BACHELOR
IN
ELECTRONICS, COMMUNICATION AND INFORMATION ENGINEERING

Year : I **Part : I**

Teaching Schedule								Examination Scheme							
								Theory			Practical			Total	Remark
S. N.	Course Code	Course Title	Credits	L	T	P	Total	Assessment Marks	Final		Assessment Marks	Final			
									Duration hours	Marks		Duration hours	Marks		
1	SH 101	Engineering Mathematics I	3	3	2	-	5	40	3	60	-	-	-	100	
2	SH 102	Engineering Physics	4	4	1	2	7	40	3	60	25	-	-	125	
3	CT 101	Computer Programming	3	3	1	3	7	40	3	60	50	-	-	150	
4	ME 101	Engineering Drawing	2	2	-	4	6	20	3	30	50	-	-	100	
5	EX 101	Fundamental of Electrical and Electronics Engineering	3	3	1	3	7	40	3	60	50	-	-	150	
6	ME 106	Engineering Workshop	1	1	-	3	4	20	-	-	30	-	-	50	
Total			**16**	**16**	**5**	**15**	**36**	**180**	**-**	**270**	**175**	**-**	**-**	**675**	

Year : I **Part : II**

Teaching Schedule								Examination Scheme							
								Theory			Practical			Total	Remark
S. N.	Course Code	Course Title	Credits	L	T	P	Total	Assessment Marks	Final		Assessment Marks	Final			
									Duration hours	Marks		Duration hours	Marks		
1	SH 151	Engineering Mathematics II	3	3	2	-	5	40	3	60	-	-	-	100	
2	CT 151	Object Oriented Programming	3	3	1	3	7	40	3	60	50	-	-	150	
3	EX 151	Electronic Device and Circuits	3	3	1	3	7	40	3	60	50	-	-	150	
4	EX 152	Digital Logic	3	3	1	3	7	40	3	60	50	-	-	150	
5	EE 154	Electrical Circuits and Machines	4	4	1	1.5	6.5	40	3	60	25	-	-	125	
6	SH 153	Engineering Chemistry	3	3	1	3	7	40	3	60	25	-	-	125	
Total			**19**	**19**	**7**	**13.5**	**39.5**	**240**	**-**	**360**	**200**	**-**	**-**	**800**	

ENGINEERING MATHEMATICS I

SH 101

Lecture	**: 3**	**Year : I**
Tutorial	**: 2**	**Part : I**
Practical	**0**	

Course Objectives:

To equip the students with the essential mathematical skills and techniques that are relevant to the engineering fields and enable them to solve engineering problems using mathematical methods.

1 Derivatives and its Applications (10 hours)

Review of derivative and differentiability, mean value theorems with interpretations
Indeterminate forms, types and their real life examples, L-Hospital's Rule
Power series of single valued functions
Taylor's series
Maclaurin's series
Asymptotes to Cartesian and Polar curves
Pedal equation to Cartesian and Polar curves
Curvature and radius of curvature for Cartesian curves

2 Antiderivatives and its Applications (11 hours)

Review of definite and indefinite integrals
Differentiation under integral sign
Improper integrals
Application of Beta and Gamma functions
Area, arc length, volume and surface of revolution in plane for Cartesian curves
Centroid and moment of inertia under area of curve

3 Ordinary Differential Equations and its Applications (10 hours)

Review of: Order, degree, solution of first order first degree differential equations by variable separation method and solution of homogeneous equations.
Linear differential equation and equations reducible to linear differential equation of first order Bernoulli's equation, modeling electric circuit
First order and higher degree differential equations; Clairaut's form

Linear second order differential equations with constant coefficient and variable coefficients reducible to constant coefficients, Cauchy's equations and modeling mass spring system
Application in physical sciences and engineering

4 Plane Analytic Geometry (4 hours)

Transformation of coordinates: Translation and Rotation
Equation of conic in Cartesian and polar form, identification of conics

5 Three dimensional geometry (10 hours)

The Straight line: symmetrical and general form
Coplanar lines
Shortest Distance
Sphere: General equation, plane section by planes, tangent planes
Introduction to right circular cone and right circular cylinder

Tutorials

There shall be related tutorials exercised in class and given as regular homework exercise. Tutorial can be as following for each specified chapters

1. Derivatives and its Applications
2. Antiderivatives and its Applications
3. Ordinary Differential Equations and its Applications
4. Plane Analytic Geometry
5. Three dimensional geometry

Reference

1. Jeffery A., (2001), Advanced Engineering Mathematics (1st ed.), Academic Press.
2. O'Neill, P.V., (2003), Advanced Engineering Mathematics (5th ed.), Thomson Learning.
3. Kreyszig , A. (1993), Advanced engineering Mathematics (7th ed.), John Wiley & Sons.
4. Sastry S.S. (2008), Engineering Mathematics Volume I and II (4th ed.). PHI India.
5. Wylie C. and Barrett L.(1995), Advanced Engineering Mathematics (6th ed.), McGraw-Hill College.
6. Thomas, T. and Finny, R. (1984), Calculus and Analytic Geometry (6th ed.), Addison-Wesley.

Final Examination (Mark Distribution)

ENGINEERING MATHEMATICS I

Code-SH101

S.N	Topic	Workload (hrs)	Marks *	Remarks
1	Derivatives and its applications	10	14	
2	Antiderivatives and its applications	11	14	
3	Ordinary Differential Equations and its Applications	10	14	
4	Plane Analytic Geometry	4	6	
5	Three Dimensional Geometry	10	12	
Total		**45**	**60**	

**There may be minor deviation in mark distribution.*

ENGINEERING PHYSICS

SH 102

Lecture	**: 4**	**Year : I**
Tutorial	**: 1**	**Part : I/II**
Practical	**2**	

Course Objectives:

To provide students a concept and sound knowledge of physics with the emphasis in present day applications to apply them in relevant fields. The background of physics corresponding to Proficiency Certificate Level is assumed.

1 Oscillation (6 hours)

Physical pendulum
Bar pendulum
Interchangeability of point of suspension and point of oscillation
Minimum time period in case of physical pendulum
Torsion pendulum
Damped and Forced Oscillation
Damped harmonic oscillator
Difference between free and damped oscillator
Energy in damped oscillation
Relaxation time
Forced oscillation and resonance
Sharpness of resonance
Quality factor

2 Acoustics (3 hours)

Introduction
Threshold of hearing and loudness
Reverberation and reverberation time
Absorption coefficient
Sabine's Law
Conditions for good acoustics
Ultrasound
Production (piezoelectric) of ultrasound and its applications
Test of structure and materials
Medical uses

3 Heat and Thermodynamics (8 hours)

- Quantity of Heat
  - Calorific value of Foods and Fuels
  - Bomb Calorimeter
  - Specific heat of solid: Dulong - Petit law, Einstein's law
- Nature of Heat
  - Degree of freedom
  - Maxwell's law of equipartition of energy
  - atomicity of gases
  - Vander-Waal's equation of real gases
  - Critical constants
- Thermodynamics
  - Laws of Thermodynamics
  - Clapeyron latent heat equation
  - Entropy and Third law of thermodynamics
  - Negative energy
  - Maxwell's thermodynamic relations
  - Gibb's free energy and phase transitions
- Heat and Mass Transfer
  - Fourier's law of thermal conductivity
  - Use of thermal conductivity in building sciences
  - Thermal resistance
  - Types of convection
  - Law of diffusion
  - Relation between Stefan's law and Newton's law of Cooling
  - Pyrheliometer and Pyrometer

4 Optics (17 hours)

- Geometrical optics
  - Lens separation
  - Chromatism in lens combination
- Interference
  - Interference in thin films (reflected and transmitted light)
  - fringes produced by a wedge-shaped thin film
  - Newton's rings (both reflected and transmitted case)
  - Determination of wavelength of light and refractive index of liquid by using Newton's rings.
- Diffraction
  - Introduction: Fresnel and Fraunhoffer's diffraction
  - Fraunhoffer's diffraction at single slit
  - Intensity distribution in the diffraction pattern due to a single slit
  - Multiple slits, diffraction grating
  - X-ray diffraction, X-rays in material testing

Polarization
Introduction: double refraction, Nichol prism (construction and uses)
Retardation plate (quarter and half wave plates), plane, elliptical and circular polarized light (theoretical and mathematical explanation)
Optical activity, specific rotation
Laser
Introduction: Laser and ordinary light, properties of laser
Induced absorption, spontaneous and Stimulated emission, active medium, population inversion, metastable state
Pumping (types: optical, electrical, chemical and heating)
He-Ne laser, semiconductor Laser
Uses of laser
Fiber Optics
Introduction: Propagation of light wave
Types of optical fiber: step index and graded index
Fiber transmission – single and multimode, self focusing, acceptance angle and numerical aperture
Applications

5 Electrostatics (8 hours)

Electric Field
Electric field due to a electric dipole (along axial line and equatorial line)
Electric dipole in an external electric field
Electric field due to linear electric quadrupole (along axial line)
Electric field: a ring of charge, circular ring and disc of charge
Electric Potential
Potential due to electric dipole
Potential due to linear quadrupole
potential due to continuous charge distribution, potential due to ring of charge and disc of charge
Capacitors
Cylindrical Capacitor
Charging and discharging of capacitor
Capacitor with dielectrics: dielectrics and Gauss law
High intensity electrostatic fields: uses and hazards (xerography, inkjet, precipitation)

6 Electromagnetism (6 hours)

- Electromagnetic induction
  - Faraday's laws
  - Induction and energy transformation
  - Induced electric field
  - Self-induction and mutual induction
  - LR circuit
  - Energy stored in a magnetic field and energy density
  - Induced magnetic field: modified Ampere's law and displacement current
- Eddy Current
  - Introduction
  - Applications: Induction cooker, Electric Guitar, Metal Detector and Eddy Current Breaking
  - Cyclotron and Synchrotron

7 Electromagnetic waves (6 hours)

- Maxwell's Equations
  - Differential and integral forms
  - Conversion of Maxwell's equations from integral form to differential form and differential form to integral form
  - Maxwell's equations in different media
- Applications
  - Wave equations: non conducting and conducting medium and free space
  - Plane solution of wave equations, amplitude of electromagnetic waves, speed of electromagnetic waves, ratio of electric and magnetic fields
  - Continuity equation
  - Energy transfer and Poynting vector, Radiation pressure

8 Photon and matter waves (6 hours)

- Quantum Physics
  - Inadequacy of classical mechanics and rise of quantum mechanics, Quantization of energy
  - Group velocity and phase velocity, electrons and matter waves de-Broglie wavelength, its applications
  - Heisenberg uncertainty principle and its applications
  - Wave functions and its significance

Schrodinger wave equation
Time dependent and independent equation
Probability distribution
One dimensional infinite potential well, particle in a box
Barrier tunneling (reflection and transmission coefficient)

Laboratory

1. To determine the acceleration due to gravity and radius of gyration of the given metal bar using bar pendulum.
2. To determine the modulus of elasticity of the given material and moment of inertia of the circular disc about the wire as an axis passing through its center and perpendicular to its plane by using torsional Pendulum
3. To determine the coefficient of thermal conductivity of a bad conductor by Lee's method
4. To determine the mechanical equivalent of heat by given method
5. To determine the wavelength of the sodium light using Newton's rings
6. To determine the wavelength of sodium light using wedge-shaped method
7. To determine the wavelength of LASER light using diffraction grating and hence determine the particle size of lycopodium power
8. To determine the focal length of two lenses when they are separated by some finite distance
9. To determine the chromatic aberration of a convex lens between red and blue colors
10. To determine the capacitance of the given capacitor by the method of charging and discharging through resistor
11. To plot the graph between frequency and current in LCR series circuit and hence determine the quality factor of the circuit
12. To study the growth and decay of current in LR circuit then determine the self-inductance of the given inductor
13. To determine the dielectric constant of the given material

Reference

1. Halliday, Resnick, Walker, "Fundamentals of Physics', John Wiley & Sons. Lnc.
2. Pokharel, Bhattarai, and Paudel "Fundamentals of Engineering Physics", Benchmark Publication.
3. Brij Lal and Subrahmanyam, ''A text book of Optics", S. Chand Publisher.
4. Basudeva, A.S. 'Modern Engineering Physics", S. Chand Publisher.
5. Caur R. K. and Gupta, S. L., "Engineering Physics', Dhanpat Publisher.
6. Brij Lal and Subrahmanyam, 'Waves and Oscillation", S. Chand publisher.
7. Brij Lal and Subrahmanyam, 'Heat and Thermodynamics", S. Chand publisher
8. Avadhanulu, Kshirsaga and Arun Murthy, A text Book of Engineering Physics, S. Chand publisher.

Final Examination (Mark Distribution)
ENGINEERING PHYSICS
Code-SH101

S. N.	Topic	Workload (hrs)	Long questions	Short Questions	Very Short questions	Marks	Remarks
1	Oscillation	6	1	1	0	6	
2	Acoustics	3	1	0	0	4	
3	Heat & Thermodynamics	8	1	1	1	7	
4	Optics	17	4	0	1	17	
5	Electrostatics	8	2	0	1	9	
6	Electromagnetism	6	1	0	1	5	
7	Electromagnetic Waves	6	1	1	0	6	
8	Photo & Matter Waves	6	1	1	0	6	
Total		**60**	**12x4=48**	**4x2=8**	**4x1=4**	**60**	

**There may be minor deviation in mark distribution.*

COMPUTER PROGRAMMING

CT 101

Lecture	**: 3**	**Year : I**
Tutorial	**: 1**	**Part : I**
Practical	**3**	

Course Objectives:

The primary goal of this course is to provide students with a solid foundation in the principles of programming and to impart practical skills in the C programming language. This course ensures that students comprehend the fundamental concepts of variables, data types, control structures, and functions within the context of C. Advanced topics such as pointers, structures, file handling and the Standard C Library are explored to broaden students' programming capabilities. Also, through project-based assessments and evaluations, students apply their knowledge to real-world scenarios, fostering creativity and project development skills.

1 Introduction to Computer Programming (3 hours)

Definition of a computer program and programming language
Types and Generations of Programming Languages
Problem-Solving using a Computer
Problem Analysis
Algorithm and Flowchart
Programming
Compilation, Linking and Execution
Debugging and Testing
Documentation

2 Overview of C Programming (3 hours)

Introduction to C programming
History and Importance of C
C Headers and Library Functions
Basic Structure of a C Program
Preprocessor Directives
Tokens in C (Character set, Keywords and Identifiers)
Type Casting (Implicit and Explicit)
Data Types, Variables and Constants
Compiler and IDE for C Programming

3 Operators and Expressions (4 hours)

- Introduction to Operators and Expressions
- Arithmetic, Relational and Logical Operators
- Assignment, Increment and Decrement Operators
- Conditional, Bitwise and Special Operators
- Comma Operator, size of Operator
- Evaluation and Type Conversion in Expressions
- Operator Precedence and Associativity

4 Input and Output (3 hours)

- Introduction to data I/O in C
- Unformatted I/O
  - Character I/O
  - String I/O
- Formatted I/O
  - Control String (flags, field width, precision, and specifier)
  - Formatted I/O (scanf(), printf())

5 Control Structures (8 hours)

- Introduction to Simple and Compound Statement
- Sequential Statement
- Branching Statement
  - Simple if Statement
  - if-else Statement
  - Nested if-else Statement
  - else-if Ladder
  - switch Statement
  - go to statement
- Looping Statement
  - for loop
  - while loop
  - do while
  - Nested loop
- Loop Interruption
  - break
  - continue

6 Array and Pointer **(7 hours)**

Introduction to an Array
One-dimensional Array
Two-dimensional Array
Multidimensional Array
Introduction to String
String Handling Functions
Definition of a Pointer
Pointer Declaration
Pointer Arithmetic
Relationship between Pointer and Arrays

7 User-defined Functions **(6 hours)**

Introduction to Function
Advantages of Function
Elements of User-defined Function
Function Definition
Function Prototype
Function Parameters
Storage Class
Scope Rules
Category of Functions
Functions with no arguments and no return values
Functions with arguments and no return values
Functions with arguments and return values
Functions with no arguments and return values
Recursive functions
Function Call by Values and Reference
Passing Array and String to Function

8 Structures **(5 hours)**

Defining a Structure
Declaring and Accessing Structure Elements
Initializing Structure
Array of Structure
Array as member to Structure
Pointer as member to Structure
Structure as a member to Structure
Passing and Returning Structures to/from Function

9 File management (4 hours)

Introduction
Binary and Text File in C
File Opening Modes
Defining, Opening and Closing File
Input-output operations on files
    Character I/O (fputc(), fgetc())
    String I/O (fgets(), fputs())
    Formatted I/O (fscanf(), fprintf())
    Record I/O (fwrite(), fread())
Overview of Random File Access
Error handling

10 Recent Trends in Programming (2 hours)

Introduction to Object Oriented Programming (OOP)
Definitions of Class, Method and Object in OOP
Difference between Procedure Oriented and OOP
Overview of other High Level Programming Languages

Laboratory

1. Lab 1: Introduction and Demonstrations of projects written in C
2. Lab 2: Formatted and Unformatted Input/output in C
3. Lab 3: Branching in Control Structure
4. Lab 4: Looping in Control Structure
5. Lab 5: Array in C
6. Lab 6: String in C
7. Lab 7: Pointers in C
8. Lab 8: User Defined functions in C
9. Lab 9: Structure in C
10. Lab 10: File handling in C
11. Group project on C maximum 4 students in a group at the end of the course.

Reference

1. Robert Lafore, “C Programming Using Turbo C++”, SAMS publication
2. E. Balagurusamy, “Programming in Ansi C”, McGraw Hill Education
3. Bryons S. Gotterfried, “Programming with C”, TMH ….

Final Examination (Mark Distribution)

COMPUTER PROGRAMMING

Code-CT101

S.N	Topic	Workload (hrs)	Marks *	Remarks
1	Introduction to Computer Programming	3	5	
2	Overview of C Programming	3	5	
3	Operators and Expressions	4	4	
4	Input and Output	3	4	
5	Control Structures	8	8	
6	Array and Pointer	7	8	
7	User-defined Functions	6	8	
8	Structures	5	5	
9	File management	4	7	
10	Recent Trends in Programming	2	6	
Total		45	60	

**There may be minor deviation in mark distribution.*

ENGINEERING DRAWING

ME 101

Lecture : 2 **Year : I**
Tutorial : 0 **Part : I**
Practical 4

Course Objectives:

To develop basic projection concepts with reference to points, lines, planes and geometrical solids. Also, to develop sketching and drafting skills to facilitate communication.

1 Instrumental Drawing, Technical Lettering Practices and Techniques (1 hour)

Equipment, materials and drawing sheets (paper)
Description of drawing instruments, auxiliary equipment and drawing materials
Techniques of instrumental drawing
Pencil sharpening, securing paper, proper use of T- squares, triangles, scales dividers, compasses, erasing shields, French curves, inking pens
Line types and uses, thickness

2 Dimensioning (1 hour)

Fundamentals and techniques
Size and location dimensioning, SI conversions
Scales: Types and Representative factor
Use of scales, measurement units, reducing and enlarging drawings
Placement of dimensions: aligned and unidirectional, chain, parallel/baseline and combined type
Tolerance Dimensioning

3 Geometrical Construction (2 hours)

Plane geometrical construction: Proportional division of lines, Trisection of angles, smooth arc & line tangents
Methods for drawing regular polygons and standard curves such as ellipses, parabolas, hyperbolas, involutes, spirals, cycloids and helices (cylindrical and conical), ogee curve
Techniques to reproduce a given drawing (by construction)

4 Basic Descriptive Geometry (4 hours)

Introduction to Orthographic projection, Principal Planes, Four Quadrants or Angles
Projection of points on first, second, third and fourth quadrants
Projection of Lines: Parallel to one of the principal planes, Inclined to one of the principal plane and parallel to other, Inclined to both principal planes, Traces of a Line
Projection Planes: Perpendicular to both principal planes, Parallel to one of the principal planes and Inclined to one of the principal planes, perpendicular to other and Inclined to both principal planes
True length of lines: horizontal, inclined and oblique lines
Rules for parallel and perpendicular lines
Point view or end view of a line
Shortest distance from a point to a line
Edge View and True shape of an oblique plane
Angle between two intersecting lines
Intersection of a line and a plane, visible portion of line
Angle between a line and a plane
Dihedral angle between two planes
Shortest distance between two skew lines
Angle between two non- intersecting (skew) lines

5 Multi view (orthographic) projections (8 hours)

Orthographic Projections
First and third angle projection
Principal views: methods for obtaining orthographic views, Projection of lines, angles and plane surfaces, analysis in three views, projection of curved lines and surfaces, object orientation and selection of views for best representation, full and hidden lines
Orthographic drawings: making an orthographic drawing, visualizing objects (pictorial view) from the given views
Interpretation of adjacent areas, true-length lines, representation of holes, conventional practices
Sectional Views: Full, half, offset, broken (partial), rotated/aligned, revolved, removed (detail) sections, phantom of hidden section, specifying cutting planes for sections, conventions practices
Auxiliary views: Basic concept and use, drawing methods and types, symmetrical and unilateral auxiliary views, auxiliary sectional views

6 Developments and Intersections (7 hours)

Introduction and Projection of Solids with points transfer
Developments: general concepts and practical considerations, Triangulation method for approximate development of surfaces of a right/oblique; prism, cylinder, pyramid, cone, prism and cylinder cut by

oblique planes, frustum/truncated pyramid and cone, transition pieces for connecting different shapes and sphere

Intersections: lines of intersection of geometric surfaces, piercing point of a line and a geometric solid, intersection lines of two planes, intersections of – prism and prism, cylinder and prism, cylinder and cylinder, pyramid and prism, cone and prism, pyramid and cylinder, cone and cylinder.

7 Pictorial Drawings (7 hours)

Classifications: Advantages and Disadvantages

Isometric View

- Axonometric Projection
- Isometric Projection and Isometric Drawing (View)
- Isometric and Non-isometric Lines; Isometric and Non-isometric Surfaces
- Angles in Isometric Drawing
- Circles and Circular Arcs in Isometric and Non-isometric Surfaces (slopes)
- Irregular Curves in Isometric Drawing
- Isometric sectional Views

Oblique Drawing

- Procedure for making an Oblique drawing
- Rules for Placing Objects in Oblique drawing
- Angles, Circles and Circular Arcs in Oblique drawing

Perspective Projection

- Terms used in Perspective Projection
- Parallel and Angular Perspective
- Selection of Station Point
- Perspective projection of right prism and pyramid solid

Assignments

1. Geometrical Construction
2. Descriptive Geometry
3. Multi-view Projection I
4. Multi-view Projection II
5. Surface Development and Intersection
6. Isometric Drawing
7. Oblique Drawing and Perspective Projection

Laboratory

1. Drawing Sheet Layout, Freehand Lettering, Scale, Common Graphical Symbols, Sketching of parallel lines, circles, Dimensioning
2. Geometrical Construction (Sketch and Instrumental Drawing)
3. Descriptive Geometry I (Sketch and Instrumental Drawing)
4. Descriptive Geometry II (Sketch and Instrumental Drawing)
5. Multiview Drawings I (Sketch and Instrumental Drawing)

6. Multiview Drawings II (Sketch and Instrumental Drawing)
7. Multiview, Sectional Drawings and Dimensioning (Sketch and Instrumental Drawing)
8. Auxiliary View, Sectional Drawings and Dimensioning (Sketch and Instrumental Drawing)
9. Projection of Regular Geometrical Solids with point transfer (Sketch and Instrumental Drawing)
10. Surface Development of solids I (Sketch and Instrumental Drawing)
11. Surface Development of solids II (Sketch and Instrumental Drawing)
12. Intersection of solids (Sketch and Instrumental Drawing)
13. Isometric Drawing I (Sketch and Instrumental Drawing)
14. Isometric Drawing II (Sketch and Instrumental Drawing)
15. Oblique Drawing and Perspective Projection (Sketch and Instrumental Drawing)

Reference

1. "Fundamentals of Engineering Drawing", W. J. Luzadder, Prentice Hall.
2. "Engineering Drawing and Graphic Technology", T. E. French, C. J. Vierck, and R. J. Foster, Mc Graw Hill Publshing Co.
3. "Technical Drawing", F. E. Giescke, A. Mitchell, H. C. Spencer and J. T. Dygdone, Macmillan Publshing Co.
4. "Elementary Engineering Drawing", N. D. Bhatt, Charotar Publshing House, India.
5. "A Text Book of Engineering Drawing", P. S. Gill, S. K. Kataria and Sons, India
6. "A Text Book of Engineering Drawing", R. K. Dhawan, S. Chand and Company Limited, India
7. "Engineering Drawing I" and "Engineering Drawing II", M. C. Luintel, Heritage Publishers and Distributors Pvt. Ltd., Bhotahity, Kathmdu, Nepal

Final Examination (Mark Distribution)

ENGINEERING DRAWING

Code-ME 158 (ME 101)

S.N	Chapters	Workload (hrs)	Marks*
1	1,2,3	4	3
2	4	4	3
3	5	8	9
4	6	7	8
5	7	7	7
		30	30

*There may be minor deviation in mark distribution.

FUNDAMENTAL OF ELECTRICAL AND ELECTRONICS ENGINEERING

EX 101

Lecture : 3 **Year : I**
Tutorial : 1 **Part : I**
Practical : 3

Course Objectives:

Objective of the course is to understand the language of electronics, elements, and their functionality, to introduce the DC and AC circuit analysis and basic understanding of analog systems and their applications

1 Basic Circuits Concepts (6 hours)

Current and Potential

Passive components: Resistance, Inductance, Capacitance; series, parallel combinations; Kirchhoff's voltage and current laws for dc circuits.

Signal sources: voltage and current sources; non ideal sources; representation under assumption of linearity; controlled sources: VCVS, CCVS, VCCS, CCCS; concept of gain, transconductance, transimpedance.

Maximum power transfer, Superposition theorem, Thevenin's theorem, Norton's theorem

2 Average and RMS Values (4 hours)

Generation of AC voltage

Waveform and its characteristics

RMS and Average values of periodic waveforms

3 AC Circuit Analysis (12 hours)

Single Phase AC Circuit Analysis

Series, parallel and network circuits with sinusoidal excitations

The concept of complex impedance and admittance

Sinusoidal excitation of inductive and capacitive reactance and complex impedance

Concept of time phase differences between various sinusoidal quantities

Phasor concept and phasor representation of AC quantities

Transformed Impedances and network reduction

Real , reactive and apparent power Concepts

Three Phase AC Circuit
Generation of three phase voltage
Wye and Delta connection

4 Diodes (7 hours)

Semiconductor diode characteristics
Modeling the semiconductor diode
Diode circuits: clipper; clamper circuits
Zener diode, LED, Photodiode, Varactor diode, Tunnel diodes
DC power supply: rectifier – half wave, full wave (center tapped, bridge), Zener regulated power supply

5 Transistor (10 hours)

BJT configuration and biasing, small and large signal model
T and π model
Concept of differential amplifier using BJT
BJT as switch and logic circuits
Construction and working principle of JFET, MOSFET and CMOS
MOSFET as logic circuits

6 The Operational Amplifier and Oscillator (6 hours)

Basic model; virtual ground concept; inverting amplifier; non-inverting amplifier; integrator; differentiator, summing amplifier and their applications
Basic feedback theory; positive and negative feedback; concept of stability; oscillator
Waveform generator using op-amp for Square wave, triangular wave, Phase Shift oscillator and Wien bridge oscillator for sinusoidal waveform

Laboratory

1. Familiarization with passive components, function generator and oscilloscope
2. Measurement of amplitude, frequency, time period using oscilloscop
3. Ohm's law, series, parallel circuits and calculate average, RMS value
4. Verification of KCL, KVL and network theorems
5. Maximum power transfer/ capacitor charging and discharging
6. Diode characteristics, rectifiers, Zener diodes
7. Bipolar junction transistor characteristics and single stage amplifier
8. BJT, PMOS, NMOS and CMOS as switch
9. Inverting, non-inverting, summing and subtractor amplifier using Op-amp
10. Relaxation oscillator
11. Analog sensor and small projects

Reference

1. Robert Boylestad and Louis Nashelsky, "Electronic Device and Circuit Theory", PHI; 9th Edition, 2007

2. Thomas L. Floyd, “Electronic Devices”, 8th Edition, Pearson Education Inc., 2007
3. A.S. Sedra and K.C. Smith, “Microelectronic Circuits”, 6th Edition, Oxford University Press, 2006
4. J. R. Cogdell. “Foundation of Electrical Engineering”, prentice Hall, Englewood Cliffs, NewJersey, 1990.

Final Examination (Mark Distribution)

FUNDAMENTAL OF ELECTRICAL AND ELECTRONICS ENGINEERING

Code-EX101

S.N	Topic	Workload (hrs)	Marks *	Remarks
1	Basic Circuits Concepts	6	3	
2	Average and RMS Values	4	7	
3	AC Circuit Analysis	12	15	
4	Diodes	7	10	
5	Transistor	10	15	
6	The Operational Amplifier and Oscillator	6	10	
Total		**45**	**60**	

**There may be minor deviation in mark distribution.*

ENGINEERING WORKSHOP

ME 106

Lecture : 1 **Year : I**
Tutorial : 0 **Part : I**
Practical 3

Course Objectives:

After completing this course, the students will be able to practice workshop safety rules effectively with different hand tools and machine tools for producing metal and sheet metal components. Acquire knowledge and practice on casting, forging, welding, soldering, brazing and riveting.

1 Safety Measures in the Workshop (1 hour)

Causes of accident
Types of safety: General safety, personal safety, machine and equipment safety, job safety

2 Bench Work and Fittings (4 hours)

Fitting Tools: Types, uses of holding tools, sticking tools, cutting tools (files, chisels, hacksaw), scrapping tools (scrappers), drilling tools (drill bits), measuring, marking and testing tools (steel rule, calipers, divider, surface plate, scriber, surface gauge, punches, angle plate, try square, combination sets, vernier caliper, micrometer, bevel protractor, miscellaneous tools (wrenches, screw drivers and pliers)
Benchwork and fitting operation
Filling operations, chipping operations and sawing operation

3 Thread Cutting (1 hour)

Classification of threads
Thread cutting tools for hand threading
Threading taps: Types, uses and care
Threading dies: Types, uses and care
Thread cutting by hand: Cutting internal and external thread

4 Sheet Metal (2 hours)

Introduction, sheet metal tools, sheet metal operation
Rivet types, types of rivet joints, riveting tools and their uses, riveting procedure

5 Machine Tools (2 hours)

Lathes: Working principle, types of lathes, main parts of lathe, lathe operations (facing, centre drilling, turning, knurling, boring, chamfering, thread cutting, counter sinking, counter boring).
Drilling Machine: Types of drilling machine, types of drill bits, drilling operations (drilling, counter boring, reaming, tapping)

6 Forging and Casting (1.5 hours)

Introduction, forging tools, forging operations
Introduction, pattern making foundry tools, core making, sand casting process

7 Welding (2.5 hours)

Arc welding: Introduction, arc welding equipment and accessories, influencing factor in arc welding, methods of striking an arc (tap, scratch), electrodes, types of joint, welding positions, TIG, MIG welding
Gas welding: Oxyacetylene gas welding, oxyacetylene gas welding accessories, filler rods, fluxes, types of flames and uses

8 Brazing and Soldering (1 hour)

Introduction, brazing equipment and materials, brazing process, surface clearing, join design, support parts, brazing operations (heating, filler metal applications, flux application, clearing after brazing)
Introduction, flux, soft solder and soldering process

Laboratory

1. Fitting Practice: Demonstration, usage of different types of hand tools and measuring instruments.
2. Perform Filing, sawing, drilling and tapping operations on given Mild steel strip
3. Machining practice: Perform Lathe operations
4. Welding Practice: Perform Arc welding and Oxy-Acetylene gas welding operations
5. Sheet metal practice: Perform sheet metal operations
6. Soldering and brazing
7. Electrical installations

Reference

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2. Raghuwanshi, B. S. (1990). A Course in Workshop Technology, Volume II (machine tools). New Delhi: Dhanpat Rai & Company Ltd, 23(5), 309-316.
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5. Rajput, R. K. (2007). A textbook of manufacturing technology: Manufacturing processes. Firewall Media.
6. Rao, K. V. (2002). Manufacturing Science and Technology-Manufacturing Processess and Machine Tools. New Age International.
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