

**SCHOOL OF ENGINEERING**

**SWARNIM STARTUP & INNOVATION UNIVERSITY**

<b>Course</b>	Diploma Engineering (60 Seats)
<b>Duration</b>	3 Years
<b>Aim</b>	Our aim is to promote the education and applied research and development of knowledge in the field of engineering.
<b>Objective</b>	<ul style="list-style-type: none"><li>• To maintain a high standard of education through outstanding teaching, innovative curriculum and research training.</li><li>• To improve, develop and establish teaching and research programs in lined with industry needs.</li><li>• To develop and promote quality and market driven academic and professional peruses.</li><li>• Increase interaction and collaboration with industry.</li><li>• To provide opportunities for students to work as part of teams on multidisciplinary projects.</li></ul>
<b>Course Outcome</b>	<ul style="list-style-type: none"><li>• Automobile engineering is also called vehicle engineering, one of the most challenging fields in engineering but at the same time it has more growth opportunity worldwide.</li><li>• Automobile engineering is an applied science that includes elements of Mechanical engineering, Electrical engineering, Electronic Engineering, Software Engineering and Safety engineering as applied to the design, manufacture and operation of automobiles, buses and trucks and their respective engineering subsystems. Automobile engineering consist combination of NHV, Fuel economy / emission, vehicle dynamics, safety engineering, vehicle electronics.</li></ul>

# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SCHOOL OF ENGINEERING & TECHNOLOGY

### DEPARTMENT OF EC/CE/EE/EEE/CL/AUTO/ME

#### ENGINEERING DRAWING

CODE:

DIPLOMA 1<sup>st</sup> Year

#### Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th.	Pr	Th.	Pr	
2	-	4	6	6	30	50	70	-	150

**Prerequisites:** Zeal to learn the subject

**Course outline:** Engineering Drawing is an effective language of engineers. It is the foundation block which strengthens the engineering & technological structure. Moreover, it is the transmitting link between ideas and realization.

Sr. No.	Course Contents	Number of Hours
1	<b>ENGINEERING DRAWING AIDS:</b> Drawing equipments, instruments and materials. (a) Equipments-types, specifications, method to use them, applications. (b) Instruments-types, specifications, methods to use them and applications. (c) Pencils-grades, applications, types of points and applications. (d) Other materials-types and applications	02
2	<b>PLANNING, LAYOUT AND SCALLING OF DRAWIN :</b> Follow and apply standard practice as per bureau of I.S. for planning and layout, Choose appropriate scale factor for the drawing as per given situation	02
3	<b>LINES, LETTERING AND DIMENSIONING :</b> Write annotations on a drawing where ever necessary, Choose appropriate line and dimensioning style for a given geometrical entity.	03

4	<p><b>GEOMETRIC CONSTRUCTION:</b> Develop the ability to draw polygons, circles and lines with different geometric conditions, Geometric construction related with line like bisecting a line, to draw perpendicular with a given line, divide a line, etc., Geometric construction related with angle like bisect an angle, trisect an angle, etc., To construct polygon. A) Triangle, B) Square / Rectangle, C) Pentagon with special method, D) Hexagon with special method, To draw tangents, Geometric construction related with circle &amp; arc.</p>	04
5	<p><b>ENGINEERING CURVES:</b> Conic sections. (A) Concept and understanding of focus, directrix, vertex and eccentricity and drawing of conic sections, (B) Using various methods, understand construction of: I) Ellipse, II) Parabola, III) Hyperbola, Cycloidal Curves (Cycloid, Epicycloids, and Hypocycloid), Involutives (A) Involutives of a circle (B) Involutives of a polygon, Spiral (Archimedean spiral only).</p>	06
6	<p><b>PROJECTION OF POINTS, LINES AND PLANES :</b> Reference planes, orthographic projections, Concept of quadrant, 1<sup>st</sup> angle and 3<sup>rd</sup> angle projection and their symbols, Projection of points, Projection of lines – determination of true length and inclinations for following cases: (A) Line parallel to one or both the plane, (B) Line perpendicular to one of the plane, (C) Line inclined to one plane and parallel to another, (D) Line inclined to both the planes, Projection of Planes: (A) Types of planes, (B) Projection of planes parallel to one of the reference planes, (C) Projection of plane inclined to one reference plane and perpendicular to another, (D) Projection of planes inclined to both reference planes.</p>	08
7	<p><b>ORTHOGRAPHIC PROJECTIONS:</b> Types of projections-orthographic, perspective, isometric and oblique: concept and applications, Various term associated with orthographic projections (A) Theory of projection, (B) Methods of projection, (C) Orthographic projection, (D) Planes of projection, Conversion of simple pictorial views into Orthographic views, Illustrative problems on orthographic projection, B.I.S. code of practice.</p>	08

**Learning Outcomes:**

After learning the course the students should be able to:

1. To know and understand the conventions and the methods of engineering drawing.
2. Interpret engineering drawings using fundamental technical mathematics.
3. Construct basic and intermediate geometry.
4. To improve their visualization skills so that they can apply these skills in developing new products.
5. To improve their technical communication skill in the form of communicative drawings.
6. Comprehend the theory of projection.

## Teaching & Learning Methodology:

Note: Topic No. 1, 2, 3 and 7 of the above syllabus to be covered in Practical Hours.

## Books Recommended:

1. Elements of Engineering Drawing by N.D. Bhatt
2. Engineering Drawing by P. J. Shah
3. Fundamentals of Engineering Drawing by W. J. Luzzadar
4. Fundamentals of Drawing by K. R. Gopalkrishna
5. Fundamentals of Engineering Drawing by French & Vierck

## List of Open Source Software/learning website:

- [rgpv-ed.blogspot.com/2009/02/engineering-curves.html](http://rgpv-ed.blogspot.com/2009/02/engineering-curves.html)
- <http://www.slideshare.net/sahilsahil992/conic-section-1819818>
- <http://www.technologystudent.com/designpro/drawdex.htm>
- [http://www.engineeringdrawing.org/engg\\_curves/problem-3-8-engineering-curves/490/](http://www.engineeringdrawing.org/engg_curves/problem-3-8-engineering-curves/490/)
- <http://web.iitd.ac.in/~hirani/mel110-part3.pdf>
- <http://www.studyvilla.com/ed.aspx>
- [http://www.youtube.com/watch?v=a703\\_xNeDao](http://www.youtube.com/watch?v=a703_xNeDao)
- [http://www.youtube.com/watch?v=TCxTP\\_8ggNc](http://www.youtube.com/watch?v=TCxTP_8ggNc)
- <http://www.youtube.com/watch?v=JpgFPZILTu8&feature=related>
- <http://www.youtube.com/watch?v=o1YPja2wCYQ&feature=related>
- <http://www.youtube.com/watch?v=dJyKV3Ay7vM&feature=fvwrel>
- E-learning package from KOROS.
- E-learning package from Cognifront.
- CD with book-Engineering drawing, M.B. Shah-B.S. Rana (Pearson).
- Computer based learning material published by KOROS.

## Practical List:

Students are required to prepare drawing sheets on the following topics. Minimum three problems must be given for sheet number 3 to 8.

1. Practice sheet (which includes dimensioning methods, different types of line, construction of different polygon, divide the line and angle in parts, use of stencil,)
2. Plane scale and diagonal scale
3. Engineering curves
4. Projection of line and Projection of plane (minimum two problems on each)
5. Projection and section of solid
6. Orthographic projection.

# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SCHOOL OF ENGINEERING

DEPARTMENT OF EC/CE/EE/EEE/ME/Civil/Auto

Fundamentals of Mechanical Engineering

CODE: \_\_\_\_\_

Diploma 1<sup>st</sup> Year

### Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	-	2	5		30	50	70	-	150

**Objectives:** - Understanding of basic principles of Mechanical Engineering is required in day to day life.

Sr.No.	Course Contents	Number of Hours
1	<b>Introduction:</b> (1) Need of Mechanical engg., (2) Items in general use with specifications and types. Such as bolts, nuts, bearings, belts, springs, levers, couplings, screws, brakes, pulleys, gears, shafts, etc. (3) Pipes and Pipe fittings: types, specifications and use. (4) Hand and Power tools.	4
2	<b>Steam generation and prime movers:</b> (1) Steam generation process and uses. (2) Boilers: Classification, Working, Applications, Accessories and Mountings, Regulations and Safety requirements. (3) Prime Movers: Meaning, Classification, Working, Steam turbine and Gas turbine.	5
3	<b>Internal Combustion Engines:</b> (1) IC engine use and classification. (2) Working of Petrol engine and Diesel engine. (3) Performance parameters. (4) Main parts and functions. (5) Common troubles and remedies.	7
4	<b>Power Transmission :</b> (1) Type of Drives: Belt drive, Rope drive, Chain drive and Gear drive. (2) Types of Belts. (3) Transmission ratio and Gear-train concept. (4) Couplings: Types and Applications. (5) Safety: Causes and remedies of accidents in power transmission system,	8

	Safety norms to be followed	
<b>5</b>	<b>Hydraulic and Pneumatic devices:</b> (1) General properties of fluids. (2) Pump: Working principle, Main parts of pumps, Classification, Working of Centrifugal and Reciprocation pumps, Performance parameters. (3) Water turbines: Working, Classification, Applications. (4) Air compressor: Classification, Working principle, Performance parameters, Applications	<b>7</b>
<b>6</b>	<b>Basic Manufacturing Processes:</b> (1) Welding: Types, Working setup in Gas welding, Types of work carried out, Precautions and safety need to be taken. (2) Brazing and Soldering: General setup and Applications. (3) Foundry: Concept, Process and Applications. (4) Other metal forming and cutting operations. (5) Basic Machine tools used in industry	<b>8</b>
<b>7</b>	<b>Energy:</b> Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion	<b>3</b>

**Learning Outcomes:** - After learning the course the students should be able to

1. To understand the fundamentals of mechanical systems
2. To understand and appreciate significance of mechanical engineering in different fields of engineering

**Books Recommended:**

1. Elements of Mechanical Engineering by N M Bhatt and JR Mehta, Mahajan Publishing House
2. Basic Mechanical Engineering by Pravin Kumar ,Pearson
3. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi
4. Elements of Mechanical Engineering by Sadhu Singh S. Chand Publication
5. Introduction to Engineering Materials by B.K.Agrawal Tata McgrawHill Publication, New Delhi.
6. Elements of Workshop by Hazara Chaudhary.
7. Material Handling Equipments by M.Rundenko, Mir publishers

**E-resources:-**

1. [libguides.wpi.edu/mechanicalengineering](http://libguides.wpi.edu/mechanicalengineering)
2. [paniit.iitd.ac.in/indest/index.php/e-resourc](http://paniit.iitd.ac.in/indest/index.php/e-resourc)
3. [krc.gitam.edu/about/e-resources](http://krc.gitam.edu/about/e-resources)
4. [NPTL resources](#)

**Practical List:-**

<b>Sr. No.</b>	<b>Practical</b>
<b>1</b>	To understand construction and working of various types of boilers.
<b>2</b>	To understand construction and working of different boiler mountings and accessories
<b>3</b>	Demonstrate use of various Mechanical instruments, hand tools and power tools.
<b>4</b>	To understand construction and working of different types of air compressors
<b>5</b>	To understand power transmission methods
<b>6</b>	Demonstrate various machining methods
<b>7</b>	Study various material handling equipments.

# SWARNIM STARTUP & INNOVATION UNIVERSITY

## SCHOOL OF ENGINEERING

### DEPARTMENT OF MECHANICAL

#### MSM

CODE : \_\_\_\_\_

DIPLOMA 1<sup>st</sup> year

### Teaching & Evaluation Scheme:-

Teaching Scheme				Credits	Evaluation Scheme				
Th	Tu	P	Total		Internal		External		Total
					Th	Pr	Th	Pr	
3	0	2	5		30	50	70	-	150

**Course outline:-** Basic principles of science are used to study the structure-properties relationships of various materials for their proper applications in this subject. Especially study of different types of ferrous and non-ferrous metals and alloys, in terms of their composition, structure, properties and applications; non-destructive testing are included in this course to understand the basic concept of selection and processing of metals and materials for their applications.

Sr. No.	Course Contents	Number of Hours
1	<b>INTRODUCTION AND PROPERTIES OF ENGINEERING MATERIAL :</b> Introduction, need, classification of metals and non-metals, Materials Properties, Mechanical, Chemical Properties, Thermal Properties, Electrical / Electromagnetic, Stress and strain-concept, relationship	3
2	<b>METALLURGICAL CONSIDERATION OF METALS :</b> The concept of crystalline structure of metal, BCC, FCC, HCP., The concept of solidification of metals, crystal, grain, grain boundaries, solidification, effect of cooling rates on material properties, Equilibrium diagrams, TTT Curve, applications, TTT curve for stainless steel, Iron-carbon equilibrium diagram and its characteristic.	5



3	<p><b>FERROUS METALS AND ITS ALLOYS :</b></p> <p>Introduction and classification of ferrous metals, Flow diagram for production of Iron and steel, Ferrous metals – standards &amp; designations, composition, properties and its uses, Alloying of metals-properties and effect, Shape memory alloys-concepts, Materials, Properties,</p> <p>Applications, Coding of alloy steels as per BIS, DIN, ASME, EN and JIS, comparisons and equivalents. Introduction and designation/standards (as per BIS, DIN,ASME,EN and JIS) of sponge iron, properties and applications, Microstructures study of ferrous metals</p>	4
4	<p><b>NON FERROUS METALS AND ITS ALLOYS:</b></p> <p>Role of non ferrous metals and its alloys related to engineering field, Types, properties ,capabilities, designations (According to BIS,EN,ASME,JIS, DIN),composition, and industrial applications of copper alloys., aluminium alloys, bearing metals,</p> <p>Microstructure study of all non ferrous metals.</p>	3
5	<p><b>NON METALLIC AND COMPOSITE MATERIALS:</b> Introduction ,main composition and applications of non metallic material -Plastic, rubbers, ceramic, refractories, insulators,</p> <p>abrasives, lubricants, adhesives, fibre and Teflon,</p> <p>Composite materials-concept, structure, common materials, Properties, Advantages and Industrial applications.</p>	4
6	<p><b>HEAT TREATMENT :</b> Introduction to heat treatment, Types, method /process, process parameters and applications of various heat treatment processes/methods, Study of quenching medias and their properties.</p>	4
7	<p><b>SELECTION AND SPECIFICATION OF MATERIALS :</b> Types of commercially available materials, Specification of metals as per (BIS, EN,ASME,JIS, and DIN), Factors to be considered while selecting material.</p>	3
8	<p><b>NON-DESTRUCTIVE TESTING:</b></p> <p>Working principle, working, equipment specification, Process parameters, Procedure, and applications of various non destructive testing methods.</p>	3
9	<p><b>POWDER METALLURGY:</b> Basic concept of powder metallurgy and its applications, merits, Demerits, Manufacturing process of powder</p>	4

	metallurgy.	
<b>10</b>	<b>SURFACE COATINGS:</b> Needs and scope of surface coatings, Procedure and method of preparing surface, Procedure of various surface coating methods, Types of surface coatings and applications	3

### Teaching & Learning Methodology:-

1. Term work report content of each experience should also include following.

- Experience description / data and objectives.
- Skill/s which is / are expected to be developed in student after completion of experience.
- Drawing of experience / setup with labels/nomenclature to carry out the experience.
- The specifications of machines / equipments / devices / tools /instruments /items/elements which is / are used to carry out and to check experience.
- Process parameters / setup settings' values applied to carry out experience.
- Steps / Process description to execute experience.
- Observations
- Information on recent machines / equipments / devices / tools / instruments /items available in market to carry out the experience.
- Special / Additional notes or remarks.

2. Term work report of student of regular mode should exclude Distance Learning manual, photocopies , printed content, etc. Focus should be on developing the term work as original efforts of students.

3. Term work content of industrial visit report should also include following.

- Brief details of industry visited.
- Type, location, products, rough layout, human resource, etc of industry.
- Details, description and broad specifications of machineries/processes observed.
- Safety norms and precautions observed.
- Student's own observation on Industrial environment, culture and attitude.
- Any other details / observations asked by accompanying faculty.

4. Term work also includes experience logbook duly certified by subject teacher/s.

### Books Recommended:

1. Materials & Metallurgy - G.B.S. Narang
2. Material Science & Processes - G.R.Nagpal
3. Elements of Engg. Metallurgy - S.P.Nayak
4. Elements of Metallurgy - Dr.Swaroop
5. Heat Treatment of Metals - Zakharov
6. B.I.S.,ASME.DIN.JIS for materials.
7. Materials science for engineers – James F. Shackelford, Madanapalli K. Murlidhara, PEARSON Education

### E-Resources:

1. <http://nptel.ac.in/>

**Practical List:-**

<b>Sr. No.</b>	<b>Practical</b>
<b>1</b>	Given various items of metals, identify materials of them. Also state the criteria to identify the material. State properties of each material. Also identify main alloying elements and reasons to add them.
<b>2</b>	Demonstration and study of Microscope.
<b>3</b>	Prepare ferrous micro specimens and examine them. Also prepare report on this.
<b>4</b>	Prepare non-ferrous micro specimen and examine it. Also prepare report on this.
<b>5</b>	Demonstration and study of Heat treatment furnaces.
<b>6</b>	Perform hardening process on various steel components. Measure the hardness of hardened components.
<b>7</b>	Perform hardening process specific material. Vary the quenching media and temperature. Prepare a comparative report on hardness of component varying quenching media and temperature.