

# **Programme Structure**

**School of Engineering &  
Technology**

**Diploma in Mechanical  
Engineering  
(With specialisation in  
Production)**

**Programme Code: 0106**

**Batch: 2024-2027**

## **Vision of the University**

To be recognized as an Institution of excellence, facilitating learning, fostering creativity, knowledge creation, innovations, consultancy and leadership in multiple areas to build a conscious community that will positively impact living beings for a sustainable future.

## **Mission of the University**

### **1. Offers a wide range of Undergraduate and Postgraduate Courses.**

To create conducive environment for an interactive and application oriented experiential learning making the Institute a preferred destination for work and study.

### **2. Research, Innovation, Consultancy & Entrepreneurial Culture**

To Foster creativity, research and innovation orientation in students and faculty in basic and applied areas in all of its disciplines, provide cost effective solutions and nurture entrepreneurial capabilities to accelerate growth.

### **3. Social Relevance with local actions on global thoughts**

To act as a catalyst in social change by developing academic, social, political, technological, scientific, industrial and business leadership in the spirit “Think Globally and Act Locally”; by providing ample opportunities to develop team spirit,

## **Core Values**

**Integrity**

**Leadership**

**Diversity**

**Community**

### **Vision of the School**

To become a centre of excellence for providing quality and value based education in the field of diploma engineering that will produce skilled technocrats to meet industry requirements.

### **Mission of the School**

- To provide technical knowledge and skills by using latest engineering tools.
- To facilitate industry-institute interaction to explore the industrial knowledge of the students.
- To inculcate ethical and professional values among students.
- To impart quality education to the students coming from rural parts and to conduct different curricular & co-curricular activities to enhance the academic.

### **Core Values**

**Integrity**  
**Leadership**  
**Diversity**  
**Community**

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

**PEO 1.** Possess a solid foundation in mechanical engineering theory and practice, as well as the ability to solve problems and solve them, allowing them to develop, evaluate, and build efficient mechanical systems and procedures.

**PEO 2.** To create engineers with sound technical knowledge for facing all sorts of challenges in industry or in pursuance of higher studies.

**PEO 3.** To motivate students, to acquire attitude for lifelong learning along with leadership skills, team spirit and ethical values so that they upgrade themselves with the latest trends in the field of engineering in order to serve the society.

## **PROGRAMME OUTCOMES (POs)**

- PO 1.** Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
- PO 2.** Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.
- PO 3.** Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
- PO 4.** Modern tool usages: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities with an understanding of the limitations.
- PO 5.** Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.
- PO 6.** Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
- PO 7.** Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

## **PROGRAMME SPECIFIC OUTCOMES (PSOs)**

- PSO 1.** An ability to apply principles of mechanical engineering, including mechanics, thermodynamics, fluid mechanics, heat transfer, materials science, manufacturing processes, and machine design to solve complex engineering problems.
- PSO 2.** Proficient in the use of modern engineering tools and software for modelling, simulation, analysis, and design of mechanical systems. They will be able to utilize CAD/CAM, FEA, and other computational tools to enhance engineering solutions.
- PSO 3.** Capability to design and develop mechanical systems, components, and processes that meet specific requirements, considering public health and safety, cultural, societal, and environmental factors.
- PSO 4.** Able to collaborate effectively with professionals from other engineering disciplines and fields of study. They will possess the skills to work in multidisciplinary teams, bringing mechanical engineering expertise to diverse projects and innovations.



# SDGI GLOBAL UNIVERSITY, GHAZIABAD

## SCHOOL OF ENGINEERING & TECHNOLOGY

### SCHEME OF STUDIES AND EVALUATION FOR DIPLOMA IN MECHANICAL ENGINEERING (PRODUCTION)

**W.E.F. Session: 2025-26**

**(Batch : 2024-2027)**

**Semester - III**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	DC	D06AS24301	*Applied Mathematics- III	3	1	-	4	3	50	50	100	40
2	DC	D061524302	Engineering Materials	3	0	-	3	3	50	50	100	40
3	DC	D061524303	Mechanics of Solids	3	0	-	3	3	50	50	100	40
4	DC	D061524304	Production Technology - I	2	1	-	3	2	50	50	100	40
5	VAC	D06VA24305	*Human Values & Professional Ethics	3	0	-	3	3	50	50	100	40
6	DC	D061524352	Engineering Materials Lab	-	-	2	2	1	60	40	100	40
7	DC	D061524353	Mechanics of Solids Lab	-	-	2	2	1	60	40	100	40
8	DC	D061524354	Production Technology - I Lab	-	-	4	4	2	60	40	100	40
9	SE	D06SE24355	AutoCAD & 3D Printing Lab	-	-	4	4	2	60	40	100	40
<b>Total</b>				<b>14</b>	<b>2</b>	<b>12</b>	<b>28</b>	<b>20</b>	<b>490</b>	<b>410</b>	<b>900</b>	<b>360</b>

\*Subjects denotes the subject that are common with other diploma programs.

# Semester-3<sup>rd</sup>



## SCHOOL OF ENGINEERING & TECHNOLOGY

### APPLIED MATHEMATICS - III

(D06AS24301)

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#### JUSTIFICATION

Contents of this course provide understanding of some elementary and advanced mathematics algorithms and their applications of solving engineering problems. Content of this course will enable students to use some advanced techniques like Beta-Gamma function, Fourier series, Laplace transform and probability distributions in solving complex engineering problems.

#### DETAILED CONTENTS

##### UNIT 1: Matrices 10 Hours

- 1.1 Algebra of Matrices: Addition, Multiplication of matrices, Null matrix and a unit matrix, Square-matrix, Symmetric, Skew symmetric, Hermitian, Skew hermitian, Orthogonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix. Definition and Computation of inverse of a matrix.
- 1.2 Elementary Row/Column Transformation: Meaning and use in computing inverse and rank of a matrix.
- 1.3 Linear Dependence: Linear dependence/independence of vectors, Definition and computation of rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors, Consistency of equations.
- 1.4 Eigen Pairs: Definition and evaluation of eigen values and eigen vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof) and its verification Use in finding inverse and powers of a matrix.

##### UNIT 2: Differential Calculus 08 Hours

- 2.1 Function of two variables, identification of surfaces in space, coincides
- 2.2 Partial Differentiation: Directional derivative, Gradient, Use of gradient  $f$ , Partial derivatives, Chain rule, Higher order derivatives, Euler's theorem for homogeneous functions, Jacobians.
- 2.3 Vector Calculus: Vector function, Introduction to double and triple integral, differentiation and integration of vector functions, gradient, divergence and curl, differential derivatives.

##### UNIT 3: Differential Equation 10 Hours

- 3.1 Formation, Order, Degree, Types, Solution: Formation of differential equations through physical, geometrical, mechanical and electrical considerations, Order, Degree of a differential equation, Linear, nonlinear equation.
- 3.2 First Order Equations: Variable separable, equations reducible to separable forms, Homogeneous equations, equations reducible to homogeneous forms, Linear and Bernoulli form exact equation and their solutions.
- 3.3 Higher Order Linear Equation: Property of solution, Linear differential equation with constant coefficients (PI for  $X = e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ ,  $X^n$ ,  $e^{ax}V$ ,  $XV$ )
- 3.4 Simple Applications: LCR circuit, Motion under gravity, Newton's law of cooling, radioactive decay, Population growth, Force vibration of a mass point attached to spring with and without damping effect. Equivalence of electrical and mechanical system

**UNIT 4: Integral Calculus****10 Hours**

- 4.1 Beta and Gamma Functions: Definition, Use, Relation between the two, their use in evaluating integrals.
- 4.2 Fourier Series: Fourier series of  $f(x)$ ,  $-n < x < n$ , Odd and even function, Half range series.
- 4.3 Laplace Transform: Definition, Basic theorem and properties, Unit step and Periodic functions, inverse Laplace transform, Solution of ordinary differential equations

**UNIT 5: Probability and Statistics****8 Hours**

- 5.1 Probability: Introduction, Addition and Multiplication theorem and simple problem.
- 5.2 Distribution: Discrete and continuous distribution, Binomial Distribution, Poisson Distribution, Normal Distribution.

**TEXT BOOKS**

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1. Applied Mathematics-III (Hindi & English) by Kumar, Ajay; J.P.N.P, Meerut
2. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi

**REFERENCE BOOKS**

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1. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
2. Applied Mathematics-III by Chauhan and Chauhan, Krishna Publications, Meerut.



## SCHOOL OF ENGINEERING & TECHNOLOGY

### ENGINEERING MATERIALS

(D061524302)

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3 0 0

#### JUSTIFICATION

Lot of development has taken place in the field of materials. New materials are being developed and it has become possible to change the properties of materials to suit the requirements. Diploma holders in this course are required to make use of different materials for various applications. For this purpose, it is necessary to teach them basics of metal structure, properties, usage and testing of various ferrous and non-ferrous materials and various heat treatment processes. This subject aims at developing knowledge about the characteristics, testing and usage of various types of materials used in industries.

#### DETAILED CONTENTS

<b>UNIT 1: Introduction</b>	<b>08 Hours</b>
1.1 Materials, Classification of Materials, Properties of materials like- Thermal, Chemical, Electrical and Mechanical properties.	
1.2 <b>Ferrous Materials:</b> Different iron ores, Raw materials in production of iron and steel, Basic process of iron-making and steel-making, Classification of iron and steel.	
1.3 <b>Non-Ferrous Materials:</b> Properties and uses of Aluminium, Copper and Zinc and their alloys	
<b>UNIT 2: Metals And Alloys</b>	<b>08 Hours</b>
2.1 <b>Steels:</b> Steels and alloy steel, Classification of plain carbon steels, Properties and usage of different types of Plain Carbon Steels, Effect of various alloys on properties of steel.	
2.2 <b>Uses of alloy steels:</b> High speed steel, stainless steel, spring steel, silicon steel	
2.3 <b>Cast Iron:</b> Different types of Cast Iron, manufacture and their use. Classification of cast iron	
<b>UNIT 3: Heat Treatment</b>	<b>06 Hours</b>
3.1 <b>Introduction:</b> Heat treatment, Purpose of heat treatment, Solid solutions and its types, Formation and decomposition of Austenite, Martensitic Transformation – Simplified Transformation Cooling Curves.	
3.2 <b>Heat Treatment Processes:</b> Hardening, tempering, annealing, normalizing, Casehardening and surface hardening.	
<b>UNIT 4: Plastics, Rubber, and Miscellaneous Materials</b>	<b>08 Hours</b>
4.1 <b>Plastics:</b> Definition, classification of Plastics- Thermosetting & Thermoplastic and their uses, Various trade names of plastics.	
4.2 <b>Rubber:</b> Definition, Classification of Rubber- Natural & Synthetic rubber.	
4.3 <b>Miscellaneous Materials:</b> Tool and Die materials, Materials for bearing metals, Materials for Nuclear Energy, Refractory materials.	
<b>UNIT 5: Crystallography, Advanced Materials and Testing of Materials</b>	<b>08 Hours</b>
5.1 <b>Crystallography:</b> Crystal, Unit Cell, Space Lattice, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, atomic Packing Factor.	
5.2 <b>Advanced Materials:</b> Composites, Ceramics, Adhesives, Smart materials, their properties, classification, and applications.	
5.3 <b>Destructive Testing:</b> Definition, Classification of destructive testing- Hardness testing	

5.4 **Non-Destructive Testing:** Definition, Classification of Non-destructive testing- Visual testing, Ultrasonic testing, liquid penetration testing

**TEXT BOOKS**

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1. Text book of Material Science by R.K. Rajput; Katson Pubs, Ludhiana
2. Text book of Material Science by V.K. Manchanda; India Publishing House, Jalandhar.

**REFERENCE BOOKS**

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1. Engineering material & Material Science (Hindi & English) by Sinha,R.S.K, Asian, New Delhi.
2. Engineering material & Material Science (Hindi & English) by Bhatnagar S.K
3. Material & material science (Hindi & English) by Gupta, J L.



## SCHOOL OF ENGINEERING & TECHNOLOGY

### MECHANICS OF SOLIDS

(D061524303)

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3 0 0

#### JUSTIFICATION

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

#### DETAILED CONTENTS

<b>UNIT 1: Stresses and Strains</b>	<b>08 Hours</b>
1.1 Basic assumptions, Concept of load, stress and strain	
1.2 Tensile, compressive and shear stresses, Thermal Stresses and strains	
1.3 Stress-strain diagrams, Hook's Law and Const., Nominal stress, Percentage elongation, Proof stress and working stress, Factor of safety, Poisson's Ratio,	
1.4 Concepts of fatigue, creep and stress concentration	
<b>UNIT 2: Resilience and Moment of Inertia</b>	<b>08 Hours</b>
2.1 Resilience, proof resilience, modulus of resilience, Strain energy due to direct stresses, Stresses due to gradual, sudden, and falling load.	
2.2 Concept of moment of inertia and second moment of area, Radius of gyration, Theorem of perpendicular axis and parallel axis without derivation, Section modulus.	
2.3 Concept of Principal stresses, principal planes and maximum shear stress.	
<b>UNIT 3: Bending Stresses &amp; Torsion</b>	<b>08 Hours</b>
3.1 <b>Bending Stresses:</b> Concept of Bending stresses, Theory of simple bending, Use of the equation $\sigma/y = M/I = E/R$ , Concept of moment of resistance, Bending stress diagram, Calculation of maximum bending stress in beams of rectangular, circular, and T-Section, Permissible bending stress Section modulus for rectangular, circular and symmetrical I section.	
3.2 <b>Torsion:</b> Concept of torsion- difference between torque and torsion, Use of torque equation for circular shaft, Comparison between solid and hollow shaft with regard to their strength and weight, Power transmitted by shaft, determination of shaft diameter under combined bending and torsion.	
<b>UNIT 4: Shear Force and Bending Moment</b>	<b>08 Hours</b>
4.1 Concept of beam and form of loading	
4.2 Concept of end supports-Roller, hinged and fixed	
4.3 Concept of bending moment and shearing force	
4.4 S.F. and B.M. diagram for cantilever and simply supported beams without overhang subjected to concentrated load and U.D.L.	
<b>UNIT 5: Columns, Thin Cylinder and Spherical Shells</b>	<b>06 Hours</b>
5.1 <b>Columns:</b> Concept of column, modes of failure, Types of columns, Buckling load, crushing load, Slenderness ratio, Factors effecting strength of a column, End restraints, Effective length, Strength of column by Euler Formula without derivation, Rankine Gourdan formula (without derivation)	
5.2 <b>Thin Cylinder and Spherical Shells:</b> Introduction to longitudinal stresses, circumferential or hoop stresses and radial stresses, Longitudinal and circumferential stresses in thin cylinder, Longitudinal and circumferential	

### **TEXT BOOKS**

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1. SOM by Birinder Singh; Katson Publishing House, New Delhi.
2. SOM by RS Khurmi; S. Chand & Co; New Delhi

### **REFERENCE BOOKS**

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1. Mechanics of Materials by Dr.Kirpal Singh; Standard Publishers Distribution, New Delhi.
2. Mechanics of Solids by KarmveerSaini, Krishna Publication House, Meerut.
3. Mechanics of Solids (Hindi & English) by Kapoor,J.K, Bharat BhartiPrakashan, Meerut.
4. Mechanics of Solids (Hindi & English) by Varshney,M.K,



## SCHOOL OF ENGINEERING & TECHNOLOGY

### PRODUCTION TECHNOLOGY-I

(D061524304)

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2 1 0

#### JUSTIFICATION

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

#### DETAILED CONTENTS

<b>UNIT 1</b>	<b>Welding</b>	<b>08 Hours</b>
1.1	Principle of welding, Classification of welding processes, Advantages and limitations of welding, Welding defects	
1.2	<b>Gas Welding:</b> Principle of operation, Types of gas welding flames and their applications,	
1.3	<b>Arc Welding:</b> Principle of operation, Types of Arc Welding- TIG & MIG Welding	
1.4	<b>Resistance Welding:</b> Principle, advantages, limitations, working and applications of spot welding, seam welding, projection welding and percussion welding	
<b>UNIT 2</b>	<b>Pattern Making</b>	<b>08 Hours</b>
2.1	Types of patterns, Pattern material, Pattern allowances	
2.2	Introduction to cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores	
<b>UNIT 3</b>	<b>Moulding and Casting</b>	<b>08 Hours</b>
3.1	<b>Moulding Sand:</b> Properties of moulding sand, their impact and control of properties viz. permeability, refractoriness, adhesiveness, cohesiveness, strength, flow ability, collapsibility, Various types of moulding sand	
3.2	<b>Casting Processes:</b> Principle, working and applications of Die casting: hot chamber and cold chamber, Investment and lost wax process, centrifugal casting.	
3.3	<b>Gating and Riser System:</b> Elements of gating system, Pouring basin, sprue, runner, gates, Types of risers	
3.4	<b>Melting Furnaces:</b> Construction and working of Pit furnace, Cupola furnace, Casting defects	
<b>UNIT 4:</b>	<b>Metal Forming Process</b>	<b>08 Hours</b>
4.1	<b>Press Working-</b> Types of presses, type of dies, Press Operations-Shearing, piercing trimming, punching, notching, shaving, gearing, embossing, stamping.	
4.2	<b>Forging-</b> Open die forging, closed die forging, Press forging, upset forging, swaging, up setters, roll forging, Cold and hot forging.	
4.3	<b>Rolling-</b> Elementary theory of rolling, Types of rolling mills	
<b>UNIT 5</b>	<b>Plastic Processing</b>	<b>06 Hours</b>
5.1	Industrial use of plastics, Injection moulding-principle, working of injection moulding machine, Compression moulding-principle, and working of compression moulding machine.	
5.2	<b>Extrusion and Drawing-</b> Type of extrusion- Hot and Cold, Direct and indirect, pipe drawing, tube drawing, wire drawing.	

## **TEXT BOOKS**

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1. Workshop Technology by BS Raghuvanshi: DhanpatRai and Sons Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra: Asia Publishing House

## **REFERENCE BOOKS**

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1. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd., Delhi
2. Workshop Technology (Hindi & English) by Kapoor,J.K, Bharat Bharti Prakashan, Meerut
3. Elementary Workshop Technology, Gupta,K.K, Asian, Mujaffarnagar



## **JUSTIFICATION**

To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value based living in a natural way. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature

## **DETAILED CONTENTS**

<b>UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education</b>	<b>08 Hours</b>
1.1 Understanding the need, basic guidelines, content and process for Value Education	
1.2 Self-Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration	
1.3 Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority	
1.4 Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario	
<b>UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!</b>	<b>08 Hours</b>
2.1 Understanding human being as a co-existence of the sentient ‘I’ and the material the Body’	
2.2 Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha	
2.3 Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer).	
2.4 Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail	
<b>UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship</b>	<b>08 Hours</b>
3.1 Understanding Harmony in the family – the basic unit of human interaction	
3.2 Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti; a. Trust (Vishwas) and Respect (Samman) as the foundational values of relationship	
3.3 Understanding the meaning of Vishwas; Difference between intention and competence	
3.4 Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship	
3.5 Understanding the harmony in the society (society being an extension of	

family): Samadhan, Samridhi, Abhay, Sah-astitvaas comprehensive Human Goals

3.6 Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj)

**UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** **06 Hours**

4.1 Understanding the harmony in the Nature

4.2 Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature

4.3 Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space

4.4 Holistic perception of harmony at all levels of existence

**UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics** **06 Hours**

5.1 Natural acceptance of human values

5.2 Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

5.3 Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations

5.4 To inculcate Human Values among Students: The Role of self ,Parents and Teachers

5.5 Practical Session also Includes Different Yogic Exercises and Meditation Session

## TEXT BOOKS

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1. Universal Human Values by Ankit Kumar, J.N.P Meerut.

## REFERENCE BOOKS

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1. Value Education websites, <http://uhv.ac.in>, <http://www.aktu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, an Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology–the Untold Story
6. Case study Hevade Bazar Movie



### **JUSTIFICATION**

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Diploma holders in this course are required to make use of different materials for various applications. For this purpose, it is necessary to teach them basics of metal structure, properties, usage and testing of various ferrous and non-ferrous materials and various heat treatment processes. This subject aims at developing knowledge about the characteristics, testing and usage of various types of materials used in industries.

### **DETAILED CONTENTS**

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<b>S. No</b>	<b>Name of Practical</b>
1	Use of diamond polishing apparatus.
2	To perform following heat treatment process on materials of known carbon percentage and checking the change in the properties a) Annealing b) Normalising c) Case hardening
3	Preparation of specimens and study of micro structure of given metals and alloys on metallurgical microscope a) Brass b) Bronze c) Grey Cast Iron d) Low Carbon Steel e) High Carbon Steel f) High Speed Steel
4	To prepare specimen for microscope examination for polishing
5	To determine composition of alloy steel by steeloscope.



## SCHOOL OF ENGINEERING & TECHNOLOGY

### MECHANICS OF SOLIDS LAB

(D061524353)

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### JUSTIFICATION

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

### DETAILED CONTENTS

<b>S. No</b>	<b>Name of Practical</b>
1	To find the shear force at a given section of simply supported beam for different loading.
2	To find the value of 'E' for a steel beam by method of deflection for different loads.
3	To determine the Max-Fiber stress in X-section of simply supported beam with concentrated loads and to find the neutral axis of the section.
4	To determine the ultimate tensile strength, its modulus of Elasticity, stress at yield point, Elongation and contraction in X-sectional area of the specimen by U.T.M. through necking phenomenon.
5	To determine the ultimate crushing strength of materials like steel and copper and compare their strength.
6	To determine Rockwell Hardness No. and Brinell Hardness No. of a sample.
7	To estimate the Shock Resistance of different qualities of materials by Izod's test and Charpy test.
8	To determine the bending moment at a given section of a simply supported beam for different loading.
9	To determine the various parameters of helical coil spring.
10	To determine the angle of twist for a given torque by torsion apparatus and to plot a graph between torque and angle of twist.



**JUSTIFICATION**

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

**DETAILED CONTENTS**

**S. No Name of Practical**

**1 WELDING SHOP**

- Job 1. Preparing gas welding joint in vertical/Horizontal position joining M.S. Flates
- Job 2. Exercise on gas cutting of mild steel plate with oxy-acetylene gas torch.
- Job 3. Exercise on gas welding of cast iron and brass part or component.
- Job 4. Exercise on preparation of T Joint by arc welding
- Job 5. Exercise on spot welding/seam welding
- Job 6. Exercise on MIG and TIG welding
- Job 7 Exercise on arc welding pipe joint MS.

**2 PATTERN MAKING**

- Job 1. Preparation of solid/single piece pattern.
- Job 2. Preparation of two piece/split pattern
- Job 3. Preparation of a pattern on wooden lathe
- Job 4. Preparation of a self-cored pattern
- Job 5. Preparation of a core box.

**3 FOUNDRY SHOP**

- Job 1. Preparation of mould with solid pattern on floor.
- Job 2. Preparations of floor mould of solid pattern using cope.
- Job 3. Preparation of floor mould of split pattern in cope and drag of moulding box.
- Job 4. Moulding and casting of a solid pattern of aluminium
- Job 5. Preparing a mould of step pulley and also preparing core for the same.
- Job 6. A visit to cast iron foundry should be arranged to have first-hand knowledge of cast iron melting pouring and casting.
- Job 7. Testing of moisture contents and strength of moulding sand.

**4 FORGING SHOP/FITTING SHOP/SHEET METAL SHOP**

- Job 1. Preparation of single ended spanner by hand/machine forging.
- Job 2. Preparation of simple die
- Job 3. Demonstration of spinning process on lathe and spinning a bowl on a lathe machine.
- Job 4. Demonstration of grinding process on lathe machine and grinding a job on a lathe machine
- Job 5. Preparation of utility item out of G.I. sheet.
- Job 6. Preparation of drilling Jig.



**JUSTIFICATION**

Computer Aided Design plays a very important role in designing products with exact determines for manufacturing industries. Modelling helps to achieve the designed shape and size of products for the manufacturing sector. After studying this subject the students will be able to know Drafting, Designing and Modelling techniques which helps a manufacturer machines sound for better product development.

**DETAILED CONTENTS**

S. No	Name of Practical	
1	<b>Introduction to AutoCAD commands</b>	6 sheets
	1.1 Concept of AutoCAD, Tool bars in Auto CAD, coordinate system (Absolute, Relative and Polar), snaps, Grid, and ortho mode	
	1.2 Drawing commands – point, line, arc, circle, ellipse, parabola etc	
	1.3 Editing commands – scale, erase, copy, stretch, lengthen and explode etc	
	1.4 Dimensioning and placing text in drawing area	
	1.5 Sectioning and hatching	
	1.7 Create layers within a drawing	
2	<b>Detail and assembly drawing of the following using AutoCAD</b>	4 sheets
	2.1 Wall Bracket	
	2.2 Stepped pulley, V-belt pulley	
	2.4 Flanged coupling	
	2.5 Screw jack or knuckle joint	
3	<b>Isometric Drawing by using AutoCAD</b>	4 sheet
	3.1 User Co-ordinate System, Viewpoints, Viewports Elevation, World Coordinate System X/Y/Z Filter	
	3.2 Drawings of following on computer:	
	- Cone	
	- Cylinder	
	- Isometric view of objects	
4	<b>3 D Drawing by using Auto CAD</b>	3 sheet
	4.1 Basic 3D command	
	4.2 Some Drawing for Practice	

**REFERENCE BOOKS**

1. CAD/CAM – Theory and Practice by Zeid; Tata McGraw Hill Publishers, New Delhi.
2. Computer Aided Drawing by Jai Prakash, Sarthak Prakashan, Meerut
3. Computer Aided Drafting & Modelling (English & Hindi) by Md.Abbas/PoojaYadav, Asian Publication, Mujaffarnagar