THIRD SEMESTER
(Detailed Syllabus)

'MECHATRONICS'

MANUFACTURING ENGINEERING

Course Code:	453001
Course Title	Manufacturing Engineering
No. of Credits	6 (TH:4,T:0,P:4)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Gain knowledge of cutting fluids, lubricants and lathe operations, including various turning and machining techniques.
2. Develop proficiency in broaching machines, drilling operations, and the use of drills and reamers.
3. Acquire practical skills in welding techniques, including gas welding, arc welding, resistance welding, brazing, and soldering.
4. Learn milling machine operations, tooling, and work holding devices, as well as gear manufacturing processes such as casting, moulding, stamping and gear hobbing.
5. Understand the principles of metal removal through grinding, including factors influencing wheel selection and the classification of grinding machines.
6. Develop practical skills in grinding processes and gain knowledge of different grinding operations and their applications.

COURSE CONTENTS

Unit - 1 : Cutting Fluids & Lubricants:

1.1 Introduction;

1.2 Types of cutting fluids and coolants;

1.3 Classification, properties and applications of lubricants.

1.4 Lathe Operation:

1.4.1 Basic parts and their functions;

1.4.2 Types of lathes;

1.4.3 Lathe Operations– Facing, Turning, step turning, taper turning, parting off, Knurling, Boring, drilling, threading,

Unit - 2 : Broaching Machines

2. 1Introduction and Types of broaching machines;

2.2 Elements of broach tool, Nomenclature and Tool materials

Unit - 3 : Welding

3.1 Classification of Gas welding techniques and Types of welding flames;

3.2 Introduction of different types of ARC welding

3.3 Resistance welding

3.4 Welding defects;

3.5 Brazing and soldering: Principles and Applications.

Unit - 4 : Milling and Gear Making:

Introduction and Types of milling machines

4.1 Constructional details, specifications of milling machine

4.2 Milling operations, indexing

4.3 Milling cutters.

4.4 Tool & work holding devices

4.5 Manufacture of gears by milling machine

Unit - 5 : Grinding Processes

5.1 Principles of metal removal by Grinding

5.2 Factors affecting the selection of grind wheels

5.3 Grinding machines classification & Construction details.

5.4 Construction detail and working of NC surface grinder

PRACTICAL OUTCOMES : At the end of the course, the student will be able to:

1. Gain proficiency in arc welding techniques, including lap joints, butt joints, and T-joints.
2. Acquire proficiency in gas welding techniques, including lap joints and butt joints.
3. Develop skills in spot welding, specifically for creating lap joints.
4. Gain practical experience in turning exercises, including facing, step turning, chamfering, taper turning, groove cutting, knurling, and thread cutting. Understand the principles and techniques involved in turning and drilling.
5. Learn the process of grinding lathe cutting tools to the required angles, ensuring proper tool performance.

List of Practicals :

1. Arc welding
   (i) Lap Joint
   (ii) Butt Joint
   (iii) T- Joint
2. Gas welding
   (i) Lap Joint
   (ii) Butt Joint
3. Spot welding
   (i) Lap Joint
4. Turning Exercise
   a. Facing, Step Turning & Chamfering
   b. Step Turning & Taper Turning

c. Step Turning & Groove Cutting
d. Step Turning & Knurling
e. Step Turning & Thread Cutting
f. Turning and Drilling
g. Grinding the Lathe Cutting tools to the required angles

5. Study of Lathe machine, shaping machine.
6. The dismantling some of the components of lathe and then assemble the same
7. List the faults associated with lathe and its remedies
8. The routine and preventive maintenance procedure for lathe.
9. Producing flat finish surface of given dimension on NC Surface Grinder.

References:

1. Manufacturing technology – P N Rao, Tata McGraw-Hill Publications
2. Elements of workshop Technology (Volume I & II) – S. K. Hajra Chaudary, Bose & Roy, Media Promoters and Publishers Limited.
3. Production Technology (Volume I & II) – O. P. Khanna & Lal, Dhanpat Rai Publications.
4. Fundamental of metal cutting and machine tools– B. L. Juneja, New age international limited.
5. Manufacturing Technology, Metal Cutting & Machine tools– P. N. Rao, Tata McGraw-Hill Publications
6. Production Technology – R.B. Gupta, Satya Prakashan, New Delhi

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ELECTRICAL MACHINES

Course Code:	453002
Course Title	Electrical Machines
No. of Credits	6 (TH:4,T:0,P:4)

COURSE OUTCOMES : At the end of the course, the student will be able to:

1. Develop practical skills in dismantling a DC machine and understanding its components.
2. Gain proficiency in reversing the direction of rotation of a DC shunt motor.
3. Learn different methods to control the speed of a DC shunt motor and apply them in practical scenarios.
4. Understand various techniques to control the speed of a DC series motor and implement them in lab experiments.
5. Acquire knowledge of the different parts, their functions, and materials used in single-phase and three-phase induction motors.
6. Connect and operate three-phase squirrel cage induction motors in both directions using DOL, star-delta, & auto-transformer starters, demonstrating an understanding of motor control techniques.

COURSE CONTENTS

Unit 1 - DC Generators

1.1 Construction, parts, materials and their functions;

1.2 Principle of operation of DC generator;

1.3 E.M.F. equation of generators;

1.4 Armature reaction.

Unit 2 - D.C. Motors

2.1 Types of DC motors;

2.2 Principle of operation;

2.3 Back e.m.f. and its significance;

2.4 Voltage equation of DC motor;

2.5 Torque: Armature torque, Shaft torque;

2.6 Losses;

2.7 Efficiency;

2.8 Speed control of DC shunt and series motor, Speed Regulation

Unit 3 - Three Phase Induction Motor

3.1 Basic working principle;

3.2 Production of rotating magnetic field;

3.3 Synchronous speed, Rotor, Slip;

3.4 Elementary idea of construction of 3-phase induction motors;

3.5 Power factor at starting and running condition;

3.6 Characteristics of torque versus slip (speed);

3.7 Starters: Need and types, Stator resistance, Auto transformer, Star delta, Rotor Resistance;

Unit- 4 :Single Phase Induction & Special Purpose Motors

4.1 Construction, working and application of following special purpose motors (Brief idea only);

4.1.1 BLDC motor;

4.1.2 Single phase Synchronous Motor

4.1.3 Stepper motors;

4.1.4 AC and DC servomotors;

4.1.5 Repulsion induction motor;

4.1.6 Universal motor.

Unit 5- Three Phase Alternators & Synchronous Motor

5.1 Construction of three phase alternator;

5.2 Working principle of three phase alternator;

5.3 Principle of working /operation of synchronous;

5.4 Starting methods of Synchronous Motor.

Practical Outcomes: At the end of the course, the student will be able to:

1. Develop practical skills in dismantling a DC machine and get an insight of its components.
2. Gain proficiency in reversing the direction of rotation of a DC shunt motor.
3. Learn different methods to control the speed of a DC shunt motor and apply them in practical scenarios.
4. Acquire knowledge of the different parts, their functions, and materials used in single-phase and three-phase induction motors.
5. Understand the motor control techniques of three-phase induction motors in both directions.

List of Practicals:-

1 Dismantle a DC machine.

2 Reverse the direction of rotation of the DC shunt motor.

3 Control the speed of DC shunt motor by different methods.

4 Control the speed of DC series motor by different methods.

5 Identify the different parts (along with function and materials) for the given single phase and three phase induction motor.

6 Connect and run the three- phase squirrel cage induction motors (in both directions) using the DOL, star-delta, auto-transformer starters (any one).

7 Dismantling and reassembling of single-phase motors used for ceiling fans, universal motor for mixer.

8 Control the speed & reverse the direction of stepper motor.

9 Control the speed and reverse the direction of the AC/DC servo motor.

References /Suggested Learning Resources:

1. P.S. Bimbhra, Electric Machines, Khanna Book Publishing Co., New Delhi.
2. Mittle, V. N. and Mittle, Arvind, Basic Electrical Engineering, McGraw Hill Education New Delhi.
3. Kothari, D. P. and Nagrath, I. J., Electrical Machines, McGraw Hill Education. New Delhi.
4. Bhattacharya, S. K., Electrical Machines, McGraw Hill Education, New Delhi.
5. Theraja, B. L., Electrical Technology Vol-II (AC and DC machines), S. Chand and Co. Ltd., New Delhi.
6. Sen, S. K., Special Purpose Electrical Machines, Khanna Publishers, New Delhi.
7. Janardanan E. G, Special Electrical Machines, Prentice Hall India, New Delhi.
8. Hughes E., Electrical Technology, ELBS
9. Cotton H., Electrical Technology, ELBS

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DIGITAL ELECTRONICS

Course Code:	453003
Course Title	Digital Electronics
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES :- After completion of the course the student will be able to -

1. Understand number systems and their conversions, codes, and complement representations.
2. Gain proficiency in logic gates, Boolean algebra, and simplification techniques using Karnaugh maps.
3. Design and analyze combinational logic circuits, including arithmetic circuits and multiplexers.
4. Learn sequential logic circuits, including flip flops, counters, and shift registers.
5. Understand memory devices, including RAM and ROM, and data converters.
6. Develop technical skills in digital circuit analysis, design, and implementation.

COURSE CONTENTS

Unit - 1 : Number Systems & Boolean Algebra

1.1 Introduction to different number systems – Binary, Octal, Decimal, Hexadecimal;

1.2 Conversion from one number system to another;

1.3 Familiarization with Different types of codes- Gray code, Excess-3, BCD code;

1.4 Concept of 1's and 2's complement;

1.5 Binary Addition, subtraction, multiplication & division;

Unit - 2 : Logic Gates

2.1 Logic Gates – AND, OR, NOT, NAND, NOR, XOR, XNOR: Symbolic representation and truth table;

2.2 Boolean variables – Laws of Boolean algebra;

2.3 De-Morgan's Theorem;

2.4 Karnaugh Maps and their use for simplification of Boolean expressions upto 4 Variables.

2.5 Implementation of Boolean expressions and Logic Functions using universal gates;

2.6 Simplification of expressions using Boolean algebra.

Unit - 3 : Combinational Logic Circuits

3.1 Arithmetic Circuits: Addition, Subtraction, subtraction using 1's & 2's complement method,

3.2 Combinational logic circuit: Half Adder, Full Adder, Half Subtractor, Full Subtractor circuit;

3.3 Encoder and Decoder circuits;

3.4 Multiplexer – 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX.

3.5 Demultiplexer – 1 to 2 DEMUX, 1- 4 DEMUX, 1- 8 DEMUX.

Unit - 4 : Sequential Logic Circuits

4.1 Flip Flops – Basic SR, JK, T, D, JK-MS, Triggering;

4.2 Counters – 4 bit Up – Down Counters, Syncronous, Asynchronous/ Ripple Counter;

4.3 Registers – 4 bit Shift Register: Serial in Serial Out, Serial in Parallel Out, Parallel In Serial Out, and Parallel In Parallel Out (Basic Overview Only)

Unit - 5 : Memory Devices

5.1 Classification of Memories – RAM Organization, Address Lines and Memory Size;

5.2 Static RAM, Dynamic RAM;

5.3 Read only memory – ROM organization, PROM, EPROM, EEPROM, Flash memory;

5.4 Data Converters – Basic block diagram of Digital to Analog converters, Analog to Digital Converters.

References /Suggested Learning Resources:

1. Digital principles & Applications Albert Paul Malvino & Donald P. Leach McGraw Hill Education; Eighth edition, ISBN: 978-9339203405.
2. Digital Electronics Roger L. Tokheim Macmillian McGraw-Hill Education (ISE Editions); International 2 Revised edition, ISBN: 978-0071167963.
3. Digital Electronics – an introduction to theory and practice William H. Gothmann Prentice Hall India Learning Private Limited; 2 edition, ISBN: 978-8120303485.
4. Fundamentals of Logic Design Charles H. Roth Jr. Jaico Publishing House; First edition, ISBN: 978-8172247744.
5. Digital Electronics R. Anand Khanna Publications, New Delhi (Edition 2018), ISBN: 978-93- 82609445.

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ANALOG ELECTRONICS & DEVICES

Course Code:	453004
Course Title	Analog Electronics & Devices
No. of Credits	6 (TH:4,T:0,P:4)

COURSE OUTCOMES :- After completion of the course the Student is able to:

1. Develop a comprehensive understanding of semi-conductor materials as well as the characteristics of N-type and P-type semiconductors.
2. Gain proficiency in analyzing the V-I characteristics of PN junction diodes and their practical applications.
3. Acquire knowledge of various transistors configurations.
4. Acquire knowledge of FETs, MOSFETs, UJT and their applications.
5. Develop an in-depth understanding of SCR, DIAC, & TRIAC and explore their applications as switches.
6. Develop proficiency in using operational amplifiers (op-amps) in various configurations (inverting amplifier, summing amplifier, non-inverting amplifier, etc.). Besides, that also gain practical knowledge of the 555 timer and its applications as an astable multivibrator, monostable multivibrator, Schmitt trigger, sequence timer, and PWM generator.

COURSE CONTENTS

Unit - 1 : Diodes and Bipolar Junction Transistor (BJT)

1.1 Semiconductor: Definition, Extrinsic/Intrinsic, N-type & p-type;

1.2 PN Junction Diode – Forward and Reverse Bias Characteristics;

1.3 Diode Rectifiers – Half Wave and Full Wave, bridge rectifier;

1.4 NPN and PNP Transistor–Operation and characteristics;

1.5 Transistor CB, CE & CC Configurations.

Unit - 2 : Field Effect Transistors

2.1 FET – Working Principle, Classification;

2.2 N-Channel / P-Channel MOSFETs – characteristics;

2.3 Enhancement and depletion mode;

2.4 Uni-Junction Transistor – equivalent circuit and operation, Applications

Unit - 3 : SCR, DIAC & TRIAC

3.1 SCR - Construction, operation, working, characteristics;

3.2 DIAC-Construction, operation, working, characteristics;

3.3 TRIAC-Construction, operation, working, characteristics;

3.4 SCR and MOSFET as a Switch;

3.5 DIAC as bidirectional switch;

3.6 Comparison of SCR, DIAC, TRIAC & MOSFET.

Unit - 4 : Amplifiers and Oscillators

4.1 Classification of amplifiers Feedback Amplifiers – Properties of negative Feedback, impact of feedback on different parameters;

4.2 Oscillator – Basic Principles, Crystal Oscillator, Non-linear/ Pulse Oscillator.

Unit - 5 : Operational Amplifiers and Timers

5.1 Operational amplifier; Ideal Op. Amp; Block diagram and characteristics;

5.2 Op-amp parameters – CMRR, Slew rate, band width, Gain, Virtual ground, Applications of op-amp;

5.3 Inverting amplifier, Summing amplifier, Non inverting amplifier;

5.4 Instrumentation amplifier, Voltage follower

5.5 555 Timer – Functional Block diagram, Astable, Monostable and Schmitt Trigger, Sequence timer, 555 timer used as PWM.

PRACTICAL OUTCOMES: At the end of the course, the student will be able to:

1. Understand the characteristics and behavior of electronic components such as PN Junction diodes, transistors, FET transistors, and operational amplifiers (IC 741).
2. Gain practical knowledge of different rectifier circuits (half wave rectifier, full wave rectifier and bridge rectifier) and observe their respective wave shapes.
3. Develop skills in plotting input and output characteristics of transistors in CE configuration and calculating relevant parameters.
4. Gain hands-on experience in using the IC 555 timer as a monostable multivibrator and observe the output for different values of RC.
5. Verify and interpret truth tables for various logic gates (AND, OR, NOT, NAND, NOR, and EX-OR) using corresponding integrated circuits (7408, 7432, 7404, 7400, 7402, and 7486).
6. Design and implement digital circuits such as half adders, full adders, 4-bit parallel adders, Multiplexers, Demultiplexers, Decoders, D flip-flops, JK flip-flops, 4-bit SISO, SIPO using D Flip Flop, and 4-bit Binary Counters.

List of Practicals :

1. To plot V-I characteristics of PN Junction diode.
2. To observe the wave shape of following rectifier circuit
   - Half wave rectifier
   - Full wave rectifier
   - Bridge rectifier
3. To plot input and output characteristics and calculate parameter of transistor in CE configuration
4. To plot V-I characteristics of FET Transistor
5. Use of IC 555 as monostable multivibrator and observe the output for different values of RC
6. To use IC 741 (op-amplifier) as an i) Inverter, ii) Adder, iii) Subtractor iv) Integrator
7. Plot the V-I characteristics of SCR.
8. Plot the V-I characteristics of DIAC.
9. Plot the V-I characteristics of TRAIC.
10. Verification and interpretation of truth tables for AND (7408), OR (7432), NOT (7404), NAND (7400), NOR (7402) and Exclusive OR (EX-OR) (7486) gates
11. To design a half adder & full adder using XOR(7486) and NAND (7410)gates and verification of its Truth Table.
12. Verification of truth table of D flip-flop (7474) and JK flip-flops (7476)

References /Suggested Learning Resources:

1. Electronic Devices and Circuits S. Salivahanan and N. Suresh Kumar McGraw Hill Education; Fourth edition (1July 2017), ISBN: 978-9339219505.
2. Electronics Devices and circuit theory Boyestad & Nashelsky Pearson Education India; 11 edition (2015), ISBN: 978-9332542600.
3. Electronic Principles Albert Malvino & David Bates Tata McGraw Hill Publication 2010, ISBN: 978- 0070634244.
4. Electronics Devices & Circuits Jacob Millman McGraw Hill Education; 4 edition (2015), ISBN: 978-9339219543.
5. Design with operational amplifiers and analog integrated circuits, 3rd Edition Sergio Franco Tata McGraw-Hill, 2007.
6. OP-AMP and Linear ICs by Ramakant A.Gayakwad Prentice Hall / Pearson Education, 4th Edition, 2001.
7. Analog Circuits , A K Maini, Khanna Publishing House, Ed. 2018, ISBN: 978-93-86173-584.
8. Digital Electronics M.Morris Mano, Pearson.

Suggested Software/learning Websites:

1. https://www.electronics-tutorials.ws/
2. https://www.youtube.com/watch?v=Rx43l-QpeWQ
3. https://electronicsforu.com/resources/electronic-devices-and-circuit-theory

BASIC CONCEPTS OF MECHATRONICS

Course Code:	453005
Course Title	Basic Concepts of Mechatronics
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES :- After completion of the course the Student is able to:

1. Demonstrate a comprehensive understanding of mechanical systems, their definition, and their role in various industries.
2. Apply a mechatronic approach to system design, integrating mechanical and electronic components effectively.
3. Utilize modeling, analysis, and simulation techniques for integrated product design.
4. Understand the principles and applications of various sensors, such as opto-electronic sensors, ultrasonic sensors, Hall effect sensors, and pyroelectric sensors.
5. Analyze different types of drives and actuators, including hydraulic and pneumatic drives, electrical actuators (such as servo motors and stepper motors), and their associated control systems.
6. Explore advanced topics such as smart materials, micro-mechatronic systems, and microfabrication techniques, including shape memory alloys, piezoelectric and magnetostrictive actuators, and microsensors and microactuators.

COURSE CONTENTS

Unit - 1 : Introduction

1.1 Definition of Mechanical Systems;

1.2 Systems and Design: Mechatronic approach;

1.3 Integrated Product Design, Modelling, Analysis & Simulation;

1.4 Man-Machine Interface.

Unit - 2 : Sensors

2.1 Opto - Electronics-Shaft encoders; CD Sensors, Vision System, etc.

2.2 Ultrasonic Sensors: for Level Measurement and Distance Measurement.

2.3 Hall effect Sensors: Hall effect, Hall effect sensors for Displacement measurement, Fluid level measurement;

2.4 Pyro electric Sensors: Pyro electric Sensors as Thermal Detector;

Unit - 3 : Drives and Actuators

3.1 Hydraulic and Pneumatic drives;

3.2 Electrical Actuators such as servo motor and Stepper motor;

3.3 Drive circuits, open and closed loop control;

3.4 Embedded systems: hardware structure;

3.5 Software design and communication;

3.6 Programmable logic devices;

3.7 Automatic control and real time control systems.

Unit 4 - Smart Materials :

4.1 Shape Memory Alloy;

4.2 Piezoelectric and Magneto strictive Actuators;

4.3 Materials, Static and dynamic characteristics;

4.4 Examples for positioning, vibration isolation, etc.

Unit 5 - Micromechatronic Systems

5.1 Microsensors, Microactuators;

5.2 Lithography, etching, Micro-joining etc;

5.3 Application and examples of Mechatronic Systems.

Text & Reference Books:

1 Mechatronics System Design, Devdas Shetty & Richard A. Kolk, PWS Publishing Company (Thomson Learning Inc.).

2 Mechatronics: A Multidisciplinary Approach, William Bolton, Pearson Education.

3 A Textbook of Mechatronics, R.K. Rajput, S. Chand & Company Private Limited.

4 Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, Willia Bolton, Prentice Hall.

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'C ' PROGRAMMING

Course Code:	433004
Course Title	'C ' Programming
No. of Credits	6 (TH:4,T:0,P:4)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Develop algorithms and flowcharts to solve programming problems and understand the steps involved in program development.
2. Demonstrate proficiency in writing and executing C programs, including understanding program structure, I/O statements, variables, data types, and storage classes.
3. Apply control structures such as decision-making statements (IF-ELSE, nested IF, and switch), loops (while, do-while, for), and break/continue statements to control program flow.
4. Understand the concept of functions, including global and local variables, function declaration and calling, different types of functions, and parameter passing.
5. Manipulate arrays and strings effectively, including array declaration, accessing array elements, multidimensional arrays, and using string-related functions.
6. Demonstrate understanding of pointers, including static and dynamic memory allocation, working with addresses and pointers, and utilizing pointers to arrays and structures.

DETAILED CONTENTS

1. Algorithm and Programming Development

Steps in development of a program, algorithm development, concept of flowcharts, programming & use of programming, various techniques of program-ming, Structured Programming, Pre-processors, Debugging, Compiling.

2. Program Structure

Structure of C program, Writing and executing the first C program, Translator: Assembler, Interpreter, Compiler, I/O statement, assign statement, Keywords, constants, variables and data types, storage classes, operators and expressions, Unformatted and Formatted IOS, Data Type Casting

3. Control Structures

Introduction, decision making with IF – statement, IF – Else and Nested IF, Ladder, if-else, Loop: While, do-while, for, Break, Continue, goto and switch statements.

4. Functions

Introduction to functions, Global and Local Variables, Function Declaration, Function Call and Return, Types of Functions, Standard functions, Parameters and Parameter Passing, Call-by value/ reference, recursive function, function with array, function with string.

5. Arrays and Strings

Introduction to Arrays, Array Declaration, Length of array, Manipulating array elements, Single & Multidimensional Array, Arrays of characters, Passing an array to function, Introduction of Strings, String declaration and definition, Overview of String Related function.

6. Pointers

Introduction to pointers, Static and dynamic memory allocation, Address operator and pointers, Declaring and initializing pointers, Single pointer, Pointers to an array.

7. Structures and Unions

Declaration of structures, Accessing structure members, Structure initialization, array of structure variable, Pointer to a structures, Union, Declaration of Union.

8. File Handling

Basics of File Handling, opening and closing of File, reading and writing character from a file.

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

1. Identify the problem and formulate an algorithm for it.
2. Use pointer in an array and structure.
3. Use structures and union for data handling.
4. Install C software on the PC and debug the programme.
5. Explain & execute member functions of C in the programme
6. Describe and implement array concept in C programme
7. Expose File System using File Handling.

List of Practicals :-

1. Programming exercises on executing & editing a C program.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetic, logical and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation.
5. Programming exercises on formatting input/output using printf and scanf & their return type values.
6. Programming exercises using if statement.
7. Programming exercises using if – Else.
8. Programming exercises on switch statement.
9. Programming exercises on while and do– while statement.
10. Programming exercises on for – statement.
11. Simple programs using functions and recursive function.
12. Programming Exercise on array.
13. Simple programs using pointers.
14. Simple programs using structures.
15. Simple programs for File Handling

References :-

1. Problem Solving and Programming in C, R.S. Salaria, Khanna Publishing House
2. C Programming Absolute Beginner's Guide, Dean Miller and Greg perry
3. The C Programming Language, Kernighan and Ritchie, Prentice Hall of India

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COMPUTER AIDED MACHINE DRAWING PRACTICE

Course Code:	453006
Course Title	Computer Aided Machine Drawing Practice
No. of Credits	2 (TH:0,T:0,P:4)

PRACTICAL OUTCOMES : At the end of the course, the student will be able to:

1. Gain proficiency in using CAD software, including understanding its features, interface, and basic operations.
2. Utilize drawing aids and editing commands in CAD software to create and modify drawings efficiently and accurately.
3. Demonstrate the ability to apply basic dimensioning techniques, hatch patterns, blocks, and views in CAD software to create clear and comprehensive technical drawings.
4. Develop skills in creating isometric drawings and understand the process of printing and plotting drawings using CAD software.
5. Apply CAD software to practice machine drawing by creating detailed drawings of various machine parts, including sectional or plain elevations, plans, and side views with proper dimensioning and bill of materials.
6. Gain proficiency in using CAD software to assemble machine parts, understand their functional relationships, and accurately represent them in technical drawings.

COURSE CONTENTS:

1. Introduction to CAD software.
2. Drawing aids and editing commands.
3. Basic dimensioning, hatching, blocks and views.
4. Isometric drawing, printing and plotting
5. Machine Drawing practice using Auto CAD:

   Detailed drawings of following machine parts are to be given to the students to assemble and draw the sectional or plain elevations, plans and side views with dimensioning and bill of materials using CAD software:-

   5.1 Sleeve & Cotter Joint

   5.2 Spigot & Cotter Joint

   5.3 Knuckle Joint

   5.4 Stuffing Box

   5.5 Screw Jack

   5.6 Foot Step Bearing

   5.7 Universal Coupling

   5.8 Plummer Block

   5.9 Simple Eccentric

   5.10 Machine Vice

References:

1. Bhatt, N.D., Machine Drawing, Charotar Publishing House, 2003.
2. Sidheswar, N., Kannaiah, P. and Sastry, V.V.S., Machine Drawing, Tata McGraw Hill Book Company, New Delhi, 2000.
3. Kannaih, P., Production Drawing, New Age International , 2009

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SUMMER INTERNSHIP-I

Course Code:	AS301
Course Title	Summer Internship - I
No. of Credits	2 (TH:0,T:0,P:0)

Summer Internship provides an invaluable opportunity for students pursuing their Diploma in Engineering to gain real-world experience and exposure to various industrial production units and commercial activities related to their field of study. This program aims to bridge the gap between theoretical knowledge and practical application, equipping students with the necessary skills and expertise to thrive in the branch related industry.

At the end of the **Second semester**, students will undertake a minimum 3 to 4-week Summer Internship, scheduled during the semester break following the Second Semester examinations. The respective Heads of Departments (HoDs) and experienced faculty members will guide and assist students in securing suitable training opportunities that align with their specialization. Each student will have a personalized training schedule developed in collaboration with the training providers, ensuring a comprehensive and enriching learning experience.

Before starting their training, students will receive a comprehensive briefing about the organizational setup, product range, manufacturing processes, and significant machinery and materials used in the training organization. This preliminary understanding will enhance their engagement and productivity during the internship.

To ensure a fruitful learning experience, faculty members will supervise students during their training in the industry or field organization. Each faculty member will mentor a small group of 4-5 students, providing personalized attention and guidance. Students will be encouraged to maintain daily reports in their diaries, which will assist them in composing their final training report and presentation.

The evaluation process for the Summer Internship will include both internal and external assessments, as per the study and evaluation scheme of the **Third Semester**. During the viva - voce / presentation examination, students' understanding of materials, industrial processes, practices in the industry, and problem-solving abilities will be assessed. The evaluation will also focus on their application of knowledge and skills in real-life situations.

The components of evaluation will comprise:

(a) Punctuality and regularity: 15%

(b) Initiative in learning new things: 15%

(c) Relationship with peers and colleagues: 10%

(d) Summer Internship report: 25%

(e) Viva-Voce: 35%

The purpose of summer Internship program is to create a transformative experience for students, empowering them to excel in their future careers and make meaningful contributions to the Engineering industry. The collaborative efforts of experienced faculty members and industry partners will ensure that students may gain valuable insights and practical skills during this immersive learning journey.

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