strain, Lateral strain, Shear strain, volumetric strain. Concept of Elasticity, Elastic limit and limit of proportionality, Hook's Law and Elastic Constants, Stress-strain curve for ductile and brittle materials Nominal stress, Yield point, plastic stage, Ultimate stress and breaking stress, Percentage elongation, Proof stress and working stress, Factor of safety , Poisson's Ratio ,Thermal stress and strain, Longitudinal and circumferential stresses in seamless thin walled cylindrical shells, Introduction to Principal stresses **Resilience ,** Strain Energy, Resilience, proof resilience and modulus of resilience , Strain energy due to direct stresses and Shear Stress, Stresses due to gradual, sudden and falling load.

UNIT- 2   Moment of Inertia

Concept of moment of inertia and second moment of area, Radius of gyration ,Theorem of perpendicular axis and parallel axis (with derivation), Second moment of area of common geometrical sections : Rectangle, Triangle, Circle (without derivation); Second moment of area for L,T and I section, Section modulus.

UNIT-3 Bending Moment and Shearing Force

 Concept of various types of beams and form of loading , Concept of end supports-Roller, hinged and fixed Concept of bending moment and shearing force ,B.M. and S.F. Diagram for cantilever and simply supported beams with and without overhang subjected to concentrated and U.D.L

UNIT-4 Bending stresses

Concept of Bending stresses, Theory of simple bending, Derivation of Bending Equation
Use of the equation, Concept of moment of resistance Bending stress diagram, Section modulus
for rectangular, circular and symmetrical I section. Calculation of maximum bending stress in
beams of rectangular, circular, and T section.

UNIT-5 Columns

Concept of column, modes of failure, Types of columns, modes of failure of columns
Buckling load, crushing load, Slenderness ratio, Effective length, End restraints, Factors
Effecting strength of a column, Strength of column by Euler Formula without derivation
Rankine Gourdan formula (without derivation).

UNIT-6   Torsion

Concept of torsion, difference between torque and torsion, Derivation of Torsion Equation, use
of torsion equation for circular shaft, (solid and hollow)**,** Comparison between solid and hollow
shaft with regard to their strength and weight, Power transmitted by shaft**, Springs**
Closed coil helical springs subjected to axial load and calculation of: - Stress deformation –
Stiffness and angle of twist and strain energy - Strain energy and proof resilience.
Determination of number of plates of laminated spring (semi elliptical type only)

RECOMMENDED BOOKS

1.   SOM by RS Khurmi; S.Chand & Co; New Delhi
2.   Mechanics of Materials by Dr. Kirpal Singh; Standard Publishers Distribution, New Delhi.
3.   SOM by Birinder Singh,; Katson Publishing House, New Delhi.
4.   Elements of SOM by D.R. Malhotra and H.C.Gupta; Satya Prakashan, New Delhi.
5.   e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

LIST OF PRACTICALS:-

1. Tensile test on bars of Mild steel and Aluminium.
2. Bending tests on a steel bar or a wooden beam.
3. Impact test on metals a) Izod test b) Charpy test
4. Torsion test of solid specimen of circular section of different metals for determining modulus of rigidity.
5. To plot a graph between load and extension and to determine the stiffness of a helical spring.
6. Hardness test on different metals.

Note : All the tests need to be done as per prescribed Indian Standards

MODULE NAME: THERMODYNAMICS - I

MODULE CODE: MECH2131

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A diploma holder in this course is supposed to maintain steam generators, turbines, compressors and other power plant equipment. Therefore, it is essential to impart him basic concepts of thermodynamics, steam generators, steam turbines, and compressors and about IC engines.

UNIT-1   Fundamental Concepts

Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic, properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process, reversible and irreversible processes, Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy and internal energy,explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law, Universal gas constant, Characteristic gas constants and its derivation. Specific heat at constant pressure, specific heat at constant volume of a gas, simple numerical problems on gas equation.

UNIT-2   Thermodynamic Processes

Types of thermodynamic processes – isochoric, isobaric, isothermal, adiabatic, isentropic, polytropic and throttling processes, equations representing the processes Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above processes **,** Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations, Application of first law of thermodynamics to Non-flow systems – Constant volume, Constant pressure, Adiabatic and polytropic processes, steady flow energy equation, Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators. Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement, Classius statement, equivalency of statements, Perpetual motion Machine of first kind, second kind, Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility and concept of entropy.

UNIT-3 Ideal and Real Gases

Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas, P – V – T surface of an ideal gas, triple point, real gases, Vander-Wall's equation ,**Properties of Steam,** Formation of steam and related terms, thermodynamic properties of steam, steam tables, sensible heat, latent heat, internal energy of steam, entropy of water, entropy of steam, TS diagrams, Mollier diagram (H – S Chart), Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes, determination of quality of steam (dryness fraction).

UNIT-4 Steam Generators

Uses of steam, classification of boilers, function of various boiler mounting and accessories, comparison of fire tube and water tube boilers. Construction and working of Lancashire boiler, Nestler boiler, Babcock & Wilcox Boiler. Introduction to modern boilers.

UNIT-5 Air Standard Cycles

Meaning of air standard cycle – its use, condition of reversibility of a cycle Description of Carnot cycle, Otto cycle, Diesel cycle, simple problems on efficiency for different cycles. Comparison of Otto, Diesel cycles for same compression ratio, same peak pressure developed and same heat input. Reasons for highest efficiency of Carnot cycle and all other cycles working between same temperature limits.

UNIT -6 Air Compressors

Functions of air compressor – uses of compressed air, type of air compressors Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram, calculation of work done. Multistage compressors – advantages over single stage compressors, use of air cooler, condition of minimum work in two stage compressor (without proof), simple problems Rotary compressors – types, working and construction of centrifugal compressor, axial flow compressor, vane type compressor

RECOMMENDED BOOKS

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi.
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi.
3. Engineering Thermodynamics by CP Arora; Tata McGraw Hill, Delhi.
4. A Treatise on Heat Engineering by VP Vasandani and DS Kumar; Metropolitan Book Company.

LIST OF PRACTICALS:-

1. Determination of temperature by 1.1 Thermocouple 1.2 Pyrometer 1.3 Infrared Thermometer.
2. Demonstration of mountings and accessories on a boiler.
3. Study the working of Lancashire boiler and Nestler boiler.
4. Study of working of high pressure boiler.
5. Study of boilers (Through industrial visit)
6. Determination of Dryness fraction of steam using calorimeter.
7. Demonstrate the working of air compressor.

MODULE NAME: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
MODULE CODE: ECEN 2123

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3 0 2

The objective of this subject is to impart fundamental knowledge and skills regarding basic electrical and electronics engineering, which diploma holders will come across in their professional life. This course will provide the students to understand the basic concepts and principles of d.c. and a.c. fundamentals, electromagnetic induction, batteries, transformers, motors, distribution system, domestic installation, electrical safety etc. The students will also learn basic electronics including diodes and transistors and their applications

UNIT-1 Application and Advantage of Electricity

 Difference between ac and dc, various applications of electricity, advantages of electrical energy over other types of energy Basic Electrical Quantities
 Definition of voltage, current, power and energy with their units, name of instruments used for measuring above quantities, connection of these instruments in an electric circuit.

UNIT-2 AC Fundamentals

Electromagnetic induction-Faraday's Laws, Lenz's Law; Fleming's rules, Principles of a.c. Circuits; Alternating emf, Definition of cycle, frequency, amplitude and time period. Instantaneous, average, r.m.s and maximum value of sinusoidal wave; form factor and Peak Factor. Concept of phase and phase difference. Concept of resistance, inductance and capacitance in simple a.c. circuit. Power factor and improvement of power factor by use of capacitors. Concept of three phase system; star and delta connections; voltage and current relationship (no derivation).

UNIT-3 Transformers

Working principle and construction of single phase transformer, transformer ratio, emf equation, losses and efficiency, cooling of transformers, isolation transformer, CVT, auto transformer (brief idea), applications. **Distribution System**

Difference between high and low voltage distribution system, identification of threephase wires, neutral wire and earth wire in a low voltage distribution system. Identification of voltages between phases and between one phase and neutral. Difference between three-phase and single-phase supply.

UNIT-4 Electric Motor

Description and applications of single-phase and three-phase motors. Connection and starting of three-phase induction motors by star-delta starter. Changing direction of rotation of a given 3 phase induction motor. Motors used for driving pumps, compressors, centrifuge, dyers etc. Totally enclosed submersible and flame proof motors.

UNIT-5 Domestic Installation

Distinction between light-fan circuit and single phase power circuit, sub-circuits, various accessories and parts of domestic electrical installation. Identification of wiring systems. Common safety measures and earthing. **Electrical Safety**

Electrical shock and precautions against shock, treatment of electric shock, concept of fuses and their classification, selection and application, concept of earthing and various types of earthing, applications of MCBs and ELCBs.

UNIT-6 Basic Electronics

Basic idea of semiconductors – P and N type; diodes, zener diodes and their applications, transistor – PNP and NPN, their characteristics and uses. Characteristics and applications of a thyristor, characteristics and applications of stepper motors and servo motors in process control.

RECOMMENDED BOOKS

1. Basic Electrical Engineering by PS Dhogal; Tata McGraw Hill Publishers, New Delhi
2. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New

Delhi
3. Basic Electricity by BR Sharma; Satya Prakashan, New Delhi
4. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi
6. Basic Electronics by VK Mehta; S Chand and Co., New Delhi
7. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi

LIST OF PRACTICALS

1. Connection of a three-phase motor and starter with fuses and reversing of direction of rotation.
2. Connection of a single-phase induction motor with supply and reversing of its direction of rotation.
3. Troubleshooting in domestic wiring system, including distribution board
4. Connection and reading of an electric energy meter
5. Use of ammeter, voltmeter, wattmeter, and multi-meter
6. Measurement of power and power factor in a given single phase ac circuit
7. Study of different types of fuses, MCBs and ELCBs
8. Study of zener diode as a constant voltage source and to draw its V-I characteristics
9. Study of earthing practices
10. To draw V-I characteristics of a (i) NPN transistor (ii) thyristor (SCR)
11. Study of construction and working of a (i) stepper motor and (ii) servo motor

MODULE NAME: MECHANICAL ENGINEERING DRAWING
MODULE CODE: MECH 2132

L T P
2 0 2

Diploma holders in Mechanical Engineering are required to interpret drawings and therefore it is essential that they have skills of preparing drawings and sketches of mechanical components. This subject aims at development of drawing skills in the students.

UNIT-1 Limit, fits and tolerance

Need of limit, fits and tolerance, Maximum limit of size, minimum limit of size, tolerance, allowance, deviation, upper deviation, lower deviation, fundamental deviation, clearance, maximum clearance, minimum clearance. Fits – clearance fit, interference fit and transition fit. Hole basis system, shaft basis system, tolerance grades, calculating values of clearance, interference, hole tolerance, shaft tolerance with given basic size for common assemblies like H7/g6, H7/m6, H8/p6. Basic terminology and symbols of geometrical dimensioning and tolerances.

UNIT-2   Drawing of the following with complete dimensions, tolerances, bill of material and surface finish representation.

Universal coupling and Oldham coupling (Assembly), Bearings, Bushed Bearing (Assembly Drawing), Ball Bearing and Roller Bearing (Assembled Drawing) Plummer Block (Detail and Assembly Drawing), Foot step Bearing (Assembled Drawing), Pulleys, Pulleys, Function of pulley, Types and materials of Pulley, Free hand Sketch of Various types of pulleys. Fast and loose pulley (Assembly Drawing) Pipe Joints Types of pipe Joints, Symbol and line layout of pipe lines Expansion pipe joint (Assembly drawing) Flanged pipe and right angled bend joint (Assembly Drawing) Lathe Tool Holder (Assembly Drawing)
Reading and interpretation of mechanical components and assembly drawings

Sketching practice of bearings and bracket.

UNIT 3.

Drilling Jig (Assembly Drawing) (01 sheets) Machine vices (Assembly Drawing) (02sheets)

UNIT 4   I.C. Engine Parts (03 sheets)

Piston Connecting rod (Assembly Drawing) Crankshaft and flywheel (Assembly Drawing).

UNIT 5 Boiler Parts (02 sheets)

Steam Stop Valve (Assembly Drawing) Blow off cock. (Assembly Drawing) **Mechanical Screw Jack (Assembled Drawing) (01 sheet).**

UNIT 6   Gears (02 sheets)

Gear, Types of gears, Nomenclature of gears and conventional representation Draw the actual profile of involute teeth of spur gear by different methods.

LIST OF RECOMMENDED BOOKS
1. Machine Drawing by P.S. Gill; S.K. Kataria and Sons; Ludhiana
2. A Text Book of Machine Drawing by R.K.Dhawan; S. Chand and Co. Ltd New Delhi.
3. Machine Drawing by N.D. Bhatt; Charotar Book Depot. Anand.
4. Machine Drawing by Bhattacharya, Oxford Press, New Delhi.
5. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

MODULE NAME: WORKSHOP TECHNOLOGY-1
MODULE CODE: MECH 2133

L T P
3 0 0

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various manufacturing processes is required to be imparted. Hence the subject of workshop technology.

Unit 1: Welding

Welding Process Principle of welding, Classification of welding processes, Advantages and limitations of welding, Industrial applications of welding, Welding positions and techniques, symbols. Safety precautions in welding.

Gas Welding Principle of operation, Types of gas welding flames and their applications, Gas welding equipment - Gas welding torch, Oxygen cylinder, acetylene cylinder, cutting torch, Blow pipe, Pressure regulators, Filler rods and fluxes and personal safety equipment for welding.

Arc Welding Principle of operation, Arc welding machines and equipment. A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation, Electrodes: Classification, B.I.S. specification and selection, Flux for arc welding. Requirements of pre heating, post heating of electrodes and work piece. Welding defects and their testing methods.

Other Welding Processes Resistance welding: Principle, advantages, limitations, working and applications of spot welding, seam welding, projection welding and percussion welding, Atomic hydrogen welding, Shielded metal arc welding, submerged arc welding, Welding distortion, welding defects, methods of controlling welding defects and inspection of welded joints.

Modern Welding Methods Methods, Principle of operation, advantages, disadvantages and applications of, Tungsten inert gas (TIG) welding, Metal inert gas (MIG) welding, Thermit welding, Electro slag welding, Electron beam welding, Ultrasonic welding, Laser beam welding, Robotic welding.

Unit 2: Foundry Techniques

Pattern Making Types of pattern, Pattern material, Pattern allowances, Pattern codes as per B.I.S., Introduction to cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores

2.2. Moulding and Casting

2.2.1. Moulding Sand Properties of moulding sand, their impact and control of properties viz. permeability, refractoriness, adhesiveness, cohesiveness, strength, flow ability, collapsibility, Various types of moulding sand, Testing of moulding sand. Safety precautions in foundry.

2.2.2. Mould Making Types of moulds, Step involved in making a mould, Molding boxes, hand tools used for mould making, Molding processes: Bench molding, floor molding, pit molding and machine molding, Molding machines squeeze machine, jolt squeeze machine and sand slinger.

2.2.3 Casting Processes Charging a furnace, melting and pouring both ferrous and nonferrous metals, cleaning of castings, Principle, working and applications of Die casting: hot chamber and cold chamber, Centrifugal casting

Unit 3: Metal Forming Processes

3.1 Press Working - Types of presses, type of dies, selection of press die, die material. Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping

3.2 Forging - Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging

Unit 4: Plastic Processing

4.1 Industrial use of plastics, and applications- Advantages and limitations of use of plastics.

4.2 Injection moulding-principle, working of injection moulding machine.

4.3 Compression moulding-principle, and working of compression moudling machine.

Unit 5: Rolling and Extrusion

5.1 Rolling - Elementary theory of rolling, Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies

5.2 Extrusion and Drawing - Type of extrusion- Hot and Cold, Direct and indirect. Pipe drawing, tube drawing, wire drawing

Unit 6: Gating system:

6.1 Gating and Risering System Elements of gating system, Pouring basin, sprue, runner, gates, Types of risers, location of risers, Directional solidification

6.2 Melting Furnaces Construction and working of Pit furnace, Cupola furnace, Crucible furnace – tilting type, Electric furnace

6.3 Casting Defects Different types of casting defects, testing of defects: radiography, magnetic particle inspection and ultrasonic inspection.

LIST OF RECOMMENDED BOOKS

1. Workshop Technology by BS Raghuvanshi : Dhanpat Rai and Sons Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra : Asia Publishing House
3. Welding Engineering by RL Aggarwal and T Manghnani; Khanna Publishers, Delhi
4. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
5. Foundry Technology by KP Sinha and DB Goel; Roorkee Publishng House, Roorkee.
6. A Text Book of Manufacturing Science and Technology by A Manna, Prentice Hall of India, Delhi.
7. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

LIST OF PRACTICALS

Welding Shop

Job 1.Preparing gas welding joint in vertical/Horizontal position joining M.S. Plates

Job 2. Exercise on gas cutting of mild steel plate with oxy-acetylene gas torch.

Job 3. Exercise on gas welding of cast iron and brass part or component.

Job 4. Exercise on preparation of T Joint by arc welding (200 mm x 6 mm Flats)

Job 5. Exercise on spot welding/seam welding (any utility item)

Job 6. Exercise on MIG and TIG welding

Job 7 Exercise on arc welding pipe joint MS.

Pattern making

Job 1. Preparation of solid/single piece pattern.

Job 2. Preparation of two piece/split pattern

Job 3. Preparation of a pattern on wooden lathe

Job 4. Preparation of a self-cored pattern

Job 5. Preparation of a core box.

Foundry Shop

Job 1. Preparation of mould with solid pattern on floor.

Job 2. Preparation of floor mould of solid pattern using cope.

Job 3. Preparation of floor mould of split pattern in cope and drag of moulding box.

Job 4. Moulding and casting of a solid pattern of aluminum

Job 5. Preparing a mould of step pulley and also preparing core for the same.

Job 6. A visit to cast iron foundry should be arranged to have first-hand knowledge of cast iron melting pouring and casting.

Job 7. Testing of moisture contents and strength of moulding sand.

Forging Shop/Fitting Shop/Sheet Metal Shop

Job 1. Preparation of single ended spanner by hand/machine forging.

Job 2. Demonstration of spinning process on lathe and spinning a bowl on a lathe machine.

Job 3. Demonstration of grinding process on lathe machine and grinding a job on a lathe machine

Job 4. Preparation of utility item such as Dustbin or Paper tray out of G.I. sheet.

MODULE NAME: SOFT SKILLS – I
MODULE CODE: VALU0151

L T P
- - 2

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. The diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market.

LEARNING OUTCOMES

After undergoing this course, the students will be able to: • Identify components of effective verbal communication • Prepare a report • Learn the techniques of enhancing memory • Set goals for overall personality development • Understand the concept of quality and its implementation in an organisation.

Soft Skills - Concept and Importance

• Communication Skills- Improving verbal communication
• Report Writing
• Method to enhance memory and concentration
 • Component of overall personality- Dressing sense/etiquettes/body language etc. In addition, the students must participate in the following activities to be organized in the institute.
• Sports
 • NCC/NSS
• Camp – Blood donation
• Cultural Event

Note: Extension Lectures by experts may be organized. There will be no examination for this subject

Semester: IV

NO	COURSE TITLE	COURSE CODE	TEACHING SCHEDULE PER WEEK				CREDITS	EVALUATION SCHEME						All TOTA
			L	T	P	TOTAL		INTERNAL			EXTERNAL			
								Th.	Pr.	Tot.	Th.	Pr.	Tot.	
1	Computer Aided Drafting	MECH2135	0	0	4	4	2	0	50	50	0	50	50	100
2	Material and Metallurgy	MECH2136	4	0	2	6	5	25	25	50	100	50	150	200
3	Hydraulics and Pneumatics	MECH2137	3	0	2	5	4	25	25	50	100	50	150	200
4	Thermodynamics - II	MECH2138	3	0	2	5	4	25	25	50	100	50	150	200
5	Industrial Engineering	MECH2139	3	0	0	3	3	25		25	100	0	100	125
6	Workshop Technology-II	MECH2140	4	0	0	4	4	25	-	25	100	-	100	125
7	Workshop Practice-II	MECH2141	0	0	6	6	3	-	100	100	-	100	100	200
8	Soft Skills -II	VALU0152	0	0	2	2	-	-	25	25	-	-	-	25
		Total	**17**	**00**	**18**	**35**	**25**	125	250	375	500	300	800	1175

INDUSTRIAL TRAINING:

After examination of 4th semester, the students shall go for training in a relevant industry/field organization for a minimum period of 8 weeks and will prepare a diary. It shall be evaluated during 5th semester by his/her teachers for 100 marks. The students shall also prepare a report at the end of training and shall present it in a semester, which will be evaluated for another 100 marks. This evaluation will be done by HOD and lecturer in—charge – training in the presence of one representative from industry/Sector skill council/training and placement officer/subject expert from other institution.

MODULE NAME: COMPUTER AIDED DRAFTING
MODULE CODE: MECH2135

L T P
- - 4

UNIT 1. Introduction to Computer Aided Drafting (2D) commands of any one software
(Auto CAD, ProE, Solid works, Unigraphics etc.) (6 drawing sheets)

Concept of AutoCAD, Tool bars in CAD software, coordinate system, snap, grid, and ortho Mode (Absolute, Relative and Polar), setting of units and layout. Drawing commands – point, line, arc, circle, ellipse, editing commands – scale, erase, copy, stretch, lengthen and explode. Dimensioning and placing text in drawing area Sectioning and hatching Inquiry for different parameters of drawing entity Create layers within a drawing Specifying Geometrical Dimensioning & tolerance (GD&T) parameters in drawing

UNIT 2. Detail and assembly drawing of the following using Drafting Software (2D) (4
sheets)
Plummer Block
Wall Bracket
Stepped pulley, V-belt pulley
Flanged coupling
Machine tool Holder (Three views)
Screw jack, joints, crank shaft and piston.

UNIT 3. Isometric Drawing by CAD using any part modeling Software (3D) (one sheet)

Drawings of following on computer: - Cone - Cylinder - Cube - spring - Isometric view of objects

UNIT 4. Introduction to any part modeling software (ProE, Solid works, AutoCAD, Uni
Graphic, Catia etc.) Introduction to Sketcher: Sketch Entities, Sketch Tools,
Blocks,
Dimensioning.

Part modeling (4 models) Part Modeling Tools:-
Creating reference planes
Creating Extrude features Creating Revolve Creating Swept features
Creating Loft features
Creating Reference - points, axis, coordinates
Creating curves

Creating Fillet features
Inserting Hole types
 Creating Chamfer
 Creating Shell
 Creating Rib

UNIT 5. Environment& Utilities - Working with views and manipulating views, Create parts
 e.g. Piston, Pin, Bolts and Nuts, Fixture, Jig parts, Washer, Rings, Gaskets,
 Machine parts etc.

UNIT 6.Assembly and Simulation

Assembly Modeling Tools:- Introduction to Assembly Modeling & Approaches – Top
down and Bottom up approach, Applying Standard Mates- Coincident, Parallel,
Perpendicular, Tangent, Concentric, Lock, Distance, Angle. Assemble of any two
Mechanism e.g. Crank slider mechanism, Piston and Cylinder assembly, Quick Return
Mechanism (QRM), Machine vices, Crank Shaft, Bearing assembly, any other
mechanism.

MODULE NAME: MATERIALS AND METALLURGY
MODULE CODE: MECH2136

L T P
4 0 2

UNIT 1: Introduction

Material, History of Material Origin, Scope of Material Science, Overview of different engineering materials and applications, Classification of materials, Thermal, Chemical, Electrical, Mechanical properties of various materials, Present and future needs of materials, Overview of Biomaterials and semi- conducting materials, various issues of Material Usage-Economical, Environment and Social.

UNIT 2: Crystallography

Fundamentals: Crystal, Unit Cell, Space Lattice, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, Atomic Packing Factor. Deformation: Overview of deformation behaviour and its mechanisms, behaviour of material under load and stress-strain. Failure Mechanisms: Overview of failure modes, fracture, fatigue and creep.

UNIT 3: Metals and Alloys

Introduction: History and development of iron and steel, Different iron ores, Raw Materials in Production of Iron and Steel, Basic Process of iron-making and steel-making, Classification of iron and steel, Cast Iron: Different types of Cast Iron, manufacture and their usage. Steels: Steels and alloy steel, Classification of plain carbon steels, Availability, Properties and usage of different types of Plain Carbon Steels, Effect of various alloys on properties of steel, Uses of alloy steels (high speed steel, stainless steel, spring steel, silicon steel) Non Ferrous Materials: Properties and uses of Light Metals and their alloys, properties and uses of White Metals and their alloys.

UNIT 4: Theory of Heat Treatment

Purpose of heat treatment, Solid solutions and its types, Iron Carbon diagram, Formation and decomposition of Austenite, Martensitic Transformation – Simplified Transformation Cooling Curves various heat treatment processes- hardening, tempering, annealing, normalizing, Case hardening and surface hardening, Types of heat treatment furnaces required for above operations (only basic idea)

UNIT 5: Engineering Plastics

Important sources of plastics, Classification-thermoplastic and thermo set and their uses, Various Trade names of engg. Plastics, Plastic Coatings.

UNIT 6: Miscellaneous Materials

Properties and uses of Asbestos, Glass wool, thermocole, cork, mica. Overview of tool and die materials, Materials for bearing metals, spring materials, Materials for Nuclear Energy, Refractory materials.

RECOMMENDED BOOKS

1. Text book of Material Science by R.K. Rajput; Katson Pubs, Ludhiana
2. Text book of Material Science by Varinder Kumar, Eagle Publisher, Jalandhar
3. Text book of Material Science by V.K. Manchanda; India Publishing House, Jalandhar.
4. Engg. Metallurgy by R.A. Higgens, Standard Publishers, New Delhi
5. Introduction to Material Science by A.R. Gupta, Satya Prakashan, New Delhi

LIST OF PRACTICALS

1. Classification of about 25 specimens of materials/machine parts into
 (i) Metals and non-metals (ii) Metals and alloys (iii) Ferrous and nonferrous metals (iv) Ferrous and nonferrous alloys
2. Given a set of specimen of metals and alloys (copper, brass, aluminium, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them.
3. Study of heat treatment furnace.
4. Study of a metallurgical microscope and a specimen polishing machine.
5. To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of following materials: i) Brass ii) Copper iii) Grey iv) Malleable v) Low carbon steel vi) High carbon steel vii) HSS
6. To anneal a given specimen and find out difference in hardness as a result of annealing.
7. To normalize a given specimen and to find out the difference in hardness as a result of normalizing.
8. To harden and temper a specimen and to find out the difference in hardness due to tempering.

MODULE NAME: HYDRAULICS AND PNEUMATICS
MODULE CODE: MECH2137

L T P
3 0 2

UNIT 1: Introduction

Fluid, types of fluid; properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity, compressibility, surface tension, kinematic viscosity and dynamic viscosity and their units

UNIT 2: Pressure and its Measurement

Concept of pressure (Atmospheric Pressure, gauge pressure, absolute pressure), Pascal's Law, Static Pressure Pressure measuring devices: peizometer tube manometers - simple U-tube, differential single column, inverted U-tube, micromanometer including simple problems Bourdon pressure gauge, Diaphragm pressure gauge, dead weight pressure gauge

UNIT 3: Flow of Fluids

Types of fluid flow – steady and unsteady, uniform and non-uniform, laminar and turbulent; rate of flow and their units; continuity equation of flow; potential energy of a flowing fluid; total head; Bernoulli's theorem (statement and proof) and its applications. Discharge measurement with the help of venturi-meter, orifice meter, pitot-tube, limitations of Bernoulli's theorem simple problems.

UNIT 4: Flow through Pipes

4.1 Definition of pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction; Chezy's equation and Darcy's equation of head loss (without proof), Reynold's number and its effect on pipe friction; siphon, Nozzle - definition, velocity of liquid flowing through the nozzle, power developed. Water hammer, anchor block, syphon, surge tank (concept only).

4.2 Loss of head in pipes due to sudden enlargement, sudden contraction, obstruction on flow path, change of direction and pipe fittings (without proof)

UNIT 5: Flow through Orifices

Cc, Cv, Cd, flow through drowned, partially drowned orifices, time for emptying a tank through a circular orifice. Simple problems Description, operation and application of hydraulic systems – hydraulic ram, hydraulic jack, hydraulic brake, hydraulic accumulator, hydraulic door closer, hydraulic press, selection of specification of above systems for different applications

UNIT 6: Water Turbines and Pumps

Concept of a turbine, types of turbines –impulse and reaction type (concept only), difference between them. Construction and working of pelton wheel, Francis turbine, Propeller and Kaplan turbines. Unit speed, unit power, unit discharge, specific speed of turbines, selection of turbines based on specific speed. Concept of hydraulic pump, single acting reciprocating pump (construction and operation only), vane, screw and gear pumps. Construction, working and operation of centrifugal pump. Performance, efficiencies and specifications of a centrifugal pump. Trouble shooting and problems in centrifugal pumps and remedial measures, pitting, cavitation, priming.

RECOMMENDED BOOKS
1. Fluid Mechanics by KL Kumar; S Chand and Co Ltd., Ram Nagar, New Delhi.
2. Hydraulics and Fluid Mechanics Machine by RS Khurmi ; S.Chand & Co. Ltd., New Delhi.
3. Fluid Mechanics through Problems by RJ Garde; Wiley Eastern Ltd., New Delhi.
4. Fluid Mechanics by Dr AK Jain, Khanna Publishers, New Delhi.
5. Hydraulic and Pneumatic Control by K Shammuga Sundaram, S. Chand & Co. Ltd., New Delhi

LIST OF PRACTICALS

1. Measurement of pressure head by employing. i) Piezometer tube ii) Single and double column manometer.
2. To find out the value of coefficient of discharge for a venturimeter.
3. Measurement of flow by using venturimeter.
4. Verification of Bernoulli's theorem.
5. To find coefficient of friction for a pipe (Darcy's friction).
6. To study hydraulic circuit of an automobile brake and hydraulic ram.
7. Study the working of a Pelton wheel and Francis turbine.
8. To study a single stage centrifugal pump for constructional details and its operation to find out its normal head and discharge.

MODULE NAME: THERMODYNAMICS-II
MODULE CODE: MECH2138

L T P
3 0 2

UNIT 1. IC Engines

Working principle of two stroke and four stroke cycle, SI engines and CI engines, Otto cycle, diesel cycle and dual cycle, Location and functions of various parts of IC engines and materials used for them ,Concept of IC engine terms: bore, stroke, dead centre, crank throw, compression ratio, piston displacement, piston speed.

UNIT 2. Fuel Supply & Ignition System in Petrol & Diesel Engine

Concept of carburetion, Air fuel ratio, Simple carburettor and its limitations, Description of battery coil and electro ignition system, Description of petrol injection system. Components of fuel injection in C.I. system, Description and working of fuel feed pump, Fuel injection pump, Common rail direct injection system, Injectors.

UNIT 3. Cooling and Lubrication

Function of cooling system in IC engine, Air cooling and water cooling system, use of thermostat, radiator, Function of lubrication, Types and properties of lubricant , Lubrication system of engine, Fault finding in cooling and lubrication and remedial action.

UNIT 4. Testing of IC Engines

Engine power - indicated and brake power , Efficiency - mechanical, thermal. Relative and volumetric ,Methods of finding indicated and brake power , Morse test for petrol engine , Heat balance sheet ,Concept of pollutants in SI and CI engines, pollution control, norms for two or four wheelers – BIS – I, II, III and IV methods of reducing pollution in IC engines, alternative fuels like CNG , LPG, Hydrogen.

UNIT 5. Steam Turbines and Steam condensers

Function and use of steam turbine, Steam nozzles- types and applications,steam turbines-impulse,reaction,simple   and   compound,construction   and   working principle,governing of steam turbines,functions of a steam condenser,elements of condensing plant, classification-   jet condenser, surface condenser, cooling pond and cooling towers.

UNIT 6. Gas Turbines and Jet Propulsion

Classification, open cycle gas turbine and closed cycle gas turbine, comparison of gas turbines with reciprocating IC engines, applications and limitations of gas turbine. Open cycle constant pressure gas turbine-general layout, P-V and T-S diagram and working of gas turbine. Closed cycle gas turbine, P -V and T-S diagram and working

RECOMMENDED BOOKS

1. Elements of Heat Engines by Pandey and Shah; Charotar Publishing House, Anand.
2. Thermal Engineering by PL. Ballaney; Khanna Publishers, New Delhi.
3. Engineering Thermodynamics by CP. Arora; Tata McGraw Hill Publishers, New Delhi.
4. Thermal Engineering by RK Purohit; Standard Publishers Distributors, New Delhi.

LIST OF PRACTICALS

1. Study of a two stroke engine using cut section model, note the function and material of
   each part.
2. Study of a four stroke engine using cut section model. Note the function of each part
3. Study of battery ignition system of a multi-cylinder petrol engine stressing ignition timings, setting, fixing order and contact breaker; gap adjustment.
4. Study of cooling of IC engine.
5. Study of lubricating system of IC engine.
6. Determination of BHP by dynamometer.
7. Morse test on multi-cylinder petrol engine.
8. Local visit to roadways or private automobile workshops.

MODULE NAME: INDUSTRIAL ENGINEERING
MODULE CODE: MECH2139

L T P

3 0 0

UNIT 1: Productivity

Introduction to productivity, factors affecting productivity, practical measurement of productivity, difference between production and productivity, causes of low productivity and methods to improve productivity, contribution of standardization in improving productivity.

UNIT 2: Work Study

Definition and scope of work study; factors for selection of work study job, uses and limitations of work study, Inter-relation between method study and work measurement; Human aspects of work study; Role of work study in improving productivity.

UNIT 3: Method Study

Definition, Objectives and procedure for Method study analysis; Information collection and recording techniques through various diagrams.

UNIT 4: Motion Analysis

Principles of Motion analysis; Therbligs and SIMO charts; Normal work area (Principle of motion economy), design and arrangement of work place. Ergonomics, design of tools and equipment's.

UNIT 5: Work Measurement

Objectives; work measurement techniques, stop watch time study; principle, equipment used and procedure; systems of performance rating; standard elements of time, calculation of basic
times; various allowances; guide for rest allowance in Indian conditions, calculation of standard time, work sampling, standard data and its usage. Work sampling. Introduction to wages, Wage payment for direct and indirect labour, wage payment plans and incentives, various incentive plans, incentives for indirect labour.

UNIT 6: Production Planning and Control

Production and its types- job order, batch type and continuous type of productions. Objectives
and components (functions) of P.P.C, Advantages of production planning and Production Control, stages of P.P.C, process planning, routing, scheduling, dispatching and follow up,

routing purpose, route sheets, scheduling – purpose, machine loading chart, dispatching – purpose, and procedure, follow up – purpose and procedure. Structure and function of

Production, Planning Department, Gantt chart. CPM/PERT technique, drawing of simple networks and critical time calculation. Production Control in job order, batch type and continuous type of productions.

RECOMMENDED BOOKS
1. INDUSTRIAL ENGINEERING BY RS KHURMI NEW DELHI
2. INDUSTRIAL ENGINEERING by O.P KHANNA; Khanna Publishers, New Delhi.

MODULE NAME: WORKSHOP TECHNOLOGY-II
MODULE CODE: MECH2140

L T P
4 0 0

UNIT 1: Cutting Tools and Cutting Materials

Cutting Tools - Various types of single point cutting tools and their uses, Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed and depth of cut and their effect, Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, satellite, ceramics and diamond.

UNIT 2: Lathe

Principle of turning , Function of various parts of a lathe , Classification and specification of various types of lathe ,Work holding devices , Lathe tools and operations :- Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning. Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.
 Speed ratio, preferred numbers of speed selection. Lathe accessories:- Centers, dogs, different types of chucks, collets, face plate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools. Introduction to capstan and turret lathe

UNIT 3: Drilling

 Principle of drilling. Classification of drilling machines and their description. Various operation performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping. Speeds and feeds during drilling, impact of these parameters on drilling, machining time. Types of drills and their features, nomenclature of a drill, Drill holding devices.

UNIT 4. Boring and Broaching

 Principle of boring, Classification of boring machines and their brief description, Specification of boring machine, Boring tools, boring bars and boring heads, description of jig boring machine. Introduction, Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down. Elements of broach tool, broach tooth details – nomenclature, types, and tool material.

UNIT 5. Shaping, Planing , Slotting

 Working principle of shaper, planer and slotter. Type of shapers, Type of planers, Quick return mechanism applied to shaper and planer machine, Types of tools used and their geometry. Specification of shaper and planer, Speeds and feeds in above processes.

UNIT 6. Jigs & Fixtures

Jigs and Fixtures ,Importance and use of jigs and fixture , Principle of location ,Locating devices ,Clamping devices, Advantages of jigs and fixtures ,Cutting Fluids and Lubricants, Function of cutting fluid ,Types of cutting fluids, Difference between cutting fluid and lubricant ,Selection of cutting fluids for different materials and operations.

MODULE NAME: WORKSHOP PRACTICE – II
MODULE CODE: MECH2141

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- - 6

Turning Shop
Job 1. Grinding of single point turning tool.
Job 2. Exercise of simple turning and step turning.
Job 3. A composite job involving, turning, taper turning, external thread cutting and knurling.

Advance Fitting Shop
Job 1. Exercise on drilling, reaming, counter boring, counter sinking and taping
Job 2. Dove tail fitting in mild steel
Job 3. Radius fitting in mild steel
Job 4. Pipe threading with die

Machine Shop
Job 1. Prepare a V-Block up to ± 0.5 mm accuracy on shaper machine
Job 2. Exercise on key way cutting and spline cutting on shaper machine

MODULE NAME: SOFT SKILLS – II
MODULE CODE: VALU0152

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DETAILED CONTENTS

- Concept of team building, behavior in a team
- Developing Interpersonal Relations- empathy, sympathy
- Communication skills - improving non-verbal communication
- Conflict Management
- Motivation
- Leadership
- Professional Ethics and Values
- Health, Hygiene, Cleanliness and Safety In addition, the students must participate in the following activities to be organized in the institute
- Sports
- NCC/NSS
- Camp – Environment awareness
- Cultural Event Note: Extension Lectures by experts may be organized. There will be no examination for this subject.

INDUSTRIAL TRAINING

After examination of 4th semester, the students shall go for training in a relevant industry/field organization for a minimum period of 8 weeks and will prepare a diary. It shall be evaluated during 5th semester by his/her teachers for 100 marks. The students shall also prepare a report at the end of training and shall present it in a semester, which will be evaluated for another 100 marks. This evaluation will be done by HOD and lecturer in—charge – training in the presence of one representative from industry/Sector skill council/training and placement officer/subject expert from other institution.