UNIVERSITY POLYTECHNIC
BIRLA INSTITUTE OF TECHNOLOGY MESRA – 835215 (RANCHI)
DEPARTMENT OF AUTOMOBILE ENGINEERING

III Semester

NEW COURSE STRUCTURE– To be effective for Diploma 2023-24 [2nd Year Onwards]
Based on CBCS system & OBE model Recommended scheme of study

(For Diploma in Automobile Engineering)

Semester of Study	Category of course	Course Code	Subjects	Mode of Delivery			Total Credits
				L	T	P	C
THIRD	**THEORY**						
	Program Core Course	DME 301	Thermal Engineering	3	0	0	3
		DME 303	Manufacturing Process	3	0	0	3
		DME 305	Fluid Mechanics & Hydraulic Machines	3	0	0	3
		DME 307	Engineering Materials	3	0	0	3
	Mandatory Course	DHS 301	**Universal Human Values- II**	2	1	0	**3**
	SESSIONAL						
	Program Core Course	DME 302	Thermal Engineering Lab.	0	0	2	1
		DME 304	Manufacturing Process Lab.	0	0	2	1
		DME 306	Fluid mechanics &Hydraulic M/C Lab	0	0	3	1.5
		DME 308	Machine Drawing	0	0	3	1.5
	Summer Internship	DS351	**Summer Internship- I (4 weeks) after II Semester**	0	0	0	0 (Non-credit)
TOTAL CREDITS							**20**
Total Lectures per Week				**25**			

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UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024-25

COURSE: Thermal Engineering

PROGRAMME: DIPLOMA							
COURSE CODE: DME 301			COURSE TITLE: THERMAL ENGINEERING				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURE/WEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OBJECTIVES: Students will be able to understand about

1	Understand basic concepts of thermal engineering.
2	Understand the first law of thermodynamics, and their properties.
3	Understand the second law of thermodynamics and the heat engine and the heat pump, refrigeration.
4	Explain the Boilers and the Principles of Steam Turbine and Nozzle, different laws and processes, Learn about turbine, nozzle and compressor.
5	Draw and describe the Otto cycle and diesel cycle. Explain about turbine, nozzle and compressor.

COURSE OUTCOME: After the completion of this course students will be able to understand about

CO1	Interpret thermodynamic properties in order to analyse a thermodynamic system from macroscopic view point.
CO2	Explain the first law of thermodynamics to work on the engine.
CO3	Explain the second law of thermodynamics, how it will be work on heat engine and refrigeration.
CO4	Demonstrate the operation of boiler and their types and operation of the nozzle
CO5	Recognize the air standard cycle and operation of the different types of engine & Compressors.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Concepts and Terminology** 1.1 Basic Concepts, Zeroth law of Thermodynamics and its significance, Concept of heat and work, Properties of Ideal gas. 1.2 Concept of continuum Thermodynamic properties of a system (Pressure, volume, temperature and units of measurement) Intensive and extensive properties, Specific heat, energy and its resources 1.3 State and Process, Thermodynamic equilibrium, Quasi static process. 1.4 Conceptual explanation of energy, work and heat, work transfer Path and point Function, Displacement work, forms of work transfer Property, 1.5 . Macroscopic and microscopic views of study, Properties of steam, Sensible and latent heat.

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	1.6 Modes of Heat Transfer, introductory concepts of Conduction convection and Radiation Course Outcome: CO1 Teaching Hours: 8 hrs
2	**First Law of Thermodynamics** 2.1 First Law of thermodynamics Energy as system property forms of stored energy, first law for a closed system undergoing a cyclic process. 2.2 First law for a closed system undergoing change of state Concept of Enthalpy, 2.3 First law applied to steady flow processes, Steady Flow Energy Equation and its application to nozzle, turbine and compressor, 2.4 Perpetual motion machine of first kind. Course Outcome: CO 2 Teaching Hours: 8 hrs
3	**Second Law of Thermodynamics:** 3.1 Limitations of first law Thermal reservoir, 3.2 Statement of Second law of thermodynamics (Clausius and Kelvin Planck), Perpetual motion machine of second kind, 3.3 Concepts of heat engines, refrigerator and heat pump. 3.4 Entropy changes for various reversible processes. 3.5 Carnot cycle, 3.6 cycle Application of second law in heat engine, heat pump, refrigerator and determination of Efficiencies and C.O.P, 3.7 Entropy and Enthalpy and Third law of Thermodynamics Course Outcome: CO3 Teaching Hours: 8 hrs
4	**Boiler and Principles of Steam Turbine:** 4.1 Introduction of Boiler, (Fire Tube and Water Tube Boilers) 4.2 Types of nozzle flow of steam through nozzles, 4.3 steady flow energy equation in nozzles, principle of operation of steam turbine, types of steam turbine, 4.4 Difference between steam turbine and steam engine, difference between impulse turbine and reaction turbine. Course Outcome: CO 4 Teaching Hours: 8 hrs
5	**Thermodynamic Cycle (Air standard cycle)** 5.1 Otto-cycle, Diesel-cycle, Joule/Brayton cycle, dual cycle 5.2 Introduction, classification, application, construction and working of single stage compressor, calculation of power. Course Outcome: CO5 Teaching Hours: 8 hrs

TEXT BOOKS:

1. Engineering Thermodynamics: -R.K. Rajput.
2. Thermal Engineering: -P.L. Ballaney.
3. Engineering Thermodynamics: - Arora & Domkundwar
4. Engineering. Thermodynamics: - Dr. D.S. Kumar

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REFERENCE BOOKS:

S.No	Title	Author, Publisher, Edition And Year Of Publication	Isbn
1	Engineering Thermodynamics	. Nag, P.K, Tata Mcgraw-Hill Publishing Co. Ltd.,1995	81-318-0058-X,13-97-25-906256-8,10-1-25-9062-56-2
2	Thermodynamics	R.K. Rajput	81-318-0058-X

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	2	2	1	1	1
CO2	2	2	2	2	2	2	2	1	2	2
CO3	2	3	3	2	2	2	1	1	2	2
CO4	3	1	1	2	2	2	2	1	1	1
CO5	3	3	2	2	2	2	2	1	2	1

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UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024-25

COURSE: MANUFACTURING PROCESS

PROGRAMME: DIPLOMA							
COURSE CODE: DME 303			Course Title: Manufacturing Process				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OUTCOME: Students will be able to understand about to

1.	Learn basic ideas about foundry, pattern and its kinds.
2.	Get familiar with different types of furnaces and casting defects
3.	Get familiar with different welding processes.
4.	Acquire knowledge of different types of tool materials, cutting fluid and lathe machines.
5.	Get familiar with shaper, milling and drilling machines.

COURSE OUTCOMES: After the completion of this course Students will be able to understand about

CO1	Different types of pattern and cores.
CO2	different types of furnaces and defects in casting.
CO3	working principle of different welding methods and identify welding defects.
CO4	different tool material, cutting fluids, lathe and its attachments.
CO5	working principle, specification and classification of shaper, milling and drilling machine.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Foundry, Sand Moulding& Core making** 1.1**:** Introduction to foundry, advantages and disadvantages, Pattern: pattern making, Type of patterns, pattern allowances. 1.2**:** Introduction, mould material, sand grains, types of sand, sand properties, sand preparation 1.3 testing of moulding sand, types of mould, sand moulding techniques, conventional sand moulding, 1.4: CO_2 moulding, Moulding materials, Cores: Core making materials, types of cores, Core prints 1.5 Gating System – Parts of the gating system – pouring basin, sprue, runner, riser.

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	Course Outcome: CO1 Teaching Hours: 8hrs
2	**Melting furnaces and casting defects** 2.1 Arc furnace: types, operational features, advantages and disadvantages, 2.2Cupola: construction, different zones 2.3working principle, advantages and disadvantages and efficiency of cupola, 2.4Cleaning of casting 2.5Casting defects & Remedies. Course Outcome: CO2 Teaching Hours:8hrs
3	**Welding processes:** 3.1 Concepts, principle, application, advantages and disadvantage of welding process. 3.2 Oxy-acetylene gas welding 3.3Shielded metal arc welding, Electric resistance welding, 3.4Spot, Seam, Projection and Butt welding 3.5 Concept of Brazing and Soldering. Course Outcome: CO3 Teaching Hours: 8 hrs
4	**Introduction and classification of machine tool** 4.1 Basic concept of machining, Tool Nomenclature, different type of tool material, 4.2 Cutting fluid (Classification and purpose), Types of chips 4.3 Orthogonal and Oblique cutting 4.4 Type of Lathe machine, Specification of lathe machine, Type of accessories and attachment used, 4.5 Types of operation which can be performed in Lathe machine. Course Outcome: CO4 Teaching Hours: 8 hrs
5	**Drilling, Shaper, Milling and Planer Machine** 5.1 Classification, specification, type of operations performed in shaper 5.2 drilling and milling machine, 5.3 type of work holding and tool holding mechanism 5.4 up milling and down milling 5.5 types of milling cutter. Course Outcome: CO5 Teaching Hours: 8hrs

E-REFERENCES:

1. Website: http://cgwb.gov.in/Documents/WQ-standards.pdf
2. Smagam/ NPTEL

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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Production Technology	R.K. Jain, Khanna Publisher,17th,2009	81-7409-099-1
2.	Manufacturing Technology	P N Rao, Tata Mcgraw-Hill,2nd,2005	0-07-463180-2
3.	Elements Of Workshop Technology, Vol. I &II	Hazra S. K. And Chaudhary, MEDIA PROMOTERS &PUBLISHERS PVT.LTD.	81-85099-14-6

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	2	3	1	1	1
CO2	2	3	3	2	2	2	3	1	2	1
CO3	2	3	3	2	2	1	2	1	1	1
CO4	2	3	3	2	2	1	3	1	1	1
CO5	2	3	3	2	2	2	3	1	1	1

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UNIVERSITY POLYTECHNIC

B.I.T. MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024 - 25

COURSE: Fluid Mechanics and Hydraulic Machines

PROGRAMME: DIPLOMA							
COURSE CODE: DME 305			COURSE TITLE: Fluid Mechanics & Hydraulic Machines				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

COURSE OBJECTIVE: Students will be able to understand about

1.	To understand the basic principles of fluid mechanics and use appropriate pressure measuring device.
2.	To identify various types of flows and understand about fluid dynamics.
3.	To understand about basics of turbo-machines.
4.	To evaluate the performance of hydraulic turbines.
5.	To understand the functioning and characteristic curves of pumps.

COURSE OUTCOMES: After the completion of this course Students will be able to understand about

CO1	Able to explain the effect of fluid properties on a flow system and measure various pressure using various pressure measuring devices.
CO2	Able to identify type of fluid flow patterns and describe continuity equation.
CO3	Able to draw basics of velocity diagram of turbine.
CO4	To select and analyze an appropriate turbine with reference to given situation in power plants.
CO5	To estimate performance parameters of a given Centrifugal and Reciprocating pump.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Properties of Fluid, Fluid Pressure & Pressure Measurement Properties of Fluid and their units & Dimensional Formula** 1.1Density, Specific gravity, Specific Weight, Specific Volume, Dynamic Viscosity, Kinematic Viscosity, 1.2 Surface tension, Capillarity, Vapour Pressure, Compressibility. **Fluid Pressure & Pressure Measurement:** 1.3 Fluid pressure, Pressure head, Pressure intensity, 1.4 Concept of vacuum and gauge pressures, atmospheric pressure, absolute pressure, 1.5 Hydrostatics law, Simple and differential manometers, Bourdan pressure gauge, Course

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	Outcome: CO1 Teaching Hours: 10 hrs
2	**Fluid Kinematics, Fluid Dynamics and Flow Measurement, Fluid Kinematics** 2.1 Stream line, path line and streak lines and stream tubes, 2.2 Classification of flows- steady & unsteady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows. 2.3 Equation of continuity for one dimensional flow. **Fluid dynamics:** 2.4 Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line, 2.5momentum equation and its application on force on pipe bend. Course Outcome: CO2 Teaching Hours: 10 hrs
3	**Basics of Turbo Machinery** 3.1 Hydrodynamic force of jets on stationary and moving flat, 3.2 inclined and curved vanes, 3.3 jet striking centrally and at tip, velocity diagrams, work done and efficiency, 3.4 flow over radial vanes. Course Outcome: CO3 Teaching Hours: 8hrs
4	**Hydraulic Prime Movers (Turbine) Classification, Principles** 4.1 Hydraulic Turbines: Classification of turbines, Head and efficiency, 4.2 impulse and reaction turbines, Pelton wheel, 4.3 Francis turbine and Kaplan turbine- working principles, work done, efficiencies, hydraulic design. 4.4 Draft tube theory and deficiency. Performance of hydraulic Turbines: 4.5 Geometric similarity, unit and specific quantities, 4.6 characteristic curves, governing of turbines, 4.7 selection of type of turbine, cavitation, surge tank, water hammer. Course Outcome: CO4 Teaching Hours: 6 hrs
5	**Hydraulic Pumps Displacement- Classification, Principles, Performance** 5.1 Centrifugal pumps: classification, working, work done- 5.2 barometric head – losses and efficiencies specific speed –pumps in series and parallel, 5.3 performance characteristic curves, NPSH **Reciprocating pumps:** 5.4Working, Discharge, slip, Indicator Diagram Course Outcome: Teaching Hours: 6 hrs

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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Fluid mechanics& hydraulic Machines	R.K. Bansal, Laxmi Publications, 2019	8131808157,
2.	Fluid mechanics& hydraulic Machines. (in S.I. units)	R.S. Khurmi, S. Chand &Co.Ltd, 2019	978-8121916660
3.	Fluid Mechanics and Fluid Power Engineering	Dr. D.S.Kumar, S.K.Kataria& Sons, 2019	978-93-50143-92-6

E-REFERENCES:

1. Website:www.youtube.com/watch?v=PgKsr2_-oxc&list=PLQooLeRSmIYxEQnPJMptQW-i80kg2ChT6
2. www.youtube.com/watch?v=sA99mw3D2Ds&list=PLQooLeRSmIYxEQnPJMptQW-i80kg2ChT6&index=2
3. www.youtube.com/watch?v=EpbuI6CbMRU&list=PLQooLeRSmIYxEQnPJMptQW-i80kg2ChT6&index=3
4. www.youtube.com/watch?v=YjX_RE0MJp8&list=PLQooLeRSmIYxEQnPJMptQW-i80kg2ChT6&index=4
5. www.youtube.com/watch?v=9bdGZkkHukA&list=PLQooLeRSmIYxEQnPJMptQW-i80kg2ChT6&index=9
6. www.youtube.com/watch?v=B27s0I68dyY&list=PLQooLeRSmIYxEQnPJMptQW-i80kg2ChT6&index=11
7. www.youtube.com/watch?v=8VdNGg6GuT4&list=PLQooLeRSmIYxEQnPJMptQW-i80kg2ChT6&index=12

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	1	1	1
CO2	2	2	2	1	2	2	2	1	1	2
CO3	2	2	2	1	2	1	2	1	1	2
CO4	2	2	2	1	2	1	2	1	1	2
CO5	2	3	2	2	2	2	3	1	1	2

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UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024 - 25

COURSE: Engineering Materials

PROGRAMME: DIPLOMA							
COURSE CODE: DME-307			COURSE TITLE: Engineering Materials				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

Course Objectives: Students will be able to understand about

1.	To gain knowledge of different material crystal structures, arrangement of atoms and mechanical properties
2.	To know different types of fractures and their importance.
3.	To draw TTT curves and Iron carbon diagrams
4.	To select various non-ferrous metals and alloys based on composition and properties for a given application
5.	. To describe various types of composite materials, explain various manufacturing methods of composites and identify the engineering application.

COURSE OUTCOMES: After the completion of this course Students will be able to understand about

CO1	Explain different types of material crystal structures and arrangement of atoms and describe various mechanical properties of materials
CO2	Describe about different types of fractures and their importance in engineering applications.
CO3	Explain the concept of equilibrium diagram & Plot cooling curves and phase diagrams for pure metals and alloys.
CO4	Plot cooling curves and phase diagrams for pure metals and alloys, Draw and Interpret TTT curves and Iron carbon diagram. And explain various heat treatment processes and their importance in engineering field
CO5	Identify various ferrous metals and alloys based on composition and properties for prescribed application, select various nonferrous metals and alloys based on composition and properties for given application

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COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Crystal Structure and Mechanical Behavior:** 1 1.1 Crystal Structure: BCC, FCC and HCP Structures, coordination number and atomic packing factors, crystal imperfections –point, line and surface imperfections. Atomic Diffusion: Phenomenon, Flick's laws of diffusion, factors affecting diffusion. 1.2 Mechanical Behaviour: Stress-strain diagram for ductile and brittle materials, Plastic deformation of single crystal by slip and twinning. Course Outcome: CO1 Teaching Hours: 8 hrs
2	**Fracture** 2.1 Fracture: Type I, Type II and Type III. 2.2 Creep: Description of the phenomenon with examples, three stages of creep, creep properties, stress relaxation. 2.3 Fatigue: Types of fatigue loading with examples, Mechanism of fatigue, fatigue properties, 2.4 fatigue testing and S-N diagram. Course Outcome: CO2 Teaching Hours: 8 hrs
3	**Solidification and Phase Diagram** 3.1 Solidification and Solid Solutions: Mechanism of solidification, Homogenous and Heterogeneous nucleation 3.2 crystal growth, cast metal structures, solid solutions- 3.3 types and rules governing the formation of solid solutions. 3.4 Phase Diagram: Basic terms, phase rule, lever rule, cooling curves 3.5 construction and interpretation of different phase diagrams (eutectic, eutectoid, peritectic and peritectoid) Course Outcome: CO3 Teaching Hours: 8hrs
4	**Heat Treatment** 4.1 Heat Treatment of Metals: TTT curves, continuous cooling curves 4.2, annealing and its types. normalizing, hardening, tempering, martempering, quenching, austempering, hardenability, 4.3 surface hardening methods like carburizing, cyaniding, carbonitriding, 4.4 flame hardening and induction hardening. Course Outcome: CO4 Teaching Hours: 8 hrs
5	**Composite Materials** 5.1 Composite Materials: Definition, classification, 5.2 types of matrix materials & reinforcements, 5.3 fundamentals of production of FRP' and MMC's advantages and application of composites. 5.4 Other Materials: Brief description of other materials such as optical and thermal materials Smart materials 5.5 fibre optic materials, piezo-electrics, shape memory alloys Shape Memory Alloys 5.6 Nitinol, super elasticity, biological applications of smart materials Course Outcome: CO5 Teaching Hours: 8 hrs

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REFERENCE BOOKS:

S. N.	Title	Author	ISBN
1.	Foundations of Materials Science and Engineering.	Smith,	McGraw Hill,2009
2.	, Materials Science, Pearson Publication – 2007.	Shackleford., & M. K. Muralidhara	Pearson Publication-2007
3.	Materials Science and Engineering,	Raghavan	PHI,2002

E-REFERENCES:

1https://nptel.ac.in/courses/112103019/

2. https://nptel.ac.in/syllabus/112106075/

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	1	1	2
CO2	2	2	2	1	2	2	2	2	2	2
CO3	2	2	2	1	2	1	2	1	1	2
CO4	2	2	2	1	2	1	2	1	1	2
CO5	2	3	2	2	2	2	3	1	2	2

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UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024- 25

COURSE: Thermal Engineering Lab

PROGRAMME: DIPLOMA							
COURSE CODE: DME 302				COURSE TITILE: THERMAL ENGINEERING LAB			
COMPULSORY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOUR/WEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	60	40	100

COURSE OBJECTIVES: Students will be able to understand about

1	To know the two-stroke engine and four stroke engines.
2	To know the different types of boilers.
3	To know the concept of bio-gas plant.
4	To know the concept different types of compressors.
5	To know the concept of refrigeration and air conditions.

COURSE OUTCOME: After the completion of this course Students will be able to understand about

CO1	To find the basic difference of 2-stroke and 4-stroke S.I. & C.I. engine.
CO2	To know the working difference of the fire tube and water tube boiler.
CO3	To know the working process of the bio-gas plant.
CO4	To know the working process of the compressors.
CO5	To know the concept of refrigeration and air conditions.

COURSE CONTENT DETAILS:

List of Experiments	Topics
1	Study of 2-stroke S.I. and C.I. Engine
2	Study of 4-stroke S.I. and C.I. Engine
3	Study of Lancashire boiler
4	Study of Babcock and Wilcox boiler.
5	Study of Bio-gas plant.
6	Study of single stage compressor.
7	Study of multistage compressor.
8	Study of Refrigeration and Air conditioning.

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TEXT BOOKS:

1. Engineering Thermodynamics: - R.K. Rajput.
2. Thermal Engineering: - P.L. Ballaney.
3. Engineering Thermodynamics: - Arora &Domkundwar
4. Engineering. Thermodynamics: - Dr. D.S. Kumar

REFERENCE BOOKS:

S.No	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Engineering Thermodynamics	. Nag, P.K, Tata McGraw-Hill Publishing Co. Ltd.,1995	81-318-0058-x,13-97-25-906256-8,10-1-25-9062-56-2
2	Engineering Thermodynamics	R.K. Rajput	81-318-0058-x

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	3	3	3	3	3	1	2
CO2	2	2	2	3	3	3	3	1	1	2
CO3	2	2	2	3	3	3	3	1	1	2
CO4	2	2	2	3	3	3	3	1	1	2
CO5	2	2	2	3	3	3	3	1	1	2

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UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024-25

COURSE: MANUFACTURING PROCESS LAB

PROGRAMME: DIPLOMA							
COURSE CODE: DME 304			COURSE TITLE: Manufacturing Process Lab				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	3	1	60	40	100

Course Objectives: Students will be able to understand about

1.	Get familiar with Lathe machines
2.	Get familiar with Drilling machines
3.	Get familiar with Shaper machines
4.	Get familiar with Milling machines
5.	To familiarize with working on all machine

Course Outcome: After the completion of this course Students will be able to understand

CO1	working principle, classification and specification of lathe machine.
CO2	working principle classification and specification of Drilling machine
CO3	working principle classification and specification Shaper machine
CO4	working principle classification and specification Milling machine
CO5	How to work on different kinds of machine

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Experiments:** 1. Identification and Specification of Lathe machine. 2. To perform different types of center lathe operation on job as per given dimensions. Course Outcome: CO1 Teaching Hours: 4 hrs
2	3. Identification and Specification of Drilling machine. 4. To perform different types of drilling operation on job as per given dimensions. Course Outcome: CO2 Teaching Hours: 2 hrs
3	5. Identification and Specification of Shaper machine. 6. To perform different types of shaping operations on job as per given dimensions. Course Outcome: CO3 Teaching Hours: 3 hrs
4	7. Identification and Specification of Milling machine.

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	8. To perform different types of milling operations on job as per given dimensions. Course Outcome: CO4 Teaching Hours: 3 hrs
5	**Drilling, Shaper and Milling Machine:** To make a job like (nut & bolt) using all the above four machines Course Outcome: CO5 Teaching Hours: 4 hrs

REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Elements of Workshop Technology, Vol. I & II	Hazra S. K. and Chaudhary, Media Promoters & Publishers Pvt.Ltd.	81-85099-14-6
2.	Workshop Technology	B.S.Raghuwanshi; Dhanpat Rai & Co. Pvt. Ltd	B01N4OZAJ0

E-REFERENCES:

1. https://youtu.be/gPaBULgRRuM?si=KQx2k1BJBOJRpjzF
2. https://youtu.be/KgQyuCrOKoU?si=iDg0pItHvcFoql36
3. https://youtu.be/YXP_jJNhTdI?si=BdSek6RaGcJIBasd

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	3	3	3	3	1	1	1
CO2	2	2	2	3	3	3	3	1	1	1
CO3	2	2	2	3	3	3	3	1	1	1
CO4	2	2	2	3	3	3	3	1	1	1
CO5	2	2	2	3	3	3	3	1	1	2

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UNIVERSITY POLYTECHNIC

B.I.T. MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024-25

COURSE: Fluid Mechanics and Hydraulic Machines Lab

PROGRAMME: DIPLOMA							
COURSE CODE: DME 306			COURSE TITLE: Fluid Mechanics & Hydraulic Machines Lab.				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
0	0	3	3	1.5	60	40	100

Course Objectives: Students will be able to understand about

1.	To understand the basic principles of fluid mechanics and use appropriate pressure measuring device.
2.	To identify various types of flows and understand about fluid dynamics.
3.	To understand about basics of turbo-machines.
4.	To evaluate the performance of hydraulic turbines.
5.	To understand the functioning and characteristic curves of pumps.

COURSE OUTCOMES: After the completion of this course Students will be able to understand about

CO1	Able to understand about relation between pressure and velocity for steady flow.
CO2	Learn about flow measuring devices.
CO3	Learn about head loss due to friction in different diameters of pipes.
CO4	To learn about basic concept of water power.
CO5	To learn about pump and turbine.

COURSE CONTENT DETAILS: Experiments

S. No.	TOPICS
1	Verification of Bernoulli's theorem.
2	Estimate Reynolds number using given test rig.
3	Determination of Coefficient of Discharge of Venturi meter.
4	Determination of Coefficient of Discharge, coefficient of contraction and coefficient of velocity of Orifice meter.
5	To determine Cc, Cv and Cd for different types of orifices and mouth pieces.
6	To determine loss of head due to: Friction in pipes of different diameters.
7	Determination of force exerted by the jet of water on the given vane.
8	To determine overall efficiency of centrifugal pump
9	To determine overall efficiency of reciprocating pump.
10	To determine overall efficiency of Pelton wheel.
11	To determine overall efficiency of Francis/Kaplan turbine

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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Fluid mechanics& hydraulic Machines	R.K. Bansal, Laxmi Publications, 2019	8131808157,
2.	Fluid mechanics& hydraulic Machines. (in S.I. units)	R.S. Khurmi, S. Chand & Co. Ltd, 2019	978-8121916660
3.	Fluid Mechanics and Fluid Power Engineering	Dr. D.S. Kumar, S.K. Kataria & Sons, 2019	978-93-50143-92-6

E-REFERENCES:

1. Website: www.youtube.com/watch?v=oVgVcA6G-94
2. www.www.youtube.com/watch?v=pae5WrmDzUU
3. www.youtube.com/watch?v=itBtboWKKYY
4. www.youtube.com/watch?v=iRdJHPFVHwM.
5. www.youtube.com/watch?v=Y5k4vxoztFo.
6. www.youtube.com/watch?v=f83D4h2LN4I&t=258s.
7. www.youtube.com/watch?v=dD09FCI75HI.
8. www.youtube.com/watch?v=f27nzn_Whw0.
9. www.youtube.com/watch?v=7-k7KRkYQ94.
10. www.youtube.com/watch?v=BZ9WHt-CSv0.
11. www.youtube.com/watch?v=fZMuMT0npfQ.

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	{SO3
CO1	2	2	2	1	2	1	3	1	1	1
CO2	2	2	2	1	2	2	2	1	1	1
CO3	2	2	2	1	2	1	2	1	1	1
CO4	2	2	2	1	2	1	2	2	1	2
CO5	2	3	2	2	2	2	3	1	1	3

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UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2024-25

COURSE: Machine Drawing

PROGRAMME: DIPLOMA							
COURSE CODE: DME-308			COURSE TITLE: Machine Drawing				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
0	0	3	3	1.5	60	40	100

Course Objectives: Students will be able to understand about

1.	To understand and apply national standards while drawing machine components based on BIS
2.	To understand the conventions, abbreviations, and symbols to be followed by Engineers for making assembly drawings
3.	To make the students to understand sectioning, concept of limits, fits and tolerances used for component design.
4.	To understand surface texture, riveted joints, welded joints and keys and To know various thread forms and its engineering applications
5.	To make the students learn to draw the assembly, orthographic and sectional views of various machine components and to interpret the assembly drawing

COURSE OUTCOMES: After the completion of this course Students will be able to understand about

CO1	Identify the national standards related to the machine drawing based on BIS and applying the standards.
CO2	Analyse limits and tolerances for assembly and evaluate to choose appropriate fits for the assembly.
CO3	Understand and apply surface finish and sectional views.
CO4	Assemble machine components through drawings.
CO5	Interpret the machine components and conventions used in the drawing.

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COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Conventions, Abbreviations and Symbols** Conventional representation of shaft, hollow shaft, bar 1.1 Conventional representation of common machine elements such as threads, slotted head, bearings, straight and diamond knurling, holes on a linear and circular pitch, helical spring, leaf spring 1.2 . Abbreviations for iron, carbon steel, alloy steel 1.3 Abbreviations for across corners, across flats, assembly, bearing, centre of gravity, 1.4 counterbore, countersunk, insulation, nominal, pitch circle diameter, tolerance, undercut. Course Outcome: CO1 Teaching Hours: 8hrs
2	**Sectional View** 2.1 Full section, half section, partial or local section, revolved or superimposed section, removed section, successive section, parts that are not sectioned. 2.2Identify the different sections in the assembly. 2.3Machine parts not sectioned: In principle: shafts, handles, bolts, studs, screws, washers, nuts, rivets, keys, pins, gib, cotters, webs, stiffening ribs, spokes, arms, teeth of gears, bearings etc. Course Outcome: CO2 Teaching Hours: 8hrs
3	**Limits, Fits and Tolerances** 3.1 Definitions: Limits, Fits and Tolerances - Upper limit, lower limit, tolerance, deviation, upper deviation, lower deviation, 3.2 tolerance zone - Standard tolerance grades, 3.3 Computation of IT tolerance using formulae and tables, 3.4 Fundamental deviation - Computation of fundamental deviation, 4.5 System of fits - Clearance fit - Interference fit - Transition fit - Problems on clearance and interference fit on shaft and hole basis system**.** Course Outcome: CO3 Teaching Hours: 8 hrs
4	**Surface Texture** 4.1 Nominal surface - Roughness - Waviness - Lay - Sampling length, 4.2 Indication of surface roughness by roughness values, roughness grade number, 4.3 roughness symbols - Indication of surface roughness by surface texture symbol with all the characteristics Course Outcome: CO4 Teaching Hours: 8 hrs
5	**Assembly Drawing (using mini drafter) for the Following with Part Drawing given** 5.1 Assembly and part drawings of simple assemblies and sub-assemblies of machine parts viz., couplings, clutches, bearings, gear assemblies, I.C. Engine components, valves, machine tools, 5.2 Preparation of assembled views from exploded views for the following components: Cotter joint with sleeve, screw jack, snug type pedestal bearing, swivel bearing, tail stock. Course Outcome: CO5 Teaching Hours: 8 hrs

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REFERENCE BOOKS:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	N. D. Bhatt, Machine Drawing,	N.D Bhatt, Charotar Publishing House Pvt, Ltd. 2020	BOC2H7CDW
2.	K.L Narayana	New Age International publishers –2020 – 4th Edition	
3.	P.S Gill	S.K Kataria & Sons	9350144166

E-REFERENCES:

1. https://nptel.ac.in/courses/112103019/
2. **https://www.tandfonline.com/**

Mapping of Course Outcomes onto Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	1	1	1
CO2	2	2	2	1	2	2	2	1	3	2
CO3	2	2	2	1	2	1	2	1	3	2
CO4	2	2	2	1	2	1	2	1	2	2
CO5	2	3	2	2	2	2	3	1	3	3