COURSE STRUCTURE (DIPLOMA IN MECHANICAL ENGINEERING)

Third Semester

S.N.	Subject Code	Segment	Subject	L	T	P	Credit
1	DME 301	PC	Thermal Engineering	3	0	0	3
2	DME 303	PC	Manufacturing Process	3	0	0	3
3	DME 305	PC	Fluid Mechanics & Hydraulic Machines	3	0	0	3
4	DME 307	PC	Mechanical Engineering Materials	3	0	0	3
5	DME 302	PC	Thermal Engineering Lab.	0	0	2	1
6	DME 304	PC	Manufacturing Process Lab.	0	0	2	1
7	DME306	PC	Fluid mechanics & Hydraulic M/C Lab	0	0	3	1.5
8	DME 308	PC	Machine Drawing	0	0	3	1.5
9	DHS 301	HS	Universal Human Values-II	3	0	0	3
10	DSE351	Summer Internship	Internship	0	0	0	0
			Periods per week	15	0	10	-
			Total credits	-	-	-	20
			Total periods per week	-	-	-	25

UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2023

COURSE (Thermal Engineering)

PROGRAMME: DIPLOMA							
COURSE CODE: DME 301			COURSE TITILE: THERMAL ENGINEERING				
COMPULSARY / OPTIONAL: COMPULSARY							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURE/WEEK	CREDIT	PE	FINAL	TOTAL
3	1	0	3	3	50	50	100

RATIONALE: This course enables the students to

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

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	**TITILE: 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, 1.6 Properties of steam, Sensible and latent heat. 1.7 Modes of Heat Transfer, introductory concepts of Conduction convection and Radiation Course Outcome: CO1 Teaching Hours: 8 hrs
2	**TITILE: 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	**TITILE: 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	**TITILE: Boilers and Principles of Steam Turbine and Nozzle** 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	**TITILE: Thermodynamic Cycles (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

REFERENCE BOOKS:

S.No	Author, Publisher, Edition and Year of publication	ISBN
1	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	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	3	1	2
CO2	2	2	2	2	2	2	2	3	1	2
CO3	2	3	3	2	2	2	1	2	1	3
CO4	3	1	1	2	2	2	2	2	1	3
CO5	3	3	2	2	2	2	2	2	1	3

31/05/24

UNIVERSITY POLYTECHNIC

B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2023

COURSE: DME 302Thermal Engineering Lab

PROGRAMME: DIPLOMA							
COURSE CODE: DME 302				COURSE TITILE: THERMAL ENGINEERING LAB			
COMPULSARY / 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

RATIONALE: This course enables the students to

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

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

CO1	Differentiate between 2-stroke and 4-stroke S.I. & C.I. engine.
CO2	Differentiate between working principle of the fire tube and water tube boiler.
CO3	Discuss the working process of the bio-gas plant.
CO4	Discuss the working process of the compressors.
CO5	Interpret 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.

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

31/05/24

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2023

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	-	-	3	3	50	50	100

RATIONALE: This course enables the students to

1.	Understand basic ideas about foundry, pattern and its kinds.
2.	Describe different types of furnaces and casting defects.
3.	Understand different welding processes.
4.	Understand different types of tool materials, cutting fluid and lathe machines.
5.	Draw and describe shaper, milling and drilling machines.

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

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

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE: Foundry, Sand Moulding & Core making** 1.1: Introduction to foundry, advantages and disadvantages, Pattern: pattern

	making, Type of patterns, pattern materials ,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 CO2 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. Course Outcome: CO1 Teaching Hours: 8 hrs
2	**TITLE: Melting furnaces and casting defects** 2.1 Arc furnace: types, operational features, advantages and disadvantages, 2.2 Cupola: construction, different zones 2.3 working principle, advantages and disadvantages and efficiency of cupola, 2.4 Cleaning of casting 2.5 Casting defects & Remedies. Course Outcome: CO2 Teaching Hours: 8 hrs
3	**TITLE: Welding processes:** 3.1 Concepts, principle, application, advantages and disadvantage of welding process. 3.2 Oxy-acetylene gas welding 3.3 Shielded metal arc welding, Electric resistance welding, 3.4 Spot, Seam, Projection and Butt welding 3.5 Concept of Brazing and Soldering. Course Outcome: CO3 Teaching Hours: 8 hrs
4	**TITLE: 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	**TITLE: Drilling, Shaper, Milling and Planer Machine:** 5.1 Classification, specification, type of operations performed in shaper and Planer 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: 8 hrs

TEXT 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

REFERENCE BOOKS:

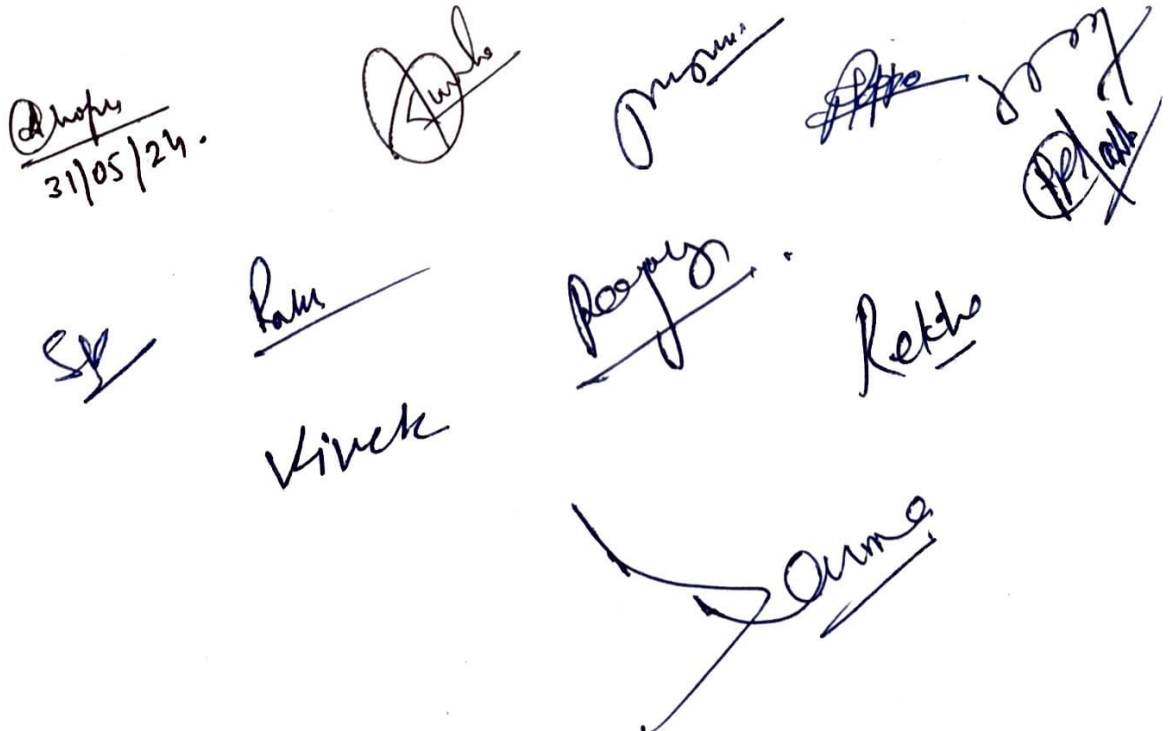
1.	Workshop Technology	S K Garg; Laxmi Publications Pvt. Ltd.	**978-8131806975**
2.	Basic Manufacturing Process	V Kapoor; Galgotia Publications Pvt.Ltd.	81-7515-467-5

E-REFERENCES:

1. https://www.youtube.com/watch?v=6ISddRRHAhA&list=PLSGws_74K01_y_JH5qBvFc-FkFknUILWl

Mapping of Course Outcomes onto Program Outcomes

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



UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2023

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
-	-	2	2	1	60	40	100

RATIONALE: This course enables the students to

1.	Familiarize with Lathe machines
2.	Familiarize with Drilling machines
3.	Familiarize with Shaper machines
4.	Familiarize with Milling machines
5.	Familiarize with working on all machine

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

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

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**Experiments:** a. Identification and Specification of Lathe machine. b. To perform different types of centre lathe operation on job as per given dimensions.

	Course Outcome: CO1 Teaching Hours: 4 hrs
2	a. Identification and Specification of Drilling machine. b. To perform different types of drilling operation on job as per given dimensions. Course Outcome: CO2 Teaching Hours: 2 hrs
3	a. Identification and Specification of Shaper machine. b. To perform different types of shaping operations on job as per given dimensions. Course Outcome: CO3 Teaching Hours: 3 hrs
4	a. Identification and Specification of Milling machine. b. To perform different types of milling operations on job as per given dimensions. Course Outcome: CO4 Teaching Hours: 3 hrs
5	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
3.	Manufacturing Practice	Swarn Singh; S.K.Kataria & Sons;Second:2011	978-93-5014-161-8

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

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UNIVERSITY POLYTECHNIC
B.I.T. MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2023

COURSE (DME 305 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		-	3	3	50	50	100

RATIONALE: This course enables the students to

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 turbomachines.
4.	To evaluate the performance of hydraulic turbines.
5.	To understand the working principle of pumps.

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

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 Rotodynamic, Reciprocating and Rotary Positive Displacement Pumps.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE: Properties Of Fluid, Fluid Pressure & Pressure Measurement** **Properties Of Fluid and their Unit and Dimensional Formula:** Density, Specific gravity, Specific Weight, Specific Volume, Dynamic Viscosity,

	Kinematic Viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility. **Fluid Pressure & Pressure Measurement:** Fluid pressure, Pressure head, Pressure intensity, Concept of vacuum and gauge pressures, atmospheric pressure, absolute pressure, Hydrostatics law, Simple and differential manometers, Bourdan pressure gauge, Concept of Total pressure on immersed bodies, centre of pressure. Course Outcome: CO1 Teaching Hours: 8 hrs
2	**TITLE: Fluid kinematics, Fluid dynamics and flow measurement** **Fluid Kinematics:** Stream line, path line and streak lines and stream tubes, classification of flows- steady & unsteady, uniform & non uniform, laminar & turbulent, rotational & irrotational flows – Equation of continuity for one dimensional flow. **Fluid dynamics:** Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend. Course Outcome: CO2 Teaching Hours: 8 hrs
3	**TITLE: Basics of Turbo Machinery** Impulse Momentum Principle, Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes. Course Outcome: CO3 Teaching Hours: 8 hrs
4	**TITLE: Hydraulic prime movers (Turbine) Classifications, Principles.** Hydraulic Turbines: Classification of turbines, Head and efficiency, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working principles, work done, efficiencies. Draft tube theory and efficiency. Performance of hydraulic Turbines: Geometric similarity, unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer. Course Outcome: CO4 Teaching Hours: 8 hrs
5	**TITLE: Hydraulic Pumps - Classifications, Principles, Performance.** Rotodynamic pumps – Centrifugal Pumps: Impeller classification, working, pressure developed by the Impeller – losses and efficiencies specific speed –pumps in series and parallel, performance characteristic curves, NPSH Axial flow pump: **Reciprocating pumps:** Working, Discharge, slip, Indicator Diagram. **Rotary Positive Displacement Pump: -** Gear Pump, Lobe Pump, Vane Pump Course Outcome: CO5 Teaching Hours: 8 hrs

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:

Website:

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

UNIVERSITY POLYTECHNIC
B.I.T. MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2023

COURSE (DME 306 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
-	-	3	3	1.5	60	40	100

RATIONALE: This course enables the students to

1.	Understand the basic principles of fluid mechanics and use appropriate pressure measuring device.
2.	Identify various types of flows and understand about fluid dynamics.
3.	Understand about basics of turbomachines.
4.	Evaluate the performance of hydraulic turbines.
5.	Understand the functioning and characteristic curves of pumps.

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

CO1	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	Explain basic concept of water power.
CO5	Explain about pump and turbine.

COURSE CONTENT DETAILS:

List of Experiments	TOPICS

1	Verification of Bernoulli's theorem.
2	Estimate Reynolds number using given test rig.
3	Determination of Coefficient of Discharge of Venturimeter.
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	To 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

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:

Website:

1. 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	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	3	2	2

CO2	2	2	2	1	2	2	2	3	2	3
CO3	2	2	2	1	2	1	2	3	2	2
CO4	2	2	2	1	2	1	2	3	2	3
CO5	2	3	2	2	2	2	3	3	3	3

UNIVERSITY POLYTECHNIC
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SYLLABUS (CBCS)-2023

COURSE (Engineering Materials)

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

RATIONALE: This course enables the students to

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

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

CO1	Explain different types of material crystal structures and arrangement of atoms and describe various mechanical properties of materials
CO2	Discuss 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	Demonstrate 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

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE: Crystal Structure and Mechanical Behaviour** 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	**TITLE: Fracture** Fracture: Type I, Type II and Type III. Creep: Description of the phenomenon with examples, three stages of creep, creep properties, stress relaxation. Fatigue: Types of fatigue loading with examples, Mechanism of fatigue, fatigue properties, fatigue testing and S-N diagram. Course Outcome: CO2 Teaching Hours: 8 hrs
3	**TITLE: solidification and Phase Diagram** 3.1Solidification and Solid Solutions: Mechanism of solidification, Homogenous and Heterogeneous nucleation, crystal growth, cast metal structures, solid solutions-types and rules governing the formation of solid solutions. 3.2 Phase Diagram: Basic terms, phase rule, lever rule, cooling curves, construction and interpretation of different phase diagrams (eutectic, eutectoid, peritectic and peritectoid) Course Outcome: CO3 Teaching Hours: 8 hrs
4	**TITLE: Heat Treatment** Heat Treatment of Metals: TTT curves, continuous cooling curves, annealing and its types. normalizing, hardening, tempering, martempering, quenching, austempering, hardenability, surface hardening methods like carburizing, cyaniding, carbonitriding, flame hardening and induction hardening. Course Outcome: CO4 Teaching Hours: 8 hrs
5	**TITLE: Composite Materials** Composite Materials: Definition, classification, types of matrix materials & reinforcements, fundamentals of production of FRP' and MMC's advantages and application of composites. Other Materials: Brief description of other materials such as optical and thermal materials Smart materials – fibre optic materials, piezo-electrics, shape memory alloys Shape Memory Alloys – Nitinol, super elasticity, Biological applications of smart materials – Course Outcome: CO5 Teaching Hours: 8 hrs

REFERENCE BOOKS:

S. N.	Title	Author	ISBN
1.	Foundations of Materials Science	Smith,	McGraw Hill,2009

	and Engineering.		
2.	Materials Science, Pearson Publication – 2007.	Shackleford., & M. K. Muralidhara	Pearson Publication-2007
3.	Materials Science and Engineering,	Raghavan	PHI,2002

E-REFERENCES:

2. https://nptel.ac.in/courses/112103019/
3. **https://nptel.ac.in/syllabus/112106075/**

Mapping of Course Outcomes onto Program Outcomes

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

UNIVERSITY POLYTECHNIC
B.I.T., MESRA – 835215 (RANCHI)

SYLLABUS (CBCS)-2023

COURSE (Machine Drawing)

PROGRAMME: DIPLONA (Mechanical)							
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
-	-	3	3	1.5	60	40	100

RATIONALE: This course enables the students to

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

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

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.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE:** CONVENTIONS, ABBREVIATIONS AND SYMBOLS Conventional representation of shaft, hollow shaft, bar - 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 -. Abbreviations for iron, carbon steel, alloy steel - Abbreviations for across corners, across flats, assembly, bearing, centre of gravity, counterbore, countersunk, insulation, nominal, pitch circle diameter, tolerance, undercut. Course Outcome: CO1 Teaching Hours: 3 hrs
2	**TITLE: SECTIONAL VIEWS** 2.1 Full section, half section, partial or local section, revolved or superimposed section, removed section, successive section, parts that are not sectioned. 2.2 Identify the different sections in the assembly. 2.3 Machine 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: 3 hrs
3	**TITLE: LIMITS, FITS AND TOLERANCES** Definitions: Limits, Fits and Tolerances - Upper limit, lower limit, tolerance, deviation, upper deviation, lower deviation, tolerance zone - Standard tolerance grades - Computation of IT tolerance using formulae and tables - Fundamental deviation - Computation of fundamental deviation - 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: 3 hrs
4	**TITLE: SURFACE TEXTURE** Nominal surface - Roughness - Waviness - Lay - Sampling length - Indication of surface roughness by roughness values, roughness grade number, roughness symbols - Indication of surface roughness by surface texture symbol with all the characteristics Course Outcome: CO4 Teaching Hours: 3 hrs
5	**TITLE: ASSEMBLY DRAWING (USING MINI-DRAFTER) FOR THE FOLLOWING WITH PART DRAWINGS 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

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.	BOC2H7CDW

		2020	
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	P3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	3	2	2	3
CO2	2	2	2	1	2	2	2	3	2	2
CO3	2	2	2	1	2	1	2	3	3	3
CO4	2	2	2	1	2	1	2	2	3	3
CO5	2	3	2	2	2	2	3	3	3	3