DEVI AHILYA VISHWAVIDYALAYA, INDORE

FACULTY OF ENGINEERING

SCHEME OF EXAMINATION

I Yr. Bachelor of Design (B. Des)

Programme (As Per AICTE Guideline and NEP 2020)
(Product Design)

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID)
(www.iet.dauniv.ac.in)

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID)
DAVV, INDORE, INDIA

SCHEMES OF EXAMINATION FOR I Bachelor of Design (B. Des.) PROGRAMME

B. Des. 4 YEAR PROGRAMME (As per AICTE guideline and NEP 2020)
L -Lecture, T – Tutorial, P – Practical,
BS-Basic Science, ES-Engineering Science, HS-Humanities and Social Science including Management

Semester-I

S.No	Course code	Course Name	Type	L-T-P	Credits
1	1DSBS1	APPLIED MATHEMATICS-II	BS	3-1-0	4
2	1DSBS2	APPLIED PHYSICS	BS	2-1-2	3+1(P)
3	1DSBS3	COMPUTER PROGRAMMING	ES	2-1-2	3+1(P)
4	1DSBS4	BASIC ELECTRICAL ENGINEERING	ES	2-1-2	3+1(P)
5	1DSBS5	ENGINEERING GRAPHICS AND DESIGN	ES	2-0-4	2+2(P)
6	1DSHS6	CREATIVE SKILLS	HS	2-0-0	2
TOTAL CREDITS					**22**

Semester-II

S.No	Course code	Course Name	Type	L-T-P	Credits
1	2DSBS1	APPLIED MATHEMATICS-I	BS	3-1-0	4
2	2DSBS2	APPLIED CHEMISTRY AND ENVIROMENT SCIENCE	BS	2-1-2	3+1(P)
3	2DSBS3	GENERAL MECHANICAL ENGINEERING	ES	2-1-2	3+1(P)
4	2DSBS4	BASIC ELECTRONICS	ES	2-1-2	3+1(P)
5	2DSBS5	WORKSHOP PRACTICE	ES	0-0-2	1(P)
6	2DSHS6	TECHNICAL ENGLISH	HS	2-1-0	3
7	2DSHS7	DESIGN THINKING	HS	2-0-0	2
TOTAL CREDITS					**22**

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 1**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
1DSBS1: Applied Mathematics-II	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Duration of Theory Paper: 3 Hours	**3**	**1**	**-**	**3**	**1**	**-**	**4**

Learning Objectives:

- To introduce the mathematical concepts of Matrix Algebra, Differential Equation Probability and Statistics and Fuzzy sets for solving engineering problems that shall be used in various branches of engineering.
- Provide the basics of Matrix mathematics useful in providing a more compact way to deal with groups of equations in linear algebra; Differential equations, a mathematical equation that relates some function (usually represent physical quantities) with its derivatives (represent their rates of change), and the equation defines a relationship between the two; Probability distributions describe the dispersion of the values of a random variable;Curve fitting and regression analysis, to find the "best fit" line or curve for a series of data points; Theory of equations, which tells when an algebraic equation has an algebraic solution; Fuzzy sets generalize classical sets (Crisp sets), as the characteristic functions of classical sets are special cases of the membership functions of fuzzy sets.

Prerequisites: Knowledge of basics of determinants, matrices, derivatives, integrals, sets, probability and statistics.

Course Outcome:

Students earned credits will develop ability to:

CO. No.	**CO**	**PO**
CO1	Express a linear map between finite-dimensional vector spaces with a matrix, can calculate the electrical properties of a circuit, with voltage, amperage, resistance, etc. with matrix arithmetic, use them in 3D geometry (e.g. computer graphics), can try to improve linear solvers efficiency. Matrices can also represent quadratic forms (for example, in analysis to study hessian matrices, which help us to study the behaviour of critical points) and also computers run Markov simulations based on stochastic matrices in order to model events ranging from gambling through weather forecasting to quantum mechanics.	PO-1, PO-2, PO-3, PO-4, PO-5
CO2	Use differential equations to model natural phenomena, engineering systems and many other situations like exponential growth and decay, the population growth of species or the change in investment return over time, describing the movement of electricity, in modelling chemical reactions, in finding optimum investment strategies, describing the motion of waves, pendulums or chaotic systems.	PO-1, PO-2, PO-3, PO-4, PO-5
CO3	Handle probability distributions, to indicate the likelihood of an event or outcome, which are used for making forecasts and risk assessments. Pdf's are quite important and widely used in insurance, engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.	PO-1, PO-2, PO-3, PO-4, PO-5

CO4	Use fitted curves as an aid for data visualization, to infer values of a function where no data are available, and to summarize the relationships among two or more variables.	PO-1, PO-2, PO-3, PO-4, PO-5
CO5	Apply Fuzzy sets and logic to reason like a human in terms of linguistic variables, design Traffic monitoring systems, AC and heating ventilation, Gene Expression data analysis, Facial pattern recognition, Weather forecasting systems and many more.	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2	2	3	-	-	-	-	-	-	-
CO2	3	3	2	2	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

COURSE OF CONTENTS

UNIT-I

Matrix Algebra: Review of Matrices; Elementary Operations on Rows and Columns; Normal Form; Linear Dependence; Rank; Application of Rank Theory in Solving System of Linear Equations; Linear Transformation; Orthogonal, Unitary and Hermitian Matrices; Characteristic Equation; Eigen- Values and Eigen-Vectors; Caley-Hamilton Theorem; Quadratic and Linear forms.

UNIT-II

First Order Ordinary Differential Equation: Exact Differential Equation; Equations Solvable for x, y and p; Clairaut's Form; Application to Simple Problems.
Higher Order Ordinary Differential Equation: Linear Differential Equations with Constant & Variable Coefficients; Method of Variation of Parameters, Simultaneous Differential Equations; Application to Simple Problems.

UNIT-III

First Order Partial Differential Equations: Formation of Partial Differential Equations; Partial Differential Equations of First Order and First Degree i.e. $Pp + Qq = R$.
Higher Order Partial Differential Equations: Linear Homogenous Partial Differential equations of n^{th} order with constant coefficients; method of Separation of variables; their Simple applications.

UNIT-IV

Probability and Statistics: Conditional Probability, Baye's Theorem; Binomial, Poisson and Normal distributions and their Mean and Variance, Methods of least squares and curve fitting, Correlation and Regression Analysis.

UNIT-V

Theory of Equations: Polynomial equations, relation between root and coefficients, symmetric functions of roots, cube roots of unity, Cardon's method for solution of cubic equations.

Fuzzy sets: Membership function, definition, Operations on Fuzzy sets, Properties of Fuzzy sets.

BOOKS RECOMMENDED:

[1] B.S.Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
[2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
[3] Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
[4] C.Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co.Ltd., 6/e, 2003.
[5] H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
[6] Zafar Ahsan, Differential Equation and their Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
[7] S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical statistics, Sultan Chand & Sons., 2000.
[8] Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
[9] G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
[10] H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers, 1996.
[11] Timothy J. Ross, Fuzzy Logic with Engineering Applications, 3rd Edition, John Wiley & Sons, Inc., 2010.

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 1**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
1DSBS2: APPLIED PHYSICS	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	2	**1**	**2**	**2**	**1**	**1**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:
To introduce the fundamental concepts of physics that are useful in solving problems of engineering especially for semiconductors, optics, electromagnetism and quantum mechanics.

COURSE OF CONTENTS

Unit-I Optics-I: Interference of Light Waves: Thin film, Newton's Ring experiment, Michelson interferometer; Diffraction of Light Waves: Fresnel's & Fraunhofer diffraction, Zone plate, Single slit experiment, diffraction by double slit, Diffraction at Circular aperture, Plane transmission Grating.

Unit-II Optics-II: Polarization of Light Waves, Double refraction, Nicol Prism, Half Wave & Quarter Wave plates, Circularly & elliptically polarized light, Polarimeter; LASER: Stimulated & spontaneous emission, Population Inversion, Optical Resonator, Einstein's coefficients, He-Ne Laser, Co_2 Laser, Semiconductor Laser; Optical Fiber: types of Fibers (material, refractive index, mode), Acceptance angle, Numerical aperture, V-Number, Propagation of Light through Fibers, Applications.

Unit-III Crystal Structure and Semiconductors: Symmetry & properties of Simple crystal structure, Miller's Indices, Interplanar spacing, production and properties of x-ray, Bragg's law; Semiconductors: Band theory of Semiconductors, Intrinsic & extrinsic semiconductors, Fermi level , pn junction diode, LED, Zener diode, npn & pnp Transistors.

Unit-IV Electromagnetism: Continuity equation for Charge & Current, Inconsistency of Ampere's law for time varying field, Concept of Displacement current, Maxwell's equations; Wave equations for E & H, Propagation of one dimensional electromagnetic waves in dielectric medium, Energy density in electromagnetic field: Poynting Vector.

Unit-V Quantum Physics: Planck's law, Compton's effect, Concept of Matter Waves, Davison & Germer's experiment, Phase velocity & Group velocity, Heisenberg's Uncertainty Principle; Schrodinger 's Wave Equation, Interpretation of Wave function Ψ, Time dependent & Time Independent equations, Schrodinger's Wave equation for a free particle in a box.

Learning Outcomes:
Upon completing the course, students will be able to:

1. The student will demonstrate the ability to use concepts of Morden physics to their engineering applications.

2. The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their applicable to obtain quantitative solutions of problems in physics.

Students earned credits will develop ability to

CO. No.	**CO**	**PO**
CO1	Apply and learn the basic concept of interference and diffraction to measure the wavelength, refractive index, film thickness etc different physical quantities of light as well as the materials.	PO-1, PO-2, PO-3
CO2	Learn the concept of polarization, laser and optical fibre and apply in the modern era applications.	PO-1, PO-2, PO-4
CO3	Understand the basic concept of material and its application in modern engineering.	PO-1,PO-2 PO-5
CO4	Understand the concept of electromagnetism.	PO-1, PO-2, PO-3
CO5	Learn the concept of the quantised system of the materials.	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2									
CO2	3	3	2									
CO3	3	2	2									
CO4	3	1	1									
CO5	3	3	1	2	2							

Books Recommended:

[1] R K Gaur & S L Gupta, Engineering Physics, Dhanpat Rai& Sons, 2006
[2] H.K. Malik & A.K.Singh, Engineering Physics, Tata MCgRAW Hill, 2011
[3] N. Gupta & S.K. Tiwary , *A Text Book of Engineering Physics*, Dhanpat Rai & Co. 2009
[4] W. T. Silfast, *Laser Fundamentals* Cambr. Un. Press, 1996,
[5]D Halliday and R Resnick,Physics Vol-II, Wiley Eastern, 1993

[6] H White, Modern Physics:Van Nostrand; 15/e
[7] D P Khandelwal, Optics and Atomic Physics.
[8] R Feyaman,Feyaman Lectures on Physics, /e, Narosa Publication, 1998
[9]S.O. Pillai, *Solid State Physics*, New Age International Publication, 2010
[10]R.S. Sedha, *A Text Book of Applied Electronic*, S. Chand & company Lmt. 2005
[11] R.P. Goyal, *Unified physics-II*,,andIII Shive lal Agrawal & Co. ,1994

List of Practical Assignments:

During the learning of course, students need to carryout following assignments:

1. To Study the Characteristics of a Diode / Zener Diode.
2. To Study the Characteristics of a Transistor (PNP).
3. To Study the Charging & DisCharging of a Capacitor.
4. To Study the Regulated Power Supply using Zener Diode.
5. To Study the Energy Band Gap of a semiconductor.
6. To determine the specific rotation of sugar solution with the help of polarimeter.
7. To determine the refractive index and dispersive power of material of prism with the help of spectrometer.
8. To determine "R" by the Newton's Ring Method.
9. To determine "λ" by the Plane Transmission Grating.
10. To verify Malus Law using He-Ne laser.
11. To determine Resolving Power of a Telescope.
12. To determine the value of Planck's constant with the help of LEDs.

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 1**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
	L	**T**	**P**	**L**	**T**	**P**	**Total**
1DSBS3: Computer Programming in C++	**2**	**1**	**2**	**2**	**1**	**2**	**5**
Duration of Theory Paper: 3 Hours							

Course Learning Objectives:

- To learn to analyze a problem and construct a C++ program that solves it using C++ basic constructs and advanced constructs.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes with constructors and class member functions.
- To understand the concept of data abstraction and encapsulation.
- To learn how to overload and override functions and operators in C++.
- To learn how containment and inheritance promote code reuse in C++.
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to use exception handling in C++ programs.

Prerequisites: Basic knowledge of computer parts, algorithms, flowcharts, operators.

COURSE OF CONTENTS

UNIT-I

Introduction to flowcharts and problem solving. Types of programming languages, Programming with C++:- C++ Data Types:-auto, bool, int, char, float, double, void. Variables and Constants, Operators, Arithmetic and Logical Expressions, Assignment Statements and Type Casting. Control structures- Iteration statements, Jump Statements and Selective statements. Common C++ Header files, Generation of Random numbers in C++.

UNIT-II

Functions: Introduction - Call by Value and Call by Reference – return values – recursion – Arrays - Introduction to Arrays - Initialization of Array - Multi dimensional Arrays - passing arrays to functions – Strings - Arrays of Strings - Standard Library String Functions.
Structures: Structure elements, Nested Structures, Array of Structures, Array within structures and passing structures to functions.

Unit- III

Pointers:-Declaration and Initialization of Pointers, Dynamic Memory allocation/deallocation operators:-new and delete. Pointers and Arrays:-Array of Pointers, Pointer to an array, Function returning a pointer, Reference variables and use of alias. Invoking functions by passing pointers. Files – Introduction – File Structure - File handling functions - File Types - Error Handling.

UNIT-IV

Object Oriented Programming Paradigm - Basic Concepts of OOP - Benefits of OOP. Class and object fundamentals and various visibility modes in class, Object as function arguments-pass by value and pass by reference. Constructor:-Special Characteristics, Declaration and Definition of a Constructor, Default Constructor, Overloaded Constructor, Copy Constructor and Constructor with default arguments.

Function Overloading:-Need and restrictions of overloaded functions, Steps involved in finding the best match, Default arguments versus overloading.

Destructor:- Special Characteristics, Declaration and Definition of a Destructor. Friend function and its characteristics and friend class.

UNIT-V

Introduction to Operator overloading - Rules for Operator overloading – overloading of binary and unary operators - Introduction to inheritance – Types of inheritance - Abstract Classes - new Operator and delete Operator - Pointers to Objects – this Pointer - Virtual Functions - Pure Virtual Functions - Introduction to Class Templates - Function Templates - Member Function Templates - Basics of Exception Handling - Types of exceptions - Exception Handling Mechanism - Throwing and Catching Mechanism - Rethrowing an Exception - Specifying Exceptions.

Course Outcomes (CO)

1. **Understand Fundamental Concepts**: Explain the basic concepts of programming, including flowcharts, problem-solving techniques, and the role of programming languages, particularly C++.
2. **C++ Programming Proficiency**: Demonstrate proficiency in C++ programming, including the use of data types, variables, operators, control structures, and random number generation.
3. **Function and Array Manipulation**: Utilize functions, arrays, and strings in C++, focusing on parameter passing techniques and standard library functions for efficient data management.
4. **Pointer and File Handling**: Understand and apply pointer concepts, dynamic memory allocation, and file handling functions to manage data effectively in C++.
5. **Object-Oriented Programming (OOP)**: Analyze and implement object-oriented programming principles in C++, including classes, objects, constructors, destructors, and inheritance.
6. **Advanced OOP Features**: Explore advanced OOP concepts, such as operator overloading, virtual functions, and exception handling, to enhance the robustness and flexibility of C++ applications.

Program Outcomes (PO)

1. **Foundational Knowledge in Programming**: Provide students with a strong foundational knowledge of programming principles and concepts applicable across multiple programming languages.
2. **Skill Development**: Equip students with practical programming skills and problem-solving abilities necessary for software development and engineering tasks.
3. **Critical Thinking and Analysis**: Foster critical thinking and analytical skills through hands-on projects and coding exercises, encouraging students to develop efficient and effective solutions to programming challenges.
4. **Adaptability to Technology Trends**: Prepare students to adapt to evolving technology trends in software development by emphasizing best practices in programming, including OOP principles and exception handling.
5. **Collaboration and Communication**: Encourage collaboration and effective communication among students through group projects and peer programming, reflecting industry practices in software development.

Here is a table summarizing the mapping between Program Outcomes (POs) and Course Outcomes (COs):

Program Outcome (PO)	**Course Outcomes (CO)**	**Focus/Description**
PO1	**CO1, CO5**	Foundational knowledge and principles of programming
PO2	**CO2, CO3, CO4, CO6**	Practical skills in software development
PO4	**CO6**	Adaptability to modern programming practices

BOOKS RECOMMENDED:

[1] Coohoon and Davidson, C++ Program Design: An introduction to Programming and Object-Oriented Design (3rd edition), Tata McGraw Hill, New Delhi, 2003.
[2] Herbert Schildt, the Complete Reference, Tata McGraw Hill.
[3] E Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education.
[4] Ravichandran, Programming With C++, Tata McGraw Hill.
[5] Dromey G, How to solve it by Computer, Prentice Halll – 1978.

List of Experiments:

1. Program to Find the Largest of Three Numbers
2. Program to Generate Random Numbers
3. Program to Convert Temperature (Celsius to Fahrenheit)
4. Program to Find the Sum of Digits of a Number
5. Program to Check Whether a Number is Prime or Not
6. Program to Calculate the Factorial Using Recursion
7. Program to Sort an Array in Ascending Order
8. Program to Search for an Element in an Array (Linear Search)
9. Program to Store Student Records Using Structures

10. Program to Pass Arrays to Functions
11. Program to Demonstrate Pointer Operations
12. Program to Dynamically Allocate Memory for an Array
13. Program to Swap Two Numbers Using Pointers
14. Program to Read and Write Data to a File
15. Program to Count the Number of Words in a Text File
16. Program to Implement a Simple Class for Bank Account
17. Program to Implement Function Overloading in a Class
18. Program to Implement Constructor and Destructor
19. Program to Implement Class with Private and Public Members
20. Program to Create and Use a Friend Function
21. Program to Overload Operators in a Complex Number Class
22. Program to Implement Inheritance (Base and Derived Classes)
23. Program to Demonstrate Runtime Polymorphism Using Virtual Functions
24. Program to Handle Exceptions in C++
25. Program to Implement a Simple Class Template

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) **DAVV, Indore, India**				**B. Des I Year Semester- 1**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
1DSBS4: **Basic Electrical Engineering**	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Duration of Theory Paper: 3 Hours	**2**	**1**	**2**	**2**	**1**	**1**	**3+1(P)**

Course Learning Objectives:

The course is designed to

1. Understand the generation of EMF and analyze single-phase and three-phase AC circuits, preparing for practical applications in industrial power systems.
2. Apply Kirchhoff's laws and network theorems for DC circuit analysis to solve real-world electrical problems in industry.
3. Learn principles of electromagnetic induction and transformer operations, with a focus on industrial transformer applications and efficiency improvements.
4. Understand the construction and working principles of DC generators and motors, enabling practical maintenance and troubleshooting in industrial settings.
5. Analyze the operation and characteristics of three-phase and single-phase AC motors, enhancing skills for industrial motor selection and performance optimization.

Prerequisite(s): Basic circuital laws and their practical applications.

COURSE OF CONTENTS

UNIT-I

AC circuits: Generation of EMF, Phasor Quantities, RMS, Average, Form Factor, Peak Factor etc., Phasor Diagrams; Single Phase AC Circuits: R, L, C And Combinations, Resonance, Q-Factor, Bandwidth; Three Phase AC Circuits: Generation, EMF, Phase Sequence, Analysis of Star and Delta Connections, and Power Measurement in Single Phase& Three Phase Circuit.

UNIT-II

Circuit analysis tools: Kirchhoff's laws, Mesh and Nodal Analysis, Network Theorem: Thevenin's theorem, Norton's theorem, Max power transfer theorem, Superposition theorem, and Source transformation.

UNIT-III

Basic Concept of Magnetic Circuits, Series Magnetic Circuits, BH Curve, Transformer: Single phase transformers: Construction, principle of working, EMF equations, Analysis of transformer on no load and load conditions, Equivalent resistance and reactance, losses, Voltage regulation and efficiency, Auto transformer.

UNIT-IV

DC Generators: Construction, working principles, EMF equations of DC generators, Armature reaction and Commutation, DC Generator Characteristics.
DC Motors: Construction, working principles, classification, Speed Control of DC motor, Characteristics of DC motor, Losses in DC Machines.

UNIT-V

AC Machines: General aspects of AC motors, Three Phase induction motor: working principle, construction, Single phase Induction Motor: working principle, construction and starting methods., Three phase Synchronous Motor: working principle, construction and starting methods.

Course Outcomes:

Students earned credits will develop ability to

CO. No.	CO	PO
CO1	Solve circuit problems using Kirchhoff's Voltage Law (KVL), Kirchhoff's Current Law (KCL), and various network theorems, providing them with the skills to tackle practical circuit issues in future industrial settings	PO-1, PO-2
CO2	Gain fundamental knowledge of alternating current (AC) circuits and their practical applications, enabling a better understanding of domestic electrical loads.	PO-1, PO-2, PO-3, PO-6
CO3	Understand the applications of various magnetic materials available in the market for constructing different electrical machines, and calculate their circuit parameters, which is essential for the initial design of electrical machines.	PO-1, PO-2, PO-3

CO4	Comprehend the properties, characteristics, and functions of different parts of transformers and rotating electrical machines at a basic level.	PO-1, PO-2, PO-3, PO-5

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3										
CO2	3	3	2			2						
CO3	2	2	2									
CO4			3									
CO5	3	3	3		2							

Books Recommended:

[1] V Del Toro, Electrical Engineering Fundamentals, 2/e, PHI, 2000.
[2] D P Kothari, I J Nagrath, Basic Electrical Engineering, 2/e, Tata McGraw Hill, 2002 (Fifth Reprint 2003).
[3] A Sudhakar, Network Theory, 2/e, Tata McGraw Hill, 2004.
[4] P S Bimbhara, Electrical Machinery, 7/e, Khanna Publishers, New Delhi, 2006.

List of Experiments:

1. Verification of Kirchhoff's laws.
2. Verification of Thevenin's Theorem.
3. Verification of Norton's Theorem.
4. Verification of Superposition Theorem.
5. Verification of Maximum Power Transfer Theorem
6. To determine the turns ratio of single phase transformer.
7. To measure power consumed by single phase circuit using single phase wattmeter.
8. To determine the efficiency of single phase transformer by direct loading.
9. To study the speed control of DC motor.
10. Study of DC generator.

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE	**B. Des I Year Semester- 1**

OF DESIGN (DAVID) **DAVV, Indore, India**							
Course Code & Name	**Instructions Hours per Week**			**Credits**			
1DSBS5: Engineering Graphics and Design	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	2	**0**	**4**	**2**	**0**	**2**	**4**
Duration of Theory Paper: 3 Hours							

Course Learning Objective:

The course is designed

1. To expose the students to standards and conventions followed in preparation of engineering drawings and develop the ability of producing engineering drawings using drawing instruments.
2. To develop the ability of conveying engineering information through drawings and develop the ability of conveying engineering information through drawings.
3. To make them understand the concepts of engineering curves and scales.
4. To make them understand the concepts of orthographic and isometric projections for different 2D and 3D objects and to make them understand the relevance of engineering drawing to different engineering domain fields.
5. To enable them to use computer aided design packages for the generation of 2D and 3D models and their drawings

COURSE CONTENT

Unit-I

Introduction, need, classification, importance and principles of Engineering graphics/drawings, Drawing Instruments and their uses, Indian Standards (BIS-SP46) for Drawing, Drawing Conventions and Technical Lettering, Dimensioning, Engineering Scales & Engineering Curves.

Unit - II

Orthographic Projections: Principles, Conventions, Orthographic projections of simple and compound objects. Projection of Points and Straight Lines.

Unit - III

Projection of Plane Surfaces, Projection of Solids and their sections, Development of Surfaces.

Unit - IV

Interpenetration of Solids / Intersection of Surfaces, Oblique projection: Principle and projection of various objects.

Unit - V

Isometric Projections: Principles of isometric projections and conversion of pictorial views into isometric projections/views and vice versa. Introduction to Computer Aided Design: Introduction to CAD software (AutoCAD/Fusion 360/SolidWorks/UGNX/ProE etc.) and various commands. Representation of 2D and 3D objects in CAD software.

Course Outcomes:

Students earned credits will develop ability to

CO No.	CO	PO
CO1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes. Use the curves and scales needed to construct an object in drawing.	PO-1, PO-5
CO2	Produce computer generated 2D and 3D models and drawings using CAD software.	PO-2, PO-3, PO-4, PO-5, PO-6, PO-7, PO-9, PO-10
CO3	Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.	PO-2, PO-3, PO-4, PO-5, PO-6, PO-7, PO-9, PO-10
CO4	Develop isometric drawings of simple objects reading the orthographic projections of those objects.	PO-2, PO-3, PO-4, PO-5, PO-6, PO-7, PO-9, PO-10
CO5	Convert pictorial and isometric views of simple objects to orthographic views.	PO-2, PO-3, PO-4, PO-5, PO-6, PO-7, PO-9, PO-10

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3				2							
CO2		2	3	3	2	2	2		3	3		
CO3		3	2	2	3	3	3		2	2		
CO4		2	3	2	3	2	3		3	2		
CO5		3	2	3	2	3	2		2	3		

BOOKS RECOMMENDED:

1. Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat.
2. Engineering Drawing – Agrawal B, and Agrawal C M, *Engineering Drawing*, Tata McGraw-Hill Publishing Company Limited.
3. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.
4. French T E, Vierck C J, Foster R J, *Engineering. Drawing and Graphic Technology* Mc Graw-Hill International, Singapore, Low Price Edition.
5. Publications of Bureau of Indian Standards
   a) IS 10711 – 2001: Technical products documentation – Size and layout of drawing sheets.
   b) IS 9609 (Parts 0 & 1) – 2001: Technical products documentation – Lettering.
   c) IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
   d) IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
   e) IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

List of Practical

1. To Solve the problems of Technical Lettering on drawing sheet.
2. To Solve the problems of Engineering Scales on drawing sheet.
3. To Solve the problems of Engineering Curves - Conic Sections on drawing sheet.
4. To Solve the problems of Engineering Curves – Involute, Cycloid, Spiral on drawing sheet.
5. To Solve the problems of Orthographic Projections on drawing sheet.
6. To Solve the problems of Isometric Projections on drawing sheet.
7. To Solve the problems of Oblique Projections on drawing sheet.
8. To Solve the problems of Projections of Points and Lines on drawing sheet.
9. To Solve the problems of Projections of Planes on drawing sheet.
10. To Solve the problems of Projections of Solids on drawing sheet.
11. To Solve the problems of Section of Solids and Development of Surfaces on drawing sheet.
12. To Solve the problems of Interpenetration of Solids / Intersection of Surfaces on drawing sheet.
13. To solve the above problems in CAD drawings using AutoCAD/Fusion 365

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 2**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
2DSBS1:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Applied Mathematics-I	**3**	**1**	**-**	**3**	**1**	**-**	**4**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop the concepts of calculus, useful to create mathematical models in order to arrive into an optimal solution in various disciplines like physics, engineering, economics, and statistics.
- Provide the fundamentals of formal techniques like differentiation to find the slope of a curve, find approximation to the original function by Taylor's series, determine the stationary points of functions in order to sketch their graphs, optimization of functions and so on; Integration to find areas, volumes, central points and many useful things; Vector fields to represent many physical quantities like velocities, forces (useful in fluid mechanics), particle displacements (useful in solid mechanics), and electric and magnetic fields (electromagnetism).

Prerequisites: Knowledge of basics of functions, limits, derivatives, and integrals.

COURSE OF CONTENTS

UNIT-I

Differential Calculus: Review of Successive differentiation, Leibnitz theorem and problems; Expansion of functions by Taylor's and Maclaurin's Theorem; Asymptotes; Curvature in Cartesian and Polar Coordinates; Envelopes; Evolutes and Involutes.

UNIT-II

Advanced Differential Calculus: Function of Several Variables; Partial Differentiation; Approximations and errors; Jacobians; Taylor's Series of Two Variables; Maxima and Minima of Function of Two and More Variables; Lagrange's Method of Undetermined Multipliers.

UNIT-III

Integral Calculus: Beta and Gamma functions; detailed study of tracing of curves-Cartesian, polar and parametric curves; Area; Length of Curve; Volume; Surface of Revolution; Theorems of Pappus and Guldin and problems.

UNIT-IV

Advanced Integral Calculus: Multiple integrals: Double and Triple Integration; Change ofOrder of Integration; Area; Volume; Centre of Gravity; Moment of Inertia.

UNIT-V

Vector Calculus: Differentiation of a Vector; Gradient; Divergence; Curl; Integration of aVector Function; Gauss's, Green's and Stoke's Theorems.

BOOKS RECOMMENDED

[1] B.S.Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
[2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications,1999.
[3] Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., NewDelhi, 2006.
[4] C.Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill PublishingCo. Ltd., 6/e, 2003.
[5] H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
[6] E Mendelson, G J Hademenos, F Ayres, Schaum's Easy Outline: Calculus, McGraw-Hill, 2000.
[7] R C Wrede, M Spiegel,Schaum's Outline of Advanced Calculus, 2/e, McGraw-Hill, 2002.

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Taylor series can be used in approximating a function, or data, as a series of function in data analysis, cell phones, differential equations, etc., Asymptotes to understand the limits of mathematical models in real-world situations, Curvature can be used in graphic design, to find the normal curvature and ideal level for manufacturing car tire tubes, for designing road curves etc.	PO-1, PO-2, PO-3, PO-4, PO-5
CO2	Partial Differentiation can be used to study stress, strain, electric and magnetic fields, fluid dynamics, heat conduction, in optimization algorithms like gradient descent, Maxima-Minima is used in a variety of situations to determine the maximum or minimum value of a quantity in economics, business, and engineering.	PO-1, PO-2, PO-3, PO-4, PO-5
CO3	Beta and Gamma functions is used to provide an analytical solution to various integrals, Curve sketching serves as a critical tool in expressing and understanding complex mathematical functions and how functions behave, by sketching the graph of any function, we can find out its area, length of curve, volume etc.	PO-1, PO-2, PO-3, PO-4, PO-5
CO4	Multiple integrals are used in calculating areas under curves (useful in physics for distance and velocity), determining the volume of irregular shapes, and finding the total accumulated quantities (like income over time in economics).	PO-1, PO-2, PO-3, PO-4, PO-5
CO5	Vector calculus is also often used in physics in the areas of energy, torque, and magnetic force. Vector fields are often used to model the speed and direction of a moving fluid throughout three dimensional space, such as the wind, or the strength and direction of some force, such as the magnetic or gravitational force, as it changes from one point to another point.	PO-1, PO-2, PO-3, PO-4, PO-5

CO-PO Relationship:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3	2	2	3	-	-	-	-	-	-	-

CO2	3	3	2	2	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 2**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
2DSBS2: Applied Chemistry & Environment Science	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Duration of Theory Paper: 3 Hours	**2**	**1**	**2**	**2**	**1**	**1**	**4**

Course Learning Objectives:

The course is designed

1. To Illustrate Concepts and applications of different types of industrially important engineering materials, uses and maintenance.
2. Apply Specifications, testing and treatment of water for industrial and domestic use.
3. Explain and compute different types of Lubricants, Cements, Composites and other useful materials.
4. Explain the theory and applications of material testing and analytical techniques in qualitative and quantitative analyses.
5. Apply the Use, Ethics behind various Chemical methods in Industries and day-to-day uses.
6. Analyze the causes and remedial measures of types of pollution in our environment.

Prerequisites: Knowledge of basics Chemistry of higher secondary level.

COURSE OF CONTENTS

UNIT-I ENGINEERING MATERIALS AND TESTING

Introduction, classification and requirement of engineering materials, Material testing and its types, examples.
Polymers, Cement, Glass and Refractories: Different types, composition, properties and uses. Introduction to Nano materials.

UNIT-II WATER AND ITS APPLICATIONS
Sources, impurities, applications, Hardness- its expression and determination; Boiler troubles and their causes; Industrial water requirement, Treatment of water for industrial and domestic purpose; Water softening, De-ionization of water; Analysis of water; Water quality parameters, Numerical problems on water analysis and water treatment processes.

UNIT-III FUELS AND LUBRICANTS
Definition, Classification, Characteristics of a good fuel, Calorific Values.
Principle and functions of lubrication, Types of lubricants, Mechanism of lubrication, Properties, tests and applications of solid, semi-solid and liquid lubricants; Cutting fluids: Numerical problems on Fuels and Lubricants.

UNIT-IV INSTRUMENTAL TECHNIQUES IN MATERIAL CHARACTERIZATION
Classification, Lamberts and Beers Law; Spectroscopy, Introduction, Principle and applications of Colorimetry, IR, UV-Vis, NMR and Mass spectroscopy; Chromatographic Techniques and applications, Numerical Problems on spectroscopic techniques.

UNIT-V ENVIRONMENTAL SCIENCE
Components of Environment and their interactions, Natural resources, Energy, Ecosystem, Impacts of development of environment, Environment protection act, EIA, Sustainable development. Introduction to Green Chemistry.
Pollution and its types, Description, effects and control measures of Air, Water, Land and Noise pollution, Chemical toxicology, Global warming, Depletion of ozone layer, Acid rains, Eutrophication, Rain water harvesting, Pollution case studies.

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Learn and apply applications of various engineering materials in different technologies.	PO-1,PO-2,PO-3
CO2	Relate structure-property-uses relationship of engineering materials and tailoring of materials for technology development.	PO-1,PO-2,PO-3, PO-5
CO3	Understand and analyse the use of material testing and material characterization techniques required in different engineering applications.	PO-1,PO-2,PO-5

CO4	Learn and understand the importance of various materials like water, fuels, energy, natural resources to our society	PO-1,PO-2,PO-3, PO-4
CO5	Understand the components of Environment and their interactions with modern world. Also to analyse factors affecting, causes of Environmental Pollution and to apply possible control measures for Sustainable development.	PO-1,PO-6,PO-7, PO-8, PO-12

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	1	1									
CO2	2	1	1		1							
CO3	3	1			1							
CO4	2	1	1		1							
CO5	2					2	2	1				1

BOOKS RECOMMENDED:

[1] Jain & Jain, Engineering Chemistry, Dhanpat Rai Publications, 2007.
[2] S. S. Dara, A Text Book of Engineering Chemistry, S. Chand & Company, 2007.
[3] B. Joseph, Environmental Studies, Tata McGraw Hill.
[4] A.K. De, Environmental Chemistry, New Age International, 1996.
[5] Shashi Chawala, A Text Book of Engineering Chemistry, Dhanpat Rai Publications, 2006.

List of Experiments:

1. Determination of Total Hardness of water sample by EDTA titration method.
2. Study of Steam Emulsification Number (SEN) of oil sample.
3. Determination of CO_3^{--}, HCO_3^- and total Alkalinity of water sample.
4. Study of Flash point and fire point of oils.
5. Determination of Aniline Point of lubricating/fuel oil.
6. Determination of Total Dissolved Solid (TDS) in Water sample.
7. Determination of pH of given solution using Digital pH meter.
8. Determination of concentration of $KMnO_4$ solution and to verify Beers- Lamberts law by Colorimeter.

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des. I Year Semester-2**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
2DSBS3 General Mechanical Engineering	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	2	**1**	**2**	**2**	**1**	**1**	**4**
Duration of Theory Paper: 3 Hours							

9. Determination of Redwood Viscosity of lubricating oil.
10. Study and interpretation of UV-Visible, IR and NMR spectra of unknown compounds.

Course Learning Objective:

The course is designed

1. To understand some of the basic aspects of mechanical engineering through the real world thermal engineering systems and learn the principles of thermodynamics applied therein.
2. To present the concept of a pure substance and discussion of the physics of phase-change processes, steam and air properties.
3. To learn the basic considerations in the analysis of power cycles and understand the functioning of heat engines (internal combustion engines).
4. To introduce the basic aspects of production engineering related to metal casting and metal forming processes.
5. To understand the basic considerations related to metal fabrication and machining processes with an emphasis on welding and turning processes.

COURSE CONTENT

Unit-I

Thermodynamics processes, systems and control volume, properties of a system,internal energy and enthalpy of ideal gases, energy analysis of steady flow systems, analysis of some steady flow engineering devices, relevant review problems.

Unit-II
Properties of pure substance, wet, dry and superheated steam, Critical point and Triple point, enthalpy and internal energy of steam, quality or dryness fraction, use of steam tables, methods for measurement of steam quality, relevant review problems.

Unit-III
Basic considerations in the analysis of Air standard cycles, Air standard assumptions, Internal combustion reciprocating engines, Thermodynamic analysis of Otto cycle and Diesel cycle, Comparison of Otto and Diesel cycles under different conditions, relevant review problems.

Unit-IV
Classification of various types of manufacturing processes, Introduction to metal casting, Advantages, limitation and applications of metal casting, Pattern making and mould making, Elements of gating system, Melting and pouring, Solidification and cooling of castings; Casting processes : Sand casting and Permanent mould casting, Casting quality and defects. Introduction to Metal Forming, Overview of metal forming operations, Advantages, limitations and application of metal forming processes

Unit-V
Classification and overview of welding process, Types of welded joints, Arc welding processes (TIG and MIG), Oxy-acetylene gas welding, Resistance welding processes (Spot and Seam welding), Weld quality and safety, Fundamental of metal machining, Introduction of turning and related operations, Constructional features of lathe and the tooling used on lathe, cutting tool materials.

Course Outcomes:
Students earned credits will develop ability to

CO No.	CO	PO
CO1	Apply the basic principles of thermodynamics in engineering practice.	PO 1,PO 2, PO 3,PO 7
CO2	Apply the procedures for determining thermodynamic properties of pure substances from tables of property data and various property diagrams.	PO 1,PO 2, PO 3,PO 7
CO3	Analyze both closed and open gas power cycles, solve basic problems based on the Otto and Diesel cycles, and understand the operation of IC Engines.	PO 1,PO 2, PO 3,PO 7
CO4	Select a casting or forming process for producing a part, identify the process requirements and quality aspects related to the part.	PO 1,PO 2, PO 3,PO 7
CO5	Design and produce quality welds, operate the machine tool like lathe and machine a cylindrical work part on it.	PO 1,PO 2, PO 3,PO 7

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	2	1				2					
CO2	3	2	1				2					

CO3	3	2	1				2					
CO4	3	1	2				1					
CO5	3	1	2				1					

BOOKS RECOMMENDED:

[1] P K Nag, *Engineering Thermodynamics*, 6/e, McGraw-Hill, 2017.
[2] R K Rajput, *Thermal Engineering,*, 11/e, Laxmi Publications, 2020.
[3] S K Hajra Chaudhury, *Elements of Work Shop Technology Vol: I & II*, Media Promoters & Publishers Pvt. Ltd., 2008.
[4] P N Rao, *Manufacturing Technology Vol-I, Foundry, Forming and Welding*, 5/e, McGraw Hill, 2018.
[5] H S Shan, *Manufacturing Processes: Casting, Forming and Welding, 2/e, Cambridge Univ.Press,India,2017.*

List of Experiments

1. Study of simple vertical boiler.
2. Study of Cochran boiler.
3. Study of Lancashire boiler.
4. Study of Babcock and Wilcox boiler.
5. Study of Boiler Mountings & Accessories.
6. Study of Four stroke petrol engine.
7. Study of Four stroke diesel engine.

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) **DAVV, Indore, India**				**B. Des I Year Semester- 2**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
2DSBS4 Basic Electronics	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	2	**1**	**2**	**2**	**1**	**1**	**3+1(P)**
Duration of Theory Paper: 3 Hours							

Course Learning Objectives:

The course is designed

1. To introduce the basic concepts of electronics along with the understanding of working fundamental circuit devices such as diodes, transistors, and op-amp.
2. To apply the basics of the diode to describe the working of rectifier circuits such as Full and half wave rectifiers and Zener diode as a voltage regulator in line and load regulation.
3. Describe the application of transistors for Current and voltage amplification, the characteristics of different configurations of the transistor, DC load line and bias point.

List, explain, and design and analyse the different biasing circuits, to give basic knowledge of working of op-amp, its characteristics, and applications.

Prerequisites: Nil
Nil

COURSE CONTENTS

UNIT-I
Intrinsic, Extrinsic semiconductors, PN Junction, PN Junction under Zero, Forward and reverse Bias, Minority and Majority carrier distribution, Space charge width and electric field in forward and reverse bias, PN junction diode current equation, diode equivalent circuit, Junction breakdown phenomena.

UNIT-II
P-N diode applications: Clipper circuits, Clamper circuits, DC power supply: Half wave rectifier, full wave rectifier (center tapped and bridge) with and without filter.

UNIT-III
Types of diodes: Zener diode and its application for regulated power supply**,** Light emitting diode, 7-segment LED, Photo diode, PIN diode, Tunnel Diode, Varactor diode.

UNIT-IV
Bipolar Junction Transistor: Bipolar principal of operation, Different modes of operation- Common Base, Common Emitter, Common Collector configuration, Concept of Q point, Biasing methods (Common emitter)- fixed biasing, self-biasing, feedback biasing and stability. BJT applications- as amplifier, and as switch.

UNIT-V
OP-AMP block diagram, ideal OP-AMP characteristics, transfer curve, open loop and close loop configuration. Feedback: positive feedback, negative feedback, concept of stability, Application of OP-AMP: Inverting, non-inverting op-amp, summer, subtractor, integrator, differentiator, comparator.

Course Outcomes:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Understand the Fundamental Principles of Semiconductors.	PO-1, PO-2
CO2	Analyze and Apply PN Junction Diodes in Practical Circuits.	PO-1, PO-3
CO3	Identify and Explain the Functionality of Various Types of Diodes.	PO-1, PO-5
CO4	Comprehend and Implement Bipolar Junction Transistor (BJT) Configurations and Applications	PO-1, PO-2, PO-3
CO5	Apply Operational Amplifiers (Op-Amps) in Various Circuit Configurations	PO-1, PO-5

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO1	3	-	3	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	2	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-

Books Recommended:

[1] Adel S. Sedra and Kenneth C. Smith "Microelectronics Circuits Theory and Applications", Oxford, 6e.
[2] R.L.Boylestad, L. Nashelsky, Electronic devices, and circuit theory, Prentice Hall, 2002.
[3] Millman, Grabel, Microelectronics, Mc-Graw-Hill.
[4] Hayt, Kammerly and Durbin, Engineering Circuit Analysis, Tata McGraw Hill, sixth edition.
[5] R.A. Gayakwad, OP-amps and linear integrated circuits, Prentice Hall of India

List of Experiments:

1. To study, characterization, and calibration of Multimeter, Function Generator, Oscilloscope and basic electronics components (Resistor, capacitor, inductor).
2. To obtain V-I characteristics of PN junction diode (Si, Ge) and light emitting diode
3. To obtain V-I characteristics of Zener and application of Zener diode as Line and Load regulation.
4. To observe waveforms at the output of following circuit:
   a) clipper circuit.
   b) clamper circuits.
5. To observe waveform at the output of half wave rectifier with and without filter capacitor. To measure DC voltage, DC current, ripple factor with and without filter capacitor.
6. To observe waveform at the output of full wave center tapped rectifier with and without filter capacitor. To measure DC voltage, DC current, ripple factor with and without filter capacitor.
7. To observe waveform at the output of full wave bridge rectifier with and without filter capacitor. To measure DC voltage, DC current, ripple factor with and without filter capacitor
8. To understand working of transistor as a switch. To draw DC load line for the given circuit.
9. To understand working of transistor as an amplifier. To draw DC load line for the given circuit.
10. To observe input-output waveforms of inverting OP-AMP and non-inverting OP-AMP.

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 2**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
2DSBS5: Workshop Practice	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
	0	**0**	**2**	**0**	**0**	**2**	**1**

Course Objective:

The course is designed

1. To provide an understanding of the basic concepts of Machine tools its classification and operations can be performed on it.
2. To learn about the basic concepts and different types of welding processes of joining two materials.
3. To learn about the process of preparation of Molds through Foundry and the standard tooling used on various Foundry.
4. To learn about the basic concepts, operations, job preparation from wood, metals with the help of Plumbing, Carpentry and Fitting processes and the standard tooling used in it.

Pre requisite(s): Nil

COURSE OF CONTENTS

Introduction of and practice work on the following trade shops, processes, tools, material and their application in manufacturing:

1. Introduction of and practice work on the Fitting trade shops, processes, tools, material and their application in manufacturing.
2. Introduction of and practice work on the Carpentry trade shops, processes, tools, material and their application in manufacturing.
3. Introduction of and practice work on the Welding trade shops, processes, tools, material and their application in manufacturing.
4. Introduction of and practice work on the Foundry trade shops, processes, tools, material and their application in manufacturing.
5. Introduction of and practice work on the Machine shop, processes, tools, material and their application in manufacturing.
6. Introduction of and practice work on the Plumbing Shop trade shops, processes, tools, material and their application in manufacturing.

Course Outcome:
Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Identify the processes used in Fitting & Carpentry trades & the tools used in Fitting for the manufacturing of components of various sizes and shapes.	PO1, PO2
CO2	Identify the processes used in Welding & Foundry trades & the tools used in Fitting for the manufacturing of components of various sizes and shapes.	PO3, PO5, PO7
CO3	Identify & understand different operations can be performed, types of tools used & different parameters of machine tools in Machine Shop.	PO1, PO3, PO4
CO4	Understand the use of basic processes and tools used in Plumbing different types of joints and basic concepts of Plumbing.	PO1, PO2, PO4, PO11

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	3										
CO2			3		3		2					
CO3	3		3	2								
CO4	3	3		3							2	
CO5												

* CO (rows) mention nil/very small/insignificant contribution to the PO(column)
1→ relevant and small significance 2 → medium or moderate and 3 →strong

BOOKS RECOMMENDED:
[1] W A J Chapman, *Workshop Technology, Vol-I/II*, Elsevier Butterworth Heinenman, 5/e,
[2] S.K.Hajra Choudhury, *Elements of Workshop Technology*, Media Promoters of Publishers

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 2**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
2DSHS6: Technical English	**L**	**T**	**T**	**L**	**T**	**P**	**Total**
	2	**1**	**0**	**2**	**1**	**-**	**3**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop the English communication skills in terms of reading, writing and understanding of Engineering terms.
- To develop the technical ideas in English and to be able to express the technical ideas.

Pre requisites: Basic knowledge of English and communication skills

COURSE OF CONTENTS

UNIT I

Basic of technical communication: Meaning of technical communication; process of communication; Forms of communication: Verbal and Non-verbal; technology-enabled communication; Barriers to communication; Essentials of effective communication; Types of communication; Defining audiences for technical communication; Aspects of communication: Global, Ethical and Legal.

UNIT II

Professional correspondence: Qualities of professional correspondence: Goodwill techniques; Types of correspondence: Letters, Memos, E-mails; Business Letters: Elements of a Letters, Basic Letter Formats; Types of Business Letters: Positive Letters, Negative Letters, Inquiry Letters, Sales Letters, Complain and Adjustment Letters. Memos: Meaning and Format of Memos. Writing job application letters & Designing Resumes; Meeting and Minutes.

UNIT III

Technical Writing: Meaning & Concept of Technical Writing: Process of Technical Writing: Forms of Technical Writing: Technical Description, Summaries, Instructions& User Manuals: Technical Reports: Meaning and Essentials of Good Report Writing: Classification of Reports; Report Formats: Formal and Informal; Common Informal Technical Reports: Progress Reports, Lab Reports, Feasibility reports, Problem Solving Reports.

UNIT IV

Reading Comprehension; Precis Writing; Expansion of an idea; Dialogue Writing; Paragraph Writing (Related to Technical Communication).

UNIT V

Foreign Words & Phrases; Antonyms and Synonyms; Transitional Words and Phrases; Articles, Use of Prepositions, Modal Verbs, Connectives, Relative Clauses, Noun/Nominal Compounds: Correction of Sentences and Homophones; Punctuation, Abbreviations, Capitalization and Number Usage; Use of Technical Words and Jargons.

Learning Outcomes:
Upon completing the course, students will be able to:

- Apply various technical terms and terminologies practically
- The course aims at developing the fundamentals of Technical English and mastery in the professional writing like Business letters, Business correspondence .designing Business Memorandum, Resume and E-mail writing.
- Will be able to write formal and informal reports in workplace.
- Will have complete knowledge of comprehending different passages and Precis writing.
- Apply various grammatical skills practically.

CO. No.	CO	PO
CO1	Develop the ability to comprehend and interpret technical and engineering-related texts in English.	PO-3, PO-6
CO2	Acquire skills to articulate technical ideas effectively through structured and concise writing.	PO-3
CO3	Build a robust vocabulary of engineering and technical terms.	PO-8, PO-9 PO-10
CO4	Gain proficiency in expressing complex technical ideas in clear and accurate English.	PO-7
CO5	Learn to present technical concepts and ideas effectively in both written and spoken formats.	PO-7, PO-8
CO6	Enhance understanding of engineering concepts through effective use of the English language.	PO-12
CO7	Develop skills to communicate technical ideas clearly in collaborative and professional settings.	PO-9, PO-10
CO8	Practice applying English communication skills to solve practical engineering problems.	PO-9, PO-12

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1			2			2	2	2	3	2		2
CO2			2			2	1	2	3	2		1
CO3			2			1	1	2	2	1		1
CO4			1			1			2	1		
CO5			1			1			1	1		

BOOKS RECOMMENDED:

[1] A. Esenberg, A Beginner's Guide to Technical Communication, McGraw-Hills.
[2] A. J. Rutherford, Basic Communication Skills for Technology, Pearson Education Asia.
[3] C. L. Bovee, J. V. Thill& B Schatzman, Business Communication Today, 7/e, Pearson Education, 2002.
[4] R. V. Lesikar, J. D. Perrit, Jr., & ME Flately, Lesikar's Basic Business Communication.
[5] R. C. Sharma and K. Mohan, Business Correspondence and Report Writing, Tata McGraw-Hill, 2002.

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) DAVV, Indore, India				**B. Des I Year Semester- 2**			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
2DSHS7: Design Thinking	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Duration of Theory Paper: 3 Hours	**2**	**0**	**0**	**1**	**0**	**0**	**2**

Course Learning Objectives:
The objective of this Course is to provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which useful for a student in preparing for an engineering career.

Prerequisite: Nil

COURSE OF CONTENTS

UNIT-I Basics of Learning, Memory, Understanding, Expression
Understanding the Learning Process, Assessing and Interpreting, Memory process, Problems in retention, Memory enhancement techniques, Understanding, Expression

UNIT-II Basics of Design Thinking
Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test, Implement

UNIT-III Key Principles and Design Thinking Tools
Understanding Creative thinking process, Understanding Problem Solving, Experimentation, Creative Problem Solving, Design Thinking Tools

UNIT-IV Process of Product Design
Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Collaboration, Creativity, Solution development

UNIT-V Customer Centricity, Feedback, Research and Re-create
Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Feedback loop, Focus on User Experience, Address ergonomic challenges, User focused design, Final Presentation- “Solving Practical Engineering Problem through Innovative Product Design & Creative Solution”.

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Compare and classify the various learning styles and memory techniques and apply them in their engineering education.	PO-1,PO-2,PO-3
CO2	Analyze experience and expressions to better understand users while designing innovative products.	PO-1,PO-2,PO-3, PO-5
CO3	Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products.	PO-1,PO-2,PO-6
CO4	Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development.	PO-3,PO-5,PO-6, PO-8
CO5	Perceive individual differences and its impact on everyday decisions and further create a better customer experience.	PO-1,PO-6, PO-12

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	2	1	1									
CO2	2	1	1		1							
CO3	2	1				1						
CO4			1		1	1		1				
CO5	1					1						1

Text/Reference Books:

1. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.
2. "Design Thinking" by Tim Brown (Harvard Business Review)
   "The Design Thinking Handbook" by IDEO