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Programme: Diploma in Mechanical Engineering(DME) **Semester: IV** **Implemented from: 2017**

COURSE CODE	COURSE	GR	TEACHING SCHEME				EXAMINATION SCHEME												TOTAL MARKS
			L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR*		OR*		TW		
								Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
174MA41	Mathematics- IV	B	3	0	0	3	3	80	32	20	100	40	-	-	-	-			100
174ME42	Measurements and Control	C	3	0	2	5	3	80	32	20	100	40	-	-	25	10	25	10	150
174ME43	Thermodynamics and Heat Transfer	C	4	0	2	6	3	80	32	20	100	40	25	10	-	-	25	10	150
174ME44	Manufacturing Processes-II	C	4	0	0	4	3	80	32	20	100	40	-	-					100
174ME45	Fluid Mechanics & Machinery	C	4	0	2	6	3	80	32	20	100	40	25	10	-	-	25	10	150
174ME46	Machine Drawing-II	C	2	0	4	6	-	-	-	-	-	-	100	40	-	-	50	20	150
174ME47	Machine Shop Practice-II	C	0	0	3	3	-	-	-	-	-	-	50	20	-	-	50	20	100
	TOTAL		**20**	**0**	**13**	**33**		**400**	-	**100**	**500**	-	**200**	-	**25**	-	**175**	-	**900**

Abbreviations: B – Basic; C – Core; A – Applied; M – Management; L – Theory Lecture; T – Tutorial; P – Practical; TH – Theory Paper; IST – In-Semester Test; PR – Practical Exam; OR – Oral Exam; TW- Term Work; GR – Grade; CR - Credits

*Assessment by Internal and External Examiners

NOTE: a) During Summer Break after IV semester (i.e. between IV and V Semester), students have to undergo mandatory 6 weeks industrial training in large or medium scale industries relevant to the branch or discipline of engineering. This training would be evaluated during V semester.

b) Students have to prepare report of training, which will be evaluated during V semester.

Curriculum Coordinator

Head
Diploma in Mechanical Engineering.

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI-19

Dean - Diploma

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: FOURTH
COURSE TITLE	: MATHEMATICS IV
COURSE CODE	: 174MA41

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	-	3	3	80	32	20	100	40	-	-	-	-	-	-	100

Course Objectives:

1. To impart knowledge of hyperbolic functions, successive differentiation, Mean value theorems, expansions of functions and L'Hospital rule.

2.To expose students to the techniques of solving differential equations.

Course Outcomes:

Student should be able to

CO1	Use hyperbolic functions and successive derivatives to solve the problems.
CO2	Apply mean value theorems and expansions of functions in various engineering problem
CO3	Apply L'Hospital rule in various engineering problems
CO4	Use different methods to solve first ordered and higher ordered differential equations.

Course Content:

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
1		**Hyperbolic Functions :**	2	6	1	50%	40%	10%
	1.1	Definition of hyperbolic functions						
	1.2	Problems based on definitions.						
2		**Successive Differentiation :**	8	9	1	50%	40%	10%
		n^{th} ordered derivatives of: x^m, $(ax+b)^m$, $\frac{1}{ax+b}$, $\frac{1}{(ax+b)^m}$, $\log(ax+b)$, e^{mx}, a^{mx}, $\sin(ax+b)$, $\cos(ax+b)$						
3		**Mean Value Theorems :**	4	8	2	50%	40%	10%
	3.1	Rolle's M.V.T.						
	3.2	Lagranges M.V.T.						
	3.3	Verify theorem type Problems						
4		**Expansions of functions**	6	8	2	50%	40%	10%
	4.1	Maclaurin's series						
	4.2	Expansions of : e^x, $\sin x$, $\cos x$, $\tan x$, $\sinh x$, $\cosh x$, $\tanh x$, $\log(x+1)$, $(1+x)^m$						
	4.3	Problems based on the formulae						
5		**Indeterminate forms :**	4	9	3	50%	40%	10%
	5.1	L'Hospital rule (without proof)						
	5.2	Problems based on the rule						

SECTION-II								
Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
		Differential Equations:						
6		**First ordered differential equations :**	12	20	4	40%	40%	20%

	6.1	Order and degree of the differential equation.						
	6.2	Formation of differential equations.						
	6.3	Solution of differential equation of first order, first degree.						
		6.3.1 Variable separable method.						
		6.3.2 Reducible to variable separable Method						
		6.3.3 Homogeneous differential equation						
		6.3.4 Exact differential equation.						
		6.3.5 Introduction of integrating factor.						
		6.3.6 Linear differential equation.						
		6.3.7 Bernoulli's differential equation.						
7		**Higherordered differential equations**	12	20	4	40%	40%	20%
	7.1	Solution of Linear differential equations of higher order with constant coefficients.						
		7.1.1 Complementary function						
		7.1.2 Particular integral of e^{ax}, $\sin ax$, $\cos ax$, x^n, $e^{ax}V$, xV						
	7.2	Applications of differential equations.						

Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

List of Assignments :

Sr. No.	Unit	Practical/Assignment	CO
1	1	Hyperbolic Functions,	1
2	2	Successive Differentiation	1
3	3	Mean Value Theorems	2
4	4	Expansions of functions	2
5	5	Indeterminate forms :	3
6	6	Order, degree and formation of the differential equation.	4

7	6	Solution of differential equation of first order, first degree.	4
8	7	Complementary function	4
9	7	Particular integral	4

Reference books :

Sr. No.	Author	Title	Publisher and Edition
1	G. V. Kumbhojkar	Applied Mathematics I	Jamnadas& Co.
2	G. V. Kumbhojkar	Applied Mathematics II	Jamnadas& Co.
3	S. P. Deshpande	Mathematics for Polytechnic	Pune VidyarthiGriha Prakashan.
4	H.K.Dass	Advanced Engineering Mathematics	S.Chand& Company Ltd. Delhi
5	Dr.B.S.Grewal	Higher Engineering Mathematics	Khanna Publishers Delhi

Curriculum Coordinator **Head** **Dean - Diploma**

Diploma in Mechanical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: FOURTH
COURSE TITLE	: MEASUREMENTS & CONTROL
COURSE CODE	: 174ME42

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME												
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	5	3	80	32	20	100	40	-	-	25	10	25	10	150

Course Objectives:

- To understand principles and working of different measuring instruments
- To impart knowledge of architecture of the measurement system
- To deliver working principle of mechanical measurement system
- To study concept of mathematical modeling of the control system
- To acquaint with control system under different time domain

Course Outcomes:

Student should be able to

CO 1	To define terms used to explain features of machine components
CO 2	To list / name different types of machine parts, assemblies etc
Co 3	To imagine shapes and sizes of components and draw 3-D views.
CO 4	To imagine and Assemble the given set of components to form a workable machine assembly.

Course Content:

SECTION–I								
Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
1	1.1	**Significance of measurement,** classification of instruments.	10	14	1	20	40	40
	1.2	static terms and characteristics- range and span, accuracy and precision, reliability, Calibration, hysteresis and dead zone, drift, sensitivity, threshold and resolution, repeatability and reproducibility, linearity.						
	1.3	**Dynamic characteristics-** speed of response, fidelity and dynamic errors, overshoot.						
	1.4	**Measurement of error-** classification of errors, environmental errors, signal transmission errors, observation errors, operational errors.						
	1.5	**Transducers** : Classification of transducers- active and passive, resistive, inductive, capacitive, piezo, resistive, thermo resistive Specification, selection and application for pressure, temperature, flow, humidity, displacement, velocity, force,strain, sound .						
2	2.1	**Displacement measurement** Potentiometer, LVDT, Eddy current generation type, tachometer, incremental and absolute type.	7	12	2	20	40	40
	2.2	**Speed measurement** - Mechanical Tachometers, Revolution counter & timer, Slipping Clutch Tachometer, Electrical Tachometers, Eddy current Drag Cup Tachometer, Magnetic and photoelectric pulse counting methods, Contactless Electrical tachometer, Inductive Pick Up, Capacitive Pick Up, Stroboscope.						

3	3.1	**Temperature measurements-** Non-electrical methods- bimetal and liquid in glass thermometer, pressure thermometer Electrical methods- RTD, platinum resistance thermometer, thermistor, Thermoelectric methods- elements of thermocouple, law of intermediate temperature, law of intermediate metals, thermo emf measurement. Quartz thermometer, Pyrometers- radiation and optical.	7	12	2	20	40	40

SECTION–II

Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
4	4.1	**Control systems** Block diagram of automatic control system, closed loop system, open loop system, feed back control system, feed forward control system.	10	14	3	30	30	40
	4.2	Servomotor mechanism						
	4.3	Comparison of hydraulic, pneumatic, electronic control systems, proportional control action.						
	4.4	Applications of measurements and control for setup for boilers, air conditioners, motor speed control.						
5.	5.1	**Flow measurements-** Variable head flow meters, variable area meter-Rota meter, turbine meter.	07	12	2	30	30	40
	5.2	**Anemometer-** hot wire and hot film, electromagnetic flow meter, ultrasonic flow meter.						
	5.3	**Strain Measurement-** Stress-strain relation, types ofstrain gauges, strain gauge materials, resistance strain gauge- bonded andunbounded, types (foil, semiconductor, wire wound gauges), selectionand installation of strain gauges load cells, rosettes.						
6	6.1	**Miscellaneous Measurement**	07	16	2	20	40	40
	6.2	Acoustics measurement- sound characteristics – intensity, frequency,						

		pressure, power – sound level meter, piezoelectric crystal type.						
	6.3	Humidity measurement –hair hygrometer, Humistor hygrometer.						
	6.4	Liquid level measurement – direct and indirect methods.						
	6.5	Force measurement -Tool Dynamometer (Mechanical Type) Shaft Power Measurement - Eddy Current Dynamometer, Strain Gauge Transmission Dynamometer.						
Legends: R- Remember, U – Understand, A – Apply								

List of Practicals/Assignments/Tutorials:

Sr. No.	Practical/Assignment
1.	Measurement of strain by using a basic strain gauge and hence verify the stress induced.
2.	Speed Measurement by using Stroboscope.
3.	Measuring Position and Displacement with LVDT.
4.	Measuring Angle with RVDT.
5.	Measurement of flow by using rotameter.
6.	Temperature control using Thermal Reed switch & Bimetal switch.
7.	Temperature calibration by using Thermocouple.
8.	Determination of negative temperature coefficient and calibration of a thermister
9.	Measurement of force & weight

Students shall submit journal containing term work, practicals, assignments based on syllabus.

Text Books:

Sr. No.	Author	Title	Publisher
1.	A.K.Sawhney	Mechanical,Measurements&Instrumentation	DhanpatRai& Sons
2.	R.V. Jalgaonkar	Mechanical Measurement & Control	Everest Publishing House
3.	D.S.Kumar	Mechanical Measurements &Control	Metropolitan Publications

Reference books and Websites:

Sr. No.	Author	Title	Publisher
1.	C.S. Narang	Instrumentation Devices &Systems	Tata McGraw Hill Publications Mechanical Measurement &Control
2.	R.K.Jain	Instrumentation, Measurement and Analysis	Khanna Publications
3.	B.C.Nakra and K.K.Chaudhry	Instrumentation, Measurement and Analysis	Tata McGraw Hill Publication

Curriculum Coordinator Head Dean - Diploma

Diploma in Mechanical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE ★ MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: FORTH
COURSE TITLE	: THERMODYNAMICS AND HEAT TRANSFER
COURSE CODE	: 174ME43

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME												
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
4	-	2	6	3	80	32	20	100	40	-	-	25	10	25	10	150

Rationale:

Knowledge of thermodynamics& related devices is essential in all fields of engineering. This subject requires knowledge of basic engineering sciences, applied mechanics, mathematics etc.

Course Outcomes:

Student should be able to

CO1	To understand the basic concepts of Thermodynamics.
CO2	To understand laws of thermodynamics and study the properties of steam.
CO3	To apply laws of thermodynamics to different devices like compressor.

Course Content:

SECTION – I								
Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
1		**Basic concepts of thermodynamics.**	4	8	1	50	50	-

	1.1	System, surroundings, boundary, universe, control volume, Properties (intensive, extensive), process, path, cycle, working substance, cyclic process, reversible, irreversible process.						
	1.2	Thermodynamic equilibrium, zeroth law of thermodynamics, temperature& its measurement.						
	1.3	Energy, stored energy & energy in transition, thermodynamic work, heat, specific heat and its units.						
	1.4	Calorific value, types						
	1.5	Gas laws-Boyle`s, charles`,ideal gas equation, characteristic & universal gas constant.						
	1.6	Numericals based on work & gas laws, pressure						
2		**First law of Thermodynamics.**	**10**	**16**	**2**	**40**	**40**	**20**
	2.1	First law of thermodynamics & Joules experiment.						
	2.2	first law applied to a process & cyclic process.						
	2.3	Internal energy & enthalpy						
	2.4	Determination of heat transfer ,work transfer, internal energy change for the following process` i)Isobaric, ii)Isochoric, iii) Isothermal, iv) Adiabatic, v) Polytropic.						
	2.5	Steady flow energy equation for open system. First law applied to flow process` i) boiler ii) nozzle iii) turbine iv) condenser v) centrifugal pump v) compressor vi) evaporator.						
	2.6	Throttling process.						
	2.7	Numericals based on Ist law, various processes, and steady flow energy equation.						
3		**Steam generation & process**	**10**	**16**	**2**	**30**	**30**	**20**
	3.1	Pure substance, phase transformation at constant pressure, p-v diagram for water, various states of steam.						
	3.2	Enthalpy changes during steam formation, properties of steam & property diagrams						
	3.3	Process of steam, constant pressure, constant volume, reversible adiabatic, Isothermal, polytropic& throttling process.						
	3.4	Numericals based on the above						

SECTION – II								
4		**Second Law of Thermodynamics**	**08**	**12**	**2**	**40**	**40**	**20**
	4.1	limitations of Ist law of thermodynamics.						
	4.2	concept of heat reservoir & heat sink, heat engine, heat pump & refrigerator.						
	4.3	thermal efficiency of heat engine, cop of refrigerator & heat pump.						
	4.4	Kelvin planck`s&Clausius statements of second law of thermodynamics.						
	4.5	Equivalence of Kelvin &Clausius statement.						
5		**Heat Transfer.**	**10**	**16**	**2**	**40**	**40**	**20**
	5.1	Modes of heat transfer conduction, convection & radiation.						
	5.2	Fourier`s law of conduction, good conductors & insulators.						
	5.3	Conduction through single & multilayered slabs & cylinders, through spheres.						
	5.4	Free & forced convection.						
	5.5	combined convection & conduction.						
	5.6	Radiation heat transfer.						
	5.7	Heat exchangers, overall heat transfer coefficient, LMTD.						
	5.8	Numericals on heat transfer.						
6		**Air Compressors.**	**06**	**12**	**3**	**30**	**30**	**40**
	6.1	Use of compressed air, classification of compressors.						
	6.2	Reciprocating air compressor. Work done during various process of compression with or without consideration of clearance volume. Isothermal & adiabatic efficiencies. F.A.D, Volumetric efficiency.						
	6.3	Multistage compression, optimum stage pressure.						
	6.4	power required & cylinder dimensions.						
	6.5	Rotary compressors, comparison of rotary with reciprocating compressor.						
	6.6	Numrericals on the above discussion.						

Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

Notes: *This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.*

Practicals

1) Experiment onThermal conductivity- Determination of thermal conductivity of a Good conductor.

2) Experiment onThermal conductivity -Determination of thermal conductivity of an Insulator.

3) Experiment on radiation heat transfer- Determination of Emissivity of a plate

4) Heat exchanger Experiment – Determination of Overall heat transfer coefficient of Parallel flow & counter flow heat exchanger

5) Reciprocating air compressor –Determination of F A D & volumetric efficiency of a compressor

6) Experiment on calorimeter- Determination of calorific value of a fuel

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1)	R.K Rajput	Thermal Engineering	Laxmi Publishers 17 thEdition 2009
Reference books and Websites :			
1)	P. K Nag	Thermodynamics	Tata McGraw Hill 3rd edition 2006
2)	R.S. Khurmi&J.K. Gupta	Thermal Engineering	S Chand Publication,15th edition 2009
3)	R. Yadav	Thermodynamics and Heat Engines	Central Publishing House Allahabad

Curriculum Coordinator | Head | Dean - Diploma

Diploma in Mechanical Engineering

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: FORTH
COURSE TITLE	: MANUFACTURING PROCESSES – II
COURSE CODE	: 174ME44

Teaching & Examination Scheme

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
4	0	0	4	3	80	32	20	100	40	-	-	-	-	-	-	100

Rationale:

Manufacturing Process is a core technology subject for mechanical engineering course. Manufacturing is the basic area for any mechanical engineering technician. The technician should be introduced to the basic processes of manufacturing. This subject will help the student to be familiarized with working principles and operations like turning, drilling, boring, facing, grinding, shaping, milling, broaching, unconventional machining and computer numeric control which are the basic manufacturing processes.

The basic knowledge of these processes will be helpful to select the most appropriate process for getting the desired results in terms of getting the raw material converted to finished product as per the requirements.

Objectives:

The student will be able to

1. Know and identify basic manufacturing processes for manufacturing different components.
2. Operate& control different machines and equipments.
3. Inspect the job for specified dimensions.
4. Produce jobs as per specified dimensions.
5. Select the specific manufacturing process for getting the desired type of output.
6. Adopt safety practices while working on various machines.

Course Outcomes:

Student should be able to

CO1	Know and identify basic manufacturing processes for manufacturing different components.
CO2	Select the specific manufacturing process for getting the desired type of output.
CO3	Adopt safety practices while working on various machines.

Course Content:

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level	U Level	A Level
1		**Drilling & Reaming**	12	14	1	4	8	4
	1.1	Classification.						
	1.2	Basic parts and their functions - Radial drilling machine.						
	1.3	Types of operations.						
	1.4	Specifications of drilling machine.						
	1.5	Types of drills and reamers.						
	1.6	Twist drill nomenclature.						
	1.7	Cutting parameters, machining Timecalculation.						
	1.8	Work and Tool Holding.						
2		**Boring Machine**	06	08	1	4	6	2
	2.1	Classification.						
	2.2	Horizontal Boring Machines.						
	2.3	Vertical Boring Machines.						
	2.4	Jig Boring Machine.						
	2.5	Size of Boring Machines.						
3		**Broaching Machine**	06	08	2	4	6	2
	3.1	Types of Broaching machine.						
	3.2	Advantages, Limitation and applications broaching.						
	3.3	Broach elements.						
	3.4	Size of Broaching Machines.						
	3.5	Broaching Methods & operations.						

4		**Grinding Machine**	08	10	3	4	6	4
	4.1	Classification of machines.						
	4.2	Grinding wheel composition, types and Shapes.						
	4.3	Designation. Types of Grinding operations.						
		SECTION – II						
5		**Milling Machine**	12	14	2	4	8	4
	5.1	Classification.						
	5.2	Basic parts and their functions - column and knee type.						
	5.3	Types of operations.						
	5.4	Types of milling cutters.						
	5.5	Cutting parameters, machining time calculation.						
	5.6	Milling operations – plain milling, side and face milling, form milling, gang milling, end milling, face milling, T- slot milling, slitting.						
	5.7	Work and Tool Holding Devices.						
	5.8	Dividing Heads.						
6		**Gear Manufacturing**	10	13	2	4	8	2
	6.1	Materials.						
	6.2	Methods of manufacture.						
	6.3	Gear cutting by (i) milling, (ii) single point cutting tool on planer/shaper, (iii)Shear speed process, (iv) Gear planning, (v) Gear Shapers & Gear hobbing.						
	6.4	Gear Finishing Processes: (i) Honing, (ii) Lapping, (iii) Burnishing, (iv) Buffing, and (v) polishing.						
7		**Non traditional machining processes**	10	13	1	4	6	2
	7.1	Electrical discharge Machining. Principle of working, Setup of EDM, Dielectric fluid, tools (electrodes), Process parameters, Applications.						

	7.2	Laser Beam Machining. Physical principle of Laser, Laser action in ruby rod, Types of Lasers. Set-up for LBM. Characteristics, controlling Parameters, Application of Laser Beam for Welding (LBW).						
	7.3	Other non traditional machines such as EBM, ECM, CHM, Principle ofworking, applications.						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	S.K. HajraChaudhary	Workshop Technology Vol. 2	Media Promotors and Publisher, New Delhi. Eighth Edition 1986

Reference Books:

Sr. No.	Author	Title	Publisher and Edition
1	B.S. Raghuwanshi	Workshop Technology	Dhanpat Rai and sons, New Delhi, Ninth Edition 2002
2	P.C. Sharma	Production Technology	S. Chand, Third Edition 2009
3	R.K. Rajput	Manufacturing Technology	Laxmi Publication (P) Ltd, First edition 2007
4	S.K.Garg	Workshop Technology: Manufacturing Processes	Laxmi Publications Pvt. Ltd, Third edition 2009

Curriculum Coordinator Head Dean - Diploma

Diploma in Mechanical Engineering

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: FORTH
COURSE TITLE	: FLUID MECHANICS & MACHINERY
COURSE CODE	: 174ME45

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME												
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
4	-	2	6	3	80	32	20	100	40	25	10	-	-	25	10	150

Course Outcomes:

Student should be able to

CO1	To understand basic properties of fluid and their definitions.
CO2	To study methods and devices used for measuring fluid properties.
CO3	To understand working principles of fluid machinery by calculating their required technical parameters.
CO4	To study construction and working of fluid machinery and calculate their parameters.

Course Content:

SECTION – I								
Unit & Sub-Unit		Topics / Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
1		**Properties of fluid**	**6**	**10**	**1**	**30**	**30**	**40**
	1.1	Density, Specific gravity, Specific Weight, Specific Volume.						
	1.2	Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity.						

	1.3	Vapour Pressure, Compressibility.						
2		**Fluid Pressure & Pressure Measurement**	10	14	2	20	40	40
	2.1	Fluid pressure, Pressure head, Pressure intensity						
	2.2	Concept of absolute vacuum, gauge pressure, atmospheric pressure, absolute pressure						
	2.3	Simple and differential manometers, Bourden pressure gauge.						
	2.4	Concept of Total pressure on immersed bodies, center of pressure of Vertical, Horizontal, and Inclined surfaces.						
		Note: Numericals on Manometers, Total Pressure & Centre of pressure						
3		**Buoyancy**	4	16	2	20	40	40
	3.1	Introduction to Buoyancy						
	3.2	Centre of Buoyancy						
	3.3	Meta - centre and Meta - centric Height						
		Note: Numericals on Centre of Buoyancy.						
4		**Fluid Flow**	12	16	2	20	40	40
	4.1	Types of fluid flows						
	4.2	Continuity equation						
	4.3	Bernoulli's theorem						
	4.4	**Venturimeter** – Construction, principle of working, Coefficient of discharge, Derivation for discharge through venturimeter.						
	4.5	**Orifice meter** – Construction, Principle of working, hydraulic coefficients, Derivation for discharge through Orifice meter						
	4.6	**Pitot tube** – Construction, Principle of Working						
		Note: Numericals on Venturimeter, Orifice meter, Pitot tube.						

SECTION – II

Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
5		**Flow Through Pipes**	10	12	3	0	50	50
	5.1	Laws of fluid friction (Laminar and turbulent).						
	5.2	Darcy's equation and Chezy's equation for frictional losses						
	5.3	Minor losses in pipes.						
	5.4	Hydraulic gradient and total gradient line.						
	5.5	Hydraulic power transmission through pipe						
		Note: Numericals to estimate major and minor losses						
6		**Impact of jet**	6	8	3	0	50	50

	6.1	Impact of jet on fixed vertical, moving vertical flat plates.						
	6.2	Impact of jet on curved vanes with special reference to turbines& pumps						
7		**Hydraulic Turbines**	8	10	4	0	50	50
	7.1	Layout of hydroelectric power plant.						
	7.2	Features of Hydroelectric power plant.						
	7.3	Classification of hydraulic turbines.						
	7.4	Selection of turbine on the basis of head and discharge available						
	7.5	Construction and working principle of Pelton wheel, Francis and Kaplan turbine.						
	7.6	**Draft tubes** – types and construction, Concept of cavitation in turbines						
	7.7	Calculation of Work done, Power, efficiency of turbine.						
8		**Centrifugal Pumps**	8	10	4	0	50	50
	8.1	Construction, principle of working and applications						
	8.2	Types of casings and impellers.						
	8.3	Concept of multistage						
	8.4	Priming and its methods, Cavitation						
	8.5	Manometrichead, Work done, Manometric efficiency, Overall efficiency, NPSH						
	8.6	Performance Characteristics of Centrifugal pumps						
	8.7	Trouble Shooting						
	8.8	Construction, working and applications of submersible, jet pump						
		Note: Numericals on calculations of overall efficiency and power required to drive pumps.						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

List of Practicals / Assignments / Tutorials :

Sr. No.	Unit	Practical /Assignment	CO
1	2	Calibration of Bourden pressure gauge with the help of Dead Weight Pressure gauge.	1
2	2	Calibration of Vacuum Pressure Gauge.	1
3	2	Center of Pressure.	1
4	4	Verification of Bernoulli's Theorem.	1

5	4	Determination of Coefficient of Discharge of Venturimeter.	2
6	4	Determination of Coefficient of Discharge, coefficient of contraction and coefficient of velocity of Orifice meter.	2
7	5	Determination of coefficient of friction of flow through pipes.	2
8	6	Impact of Jet.	3
9	7	Trial on Pelton wheel to determine overall efficiency.	4
10	8	Trial on centrifugal pump to determine overall efficiency.	4

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	Dr. P. N. Modi& Dr. S. M. Seth	Hydraulics and Fluid Mechanics including Hydraulic Machines	(Standard Book House, Delhi) Sixteenth Edition, 2007
2	Dr. R. K. Bansal	Fluid Mechanics and Hydraulic Machines	Laxmi Publications (P) Ltd, Ninth Edition, 2010

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	K. L. Kumar	Engineering Fluid Mechanics	Eurasia Publishing House (P) Limited
2	Victor L. Streeter	Fluid Mechanics	DhanpatraiPublishing Co. I[st] Edition-2009
3	Frank M. White	Fluid Mechanics	McGraw Hill, Fifth Edition - 200.
4	Robert W. Fox	Fluid Mechanics	Alan T.Mcdonald (Wiley-India) Seventh Edition, 2008
5	Yunus A. Cengel, & John M. Cimbala	Fluid Mechanics	Tata McGraw Hill) First Edition, 2006
	Websites	*nptel.ac.in/courses/112104117/*	
		https://www.slideshare.net/.../fluid-mechanics-and-hydraulic-machines-by-rkbansal	

Curriculum Coordinator **Head** **Dean - Diploma**

Diploma in Mechanical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: FORTH
COURSE TITLE	: MACHINE DRAWING II
COURSE CODE	: 174ME46

Teaching & Examination Scheme

Teaching Scheme			Paper Hours	Examination Scheme											Total Marks
L	T	P		Theory		Test	Total		Pract		Oral		Term Work		
				Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
2	-	4	-	-	-	-	-	-	100	40	-	-	50	20	150

Rationale: This subject is an advanced course in Machine Drawing and is in continuation with Machine Drawing I. Understanding of working drawings is essential for a diploma holder in mechanical engineering in order to manufacture the parts with specified tolerances and accuracy. The emphasis is given on understanding and preparing the assembly and detail drawings of the machine units.

Corse Objective: At the end of this course students will be able to

CO 1	To define terms used to explain features of components like gears, significance and use of tolerances, limits and fits.
CO 2	To list / name / sketch different types of machine parts, assemblies and their conventions
CO 3	To read and interpret the given details of production drawing of machine components
CO 4	To imagine shapes and sizes of components and visualize / draw their views in different directions
CO 5	To imagine and assemble the given set of components to form a workable machine assembly.

Course Content:

Part I –Theory

SECTION – I							
Unit & Sub-Unit	**Contents**	**Hrs**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1	**Advanced Isometric Projections of Machine**	3	12	4	0	50	50

	Parts: Parts with surfaces inclined to principle planes of projections having edges as three dimensional curves, having spherical surfaces etc.						
2	**Limits, Fits and Tolerances:-** 2.1. Characteristics of surface roughness- Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods. 2.2.Introduction to ISO system of tolerance, dimensional tolerances, elements of interchangeable system, hole & shaft based system, limits, fits & allowances. Selection of fit.	1	08	1	10	40	40
3	**Preparation of Detail and Assembly Drawing:** Drawing of simple machine sub assemblies. The subassemblies should not include more than 15 parts inclusive of fastners. eg. Assemblies of jigs and fixtures, steam engine and IC engine subassemblies, m/c tool subassemblies like lathe. tailstock, tool posts, vices, different types of valves etc.	18	20	5	0	50	50
	SECTION – II						
4	**Permanent fasteners:** Rivets and riveted joints, Defects in Rivets, Types of Riveted joints.	1	4	2	40	30	30
5	**Bearings:** Simple, solid, bushed, pedestal, foot step bearings, methods for preventing rotation of bushes, Conventional representation of Rolling contact bearings	1	4	2	40	30	30
6	**Conventional Representation:-** 1. Standard convention using SP – 46 (1988) (a) Conventional representation of screw threads and threaded parts (b) Ball and Roller bearing, Knurling, serrated shafts, splined shafts, ratchet and pinion, radial ribs etc (c) Various sections- Half, removed, revolved, offset, partial and aligned sections. (d) Springs with square and flat ends, torsion springs, helical springs,disc springs, leaf springs etc (e) Conventional representation of Gears, sprocket wheel, worm and worm gears etc (f) Types of holes- Countersunk and counterbore (g) Types of Tapers	3	5	2	40	30	30
7	**Pipe Joints:** Common types of joints for cast iron, wrought iron and non ferrous pipes used for boilers and thermal power plants and process industries.	1	4	2	40	30	30
8	**Types of Pulleys**	1	4	2	40	30	30
9	**Types of oil seals and Circlips**	1	4	2	40	30	30
10	**Gears:** Profiles of involute gear teeth, exact and approximate methods for drawing profiles.	2	15	1	0	100	0
	Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).						

Part II- Practicals

Sr. No	Topic	Drawing sheets
1	Advanced Isometric Drawings	3
2	Dimensioning with Tolerances	1
3	Free hand sketches: bearings, pipe joints, pulleys, Riveted joints etc	5
4	Conventional Representation	3
5	Gear tooth profile	2
6	Assembly and detail drawings	18

Practical (Term work)

Each student should prepare a sheet of IS A2 size on each practical day based on the lecture class. These sheets will be assessed regularly. The sheets should cover all the topics from the syllabus. Maximum emphasis will be given on the assembly and detail drawings. (Covering about 16 to 18 sheets out of 24 to 26 total sheets.) .

Learning Resources:

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	N.D.Bhatt	Engineering Drawing	Charotar Publishers,49th Edition 2010
2	N.D Bhatt	Machine Drawing	Charotar Publishers,38th edition

Reference Books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	P.S.Gill	Machine Drawing	S.Kataria& sons, 3rd edition 2007
2	Siddeshwar	Machine Drawing	Tata McGraw Hill Publications,2005

Curriculum Coordinator Head Dean - Diploma

Diploma in Mechanical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN MECHANICAL ENGINEERING
PROGRAMME CODE	: DME
SEMESTER	: FORTH
COURSE TITLE	: MACHINE SHOP PRACTICE
COURSE CODE	: 174ME47

Teaching & Examination Scheme

Teaching Scheme				Paper Hours	Examination Scheme											Total Marks
L	T	P	Cr		Theory		Test	Total		PR		OR		TW		
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
0	0	3	3	-	-	-	-	-	-	50	20	-	-	50	20	100

Rationale:

Manufacturing Process is a core technology subject for mechanical engineering course. Manufacturing is the basic area for any mechanical engineering technician. The technician should be introduced to the basic processes of manufacturing. This subject will help the student to be familiarized with working principles and operations like turning, drilling, boring, facing, grinding, shaping, milling, broaching, unconventional machining and computer numeric control which are the basic manufacturing processes.

The basic knowledge of these processes will be helpful to select the most appropriate process for getting the desired results in terms of getting the raw material converted to finished product as per the requirements.

Objectives:

The student will be able to

1. Know and identify basic manufacturing processes for manufacturing different components.
2. Operate& control different machines and equipments.
3. Inspect the job for specified dimensions.
4. Produce jobs as per specified dimensions.
5. Select the specific manufacturing process for getting the desired type of output.
6. Adopt safety practices while working on various machines.

Course Outcomes:

Student should be able to

CO1	Inspect and produce the job as per specified dimensions.
CO2	Operate, control different machines and adopt safety practices while working on various machines.

Sr. No	Details Of Practical Contents	Hrs	Marks	CO	R Level	U Level	A Level
1	**TURNING & GRINDING:** One job consisting of operations such as plain turning, step turning, Chamfering, taper turning. 50 % of available time should be used.	24	50	1,2	4	8	6
2	**MILLING & SHAPING:** One job involving shaping, milling and surface grinding operations. 50 % of available time should be used.	24	50	1,2	4	8	6
Legends: R- Remember, U – Understand, A – Apply							

Learning Resources:

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	S.K. HajraChaudhary	Engineering Drawing	Media Promotors and Publisher, New Delhi. Eighth Edition 1986

Reference Books:

Sr. No.	Author	Title	Publisher and Edition
1	B.S. Raghuwanshi	Workshop Technology	DhanpatRai and sons, New Delhi, Ninth Edition 2002
2	P.C. Sharma	Production Technology	S. Chand, Third Edition 2009
3	R.K. Rajput	Manufacturing Technology	Laxmi Publication (P) Ltd, First edition 2007
4	S.K.Garg	Basic Manufacturing Processes & workshop Technology	Third edition 2009

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Diploma in Mechanical Engineering