

Scheme of Teaching and Examination
IV Semester DIPLOMA in MECHANICAL ENGINEERING
THEORY

SL. No	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME					
			Periods per Week	Periods in one Session	Hours of Exam.	Terminal Exam. (A) Marks	Final Exam. (B) Marks	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
1	Metrology & Quality Control	25401	4	50	3	20	80	100	26	36
2	Manufacturing Technology-I	25402	5	60	3	20	80	100	26	36
3	Machine Drawing	25403	9	120	4	20	80	100	26	36
4	Theory of Machines	25404	6	60	3	20	80	100	26	36
5	Hydraulics and Fluid Mechanics	25405	5	60	3	20	80	100	26	36
Total :-			29					500		

PRACTICAL

SL. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME					
			Periods per Week	Periods in one Session	Hours of Exam.	Marks Internal Exam. (A)	Marks External Exam. (B)	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
6	Workshop Practice	25406	9	120	6	10	40	50	16	21
7	Hydraulics and Fluid Mechanics Lab.	25407	4	60	6	10	40	50	16	21
Total :-			13					100		

SESSIONAL

SL. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME			
			Periods per Week	Periods in One Session	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject
8	Workshop Practice	25408	-	-	20	30	50	25
9	Machine Drawing	25409	-	-	40	60	100	50
Total :-			-				150	
Total Periods per Week			42		Total Marks			750

METROLOGY & QUALITY CONTROL

Subject Code 25401	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	-	-	Internal Exam.	:	20

Rationale & Objective:

The reputation and success of any industry largely depends upon quality of its products. So, in modern industries, the whole plant has to contribute towards building quality to the product. As such, the concept of quality and its control has become one of the stringent requirements of modern industries. Hence, it is required to have a thorough understanding of the principle of the accurate and precise measurement techniques, concept of variability in measurement.

The subject “Metrology and Quality Control” aims at equipping the students with a strong foundation in metrology and quality control concepts and skills so that they can perform the job of an inspector and help the industries to produce quality products.

<u>S. No.</u>	<u>Topics</u>	<u>Periods</u>
01	Elementary Metrology	(08)
02	Linear Measurement	(05)
03	Angular Measurement	(04)
04	Limits. Fits and Gauges	(08)
		(25)

<u>S. No.</u>	<u>PART-B</u> <u>Periods</u>	<u>Periods</u>
01	Inspection	(04)
02	Quantity function in Industry	(04)
03	Fundamentals of Statistical Concept in Quality Control	(05)
04	Control Charts in S.W.C.	(08)
05	Operation Characteristics (OC) Curve.	(04)
		(25)

CONTENTS:

PART – A

TOPIC: 01 – ELEMENTARY METROLOGY:

- 01.01 Definition of metrology
- 01.02 Objective of metrology
- 01.03 Precision and accuracy
- 01.04 Accuracy and cost
- 01.05 Sources of errors

TOPIC: 02 – LINEAR MEASUREMENT:

- 02.01 Introduction
- 02.02 Vernier Calipers – reading the vernier scale.
- 02.03 Vernier micrometers (Description of various parts and their specification)
- 02.04 Vernier Height Gauges, Depth gauges

TOPIC: 03 – ANGULAR MEASUREMENT:

- 03.01 Introduction
- 03.02 Vernier and optical Bevel protractor
- 03.03 Sine Principle and Sine Bars
- 03.04 Angle Gauges

TOPIC: 04 – LIMITS, FITS AND GAUGES:

- 05.01 Introduction
- 05.02 Concept of Tolerances, Interchangeability
- 05.03 Terms associated with an assembly basic size, normal size limits, deviation and zero line.
- 05.04 Methods of Limit systems – hole basis and shaft basis.

PART –B

TOPIC: 01 – INSPECTION:

- 01.01 Introduction & Definition of Inspection
- 01.02 Principle of Inspection
- 01.03 Inspection stages
- 01.04 Floor Inspection advantages & disadvantages

TOPIC: 02 – QUALITY FUNCTION IN INDUSTRY:

- 02.01 Concept of quality
- 02.02 Concept of reliability and maintainability
- 02.03 Factors affecting quality
- 02.04 Quality circles – basic concept, purpose & functioning

TOPIC: 03 – FUNDAMENTALS OF STATISTICAL CONCEPT IN QUALITY CONTROL:

- 03.01 Types of variations
- 03.02 Terminology used in frequency distribution
- 03.03 Graphical presentation of frequency distribution (Histogram, Frequency Bar Char, Frequency Polygon)
- 03.04 Normal distribution Curve – Description and its construction.

TOPIC: 04 – CONTROL CHARTS IN S.Q.C.:

- 04.01 Introduction to X-R Chart
- 04.02 Steps required constructing X-R Chart
- 04.03 Analysis of X and R Chart
- 04.04 Control Charts for percent defective p-chart
- 04.05 Application of p-chart.
- 04.06 Introduction of e-chart
- 04.07 Construction of e-chart and its analysis

TOPIC: 05 – OPERATION CHARACTERISTICS (OC) CURVE:

- 06.01 Definition and explanation of an OC Curve.
- 06.02 Different parameter of OC Curves
(Producer's risk, consumer's risk. Acceptance Quality Level (AQL) etc.
- 06.03 Zone of acceptance, rejection & indecision
- 06.04 Relationship between the parameters of OC-Curves.

Books Recommended:

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|----|------------------------------|--|
| 1. | Engineering Metrology | - R.K. Jain |
| 2. | Quality Control | - Khanna Publishers
- T.T.T.I. Madras
- Tata McGraw Hill Publishing Ltd. |
| 3. | Industrial Organization | - T.R. Banga
- Khanna Publishers |
| 4. | Inspection & Quality Control | - National Productivity Council |

MANUFACTURING TECHNOLOGY - I

Subject Code 25402	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	05	-	-	Internal Exam.	:	20

Rationale:

A nation is strong if the industries are strong. A nation is self dependent if it produces its all requirements with its own resources and industry and should have the capacity to export materials in other countries.

A diploma holder technician has to play a vital role in industries. He has to work as a bridge in between Management and Labour.

An industry is rich if its workshop is rich. A workshop is rich if it has recent machines in good number and technical staffs (having good concepts) in sufficient no. A diploma holder technician plays a vital role in act and guidance inside a workshop.

Objective:

For building a diploma holder technician to be more practical with good concept of theories the paper Manufacturing Technology – I has been framed. With the help of this paper a person will be able to get the almost all basic concepts of workshop.

The students will be able to:

- (i) Know the basic principles of workshop.
- (ii) Select materials, tools, equipments more speedily accurately.
- (iii) Prepare a job as per requirement (either by casting or machining).
- (iv) Check the qualities and specification of job, tools and equipments.
- (v) Develop managerial skill.

S.No.	Topics	Periods
01	Workshop Management	(04)
02	Lathe	(14)
03	Shaper and Planner	(08)
04	Drilling & Boring Machines	(04)
05	General Knowledge of Different Types of Machines	(04)
06	Welding	(08)
07	Pattern Making	(08)
08	Moulding	(05)
09	Casting	(05)
	Total :	(60)

CONTENTS:

TOPIC: 01 – WORKSHOP MANAGEMENT:

- 01.01 Rules and regulations of working in workshop
- 01.02 Duties and responsibilities of Foreman.
- 01.03 Algorithm or flow diagram for competing a job in different sections of workshop
- 01.04 Tools used in different section.

TOPIC: 02 – LATHE:

- 02.01 Introduction, terminology used in lathe: feed, depth of cut, cutting speed, R.P.M. of pass etc.
- 02.02 Types of lathe, centre lathe, capstan lathe, turret lathe, automatic lathe of computer guided lathe (C.N.C. lathe)02)
- 02.03 Constructional details of centre lathe.
- 02.04 Specification of lathe. Difference between centre lathe & turret lathe.
- 02.05 Operation on lathe – Turning (Cylindrical, taper), facing, drilling, boring, thread cutting, grinding etc – numericals
- 02.06 Tools for each types of operation, special attachment & accessories on lathe.
- 02.07 Sp. Operation on lathe using special attachment, indexing of turret & cross slide.
- 02.08 Faults in lathe & its remedies.
- 02.09 C.N.C. lathe – computer operation for C.N.C. lathe, merits of C.N.C over manually operated lathe.

TOPIC: 03 – SHAPER AND PLANNER:

- 03.01 Introduction. Construction details of shaper.
- 03.02 Quick return mechanism.
- 03.03 Terminology used (feed. Depth of cut, no. of pass, R.P.M. stroke length cutting speed)
- 03.04 Specification of shaper.
- 03.05 Difference between shaper and planner, Planner operation. Types of jobs prepared on shaper and planner,

TOPIC: 04 – DRILLING & BORING MACHINES:

- 04.01 Introduction, classification, specification.
- 04.02 Tools, accessories, operation, difference in drilling & boring tools.

TOPIC: 05 – GENERAL KNOWLEDGE OF DIFFERENT TYPES OF MACHINES:

- 05.01 General knowledge of slotting machine, its use.
- 05.02 Grinding machines, nomenclature of grinding wheel's abrasive material.

TOPIC: 06 – WELDING:

- 06.01 Introduction, types.
- 06.02 Description of Gas welding and electric welding, tools used in welding.
- 06.03 Precaution in welding.
- 06.04 Welding rod used in gas and electric welding.

TOPIC: 07 – PATTERN MAKING:

- 07.01 Definition of pattern. General terms used in pattern making.
- 07.02 Pattern making tools, pattern materials wood, metals like brass, aluminium, white metal, plastics etc.
- 07.03 Types of pattern – Single piece, split, loose piece, geted cope and drag and shell patterns.
- 07.04 Pattern allowance: shrinkage, finish and rapping or shake allowance.

TOPIC: 08 – MOULDING:

- 08.01 Moulding tools and equipments, their types with compositions and characteristics.
- 08.02 Moulding processes – Hand moulding and machine moulding, types of moulds, methods of moulding, bench moulding/hook moulding, pit moulding, loam moulding and mouldings.
- 08.03 Core binders, core boxes and core print, core preparation and setting of cores, core baking.

TOPIC: 09 – CASTING:

- 09.01 Melting furnaces, Electric furnace. Coke fired furnaces, oil and gas fired furnaces and cupola furnaces, factors affecting selection of furnaces, sand casting process, use of special methods of casting, centrifugal casting, die-casting, investment casting & their areas of application. Advantages and disadvantages of these casting. Defects in casting and their remedies.

Book Recommended:

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|----|--------------------------------|---|---|
| 1. | Karyashala Takniki (Khand – I) | - | B.S. Raghuvanshi
Dhanpat Rai & Sons, New Delhi |
| 2. | | - | R.K. Jain |
| 3. | Manufacturing | - | Begman |

MACHINE DRAWING

Subject Code 25403	Theory			No of Period in one session : 120		
	No. of Periods Per Week			Full Marks		: 100
	L	T	P/S	Annual Exam.		: 80
	09	-	-	Internal Exam.		: 20

Rationale:

For a technician to work efficiently he must have a very sound knowledge of drawing. The main objective of framing syllabus of Machine Drawing is to make the technician well trained in drawing, so that he may be able to work in different fields such as in industry, department of sales or services or in the department of drawing and design etc.

Objective:

By going through the contents student will be able to:

- (i) Understand drawing and develop capacity to represent any matter/object with the help of picture.
- (ii) Develop primary knowledge of working drawing.
- (iii) Produce orthographic drawing of different machine parts.
- (iv) Develop skill to produce assembly drawings.
- (v) Develop skill to produce detailed drawings of machines parts from assembly drawing.

<u>S. No.</u>	<u>Topics</u>	<u>No. of sheets</u>	<u>Periods</u>
01	Introduction	(01)	(09)
02	Free Hand Sketching of Machines Parts	(01)	(24)
03	Riveting	(01)	(09)
04	Nuts and Bolts	(01)	(06)
05	Conversion of Isometric Views into Orthographic Projection.	(01)	(18)
06	Sectional Views	(01)	(09)
07	Assembling of Different Machine Parts from Disassembling Views.	(01)	(21)
08	Disassembling of Machine Parts from Assembled Views	(01)	(24)
			120

CONTENTS:

TOPIC: 01 – INTRODUCTION:

1 Sheet

- (i) Different types of lines
- (ii) Different materials – Ferrous, non ferrous, atone, bricks, wood.

TOPIC: 02 – FREE HAND SKETCHES:

1 Sheet

- (i) Rules of free hand sketches & its use.
- (ii) Concept of Sectioning, full sectioning, half sectioning, part sectioning.
Sketching of different machine parts i.e. knuckle joint, cotter joint, coupling (flange & flexible).
- (iii) Bearing (All types i.e. journal, bush, foot step etc.), Fast & loose pulley. – (Not to the scale).

TOPIC: 03 – RIVETTING:

1 Sheet

Introduction of shapes of rivet heads. Caulking & fullering, pitch. Diagonal pitch, margin, back pitch etc. types of riveting (lap & butt joint, zig & chain structure).

TOPIC: 04 – NUTS & BOLTS:

1 Sheet

Classification of nuts, terminology used in the drawing of nuts & bolts. Drawing of orthographic projections (Top view, Front view & Side view) of a bolt, imperial relations of dimensions of nut & bolt w.r.t. bolt head dia.

TOPIC: 05 – CONVERSION OF ISOMETRIC VIEW INTO ORTHOGRAPHIC PROJECTION

(GENERAL):

1 Sheet

TOPIC: 06 - SECTIONAL VIEWS:

1 Sheet

Orthographic Sectional View of Piston of 2 stroke & 4 stroke I.C. Engine.

TOPIC: 07 - ASSEMBLING OF DIFFERENT MACHINE PARTS FROM DISASSEMBLED VIEWS:

1 Sheet

Expansion joint, cross head of steam engine, steam stop valve big end of connecting rod.

**TOPIC: 08 - DISASSEMBLING OF MACHINE PARTS FROM ASSEMBLED
ASSEMBLED VIEWS:**

1 Sheet

Knuckle joint, Flanged coupling, bushed bearing I.C. engine parts.

(At least 8 sheets should be done in sessional).

Books Recommended:

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|----|-----------------|--------------------|
| 1. | Machine Drawing | - N.D. Bhatt |
| 2. | Machine Drawing | - P.S. Gill |
| 3. | Machine Drawing | - Mittal & Agrawal |
| 4. | Machine Drawing | - Nagpal |

THEORY OF MACHINES

Subject Code 25404	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	06	-	-	Internal Exam.	:	20

Rationale:

Technician has to understand the basic design principles of machines, mechanism and their parts. He comes across the problem of power transmission, speed control, braking, engagement and disengagement of power balancing etc.

The subject is being prescribed with a view to help the students to develop the knowledge and understanding of the mechanism and machines so that he will be able to develop skill which will help in solving the problems of design, power transmission, maintenance etc.

Objective:

The student should be able to understand:

- Different types of links & mechanisms.
- The problems of friction and their application.
- The principles of power transmission, gear, belt and rope drives.
- The braking system and their application.
- The function of different types of governors and flywheels.
- The design and working of cam.
- The principles of balancing.

<u>S. No.</u>	<u>Topics</u>	<u>Periods</u>
01	Simple Mechanism	(05)
02	Friction	(08)
03	Belt & Rope drives	(08)
04	Gear drive & gas trains	(08)
05	Governors	(08)
06	Turning moments & flywheels	(08)
07	Brakes & dynamometer	(06)
08	Cams	(06)
09	Vibration & Balancing	(03)
		(60)

CONTENTS:

TOPIC: 01 – SIMPLE MECHANISM:

- 01.01 Introduction, Kinematic links, types of links, structure, comparison between machine and structure.
- 01.02 Kinematic pairs, classification, types of constrained motion.
- 01.03 Kinematic pair, kinematic chain, their classification, mechanism, types of joints.
- 01.04 Inversion of mechanism, inversion of single slider crank chain, crank and slotted bar quick return and Whitworth quick return motion mechanism.

TOPIC: 02 – FRICTION:

- 02.01 Introduction, classification, limiting friction, dynamic friction, co-efficient of friction, angle of repose.
- 02.02 Friction on rough inclined plane.
- 02.03 Screw friction, screw jack, torque required to lift and to lower the load by screw jack overhauling & Self-locking screws, efficiency

TOPIC: 03 – BELT & ROPE DRIVE:

- 03.01 Introduction, classification of drives.
- 03.02 Velocity ratio of compound belt drive, slip of belt creep of belt. Length of open & cross belt drive.
- 03.03 Power transmitted by a belt, ratio of driving tension for flat belt drive centrifugal tension, condition for maximum tension in belt.
- 03.04 V-belt drive, advantages and disadvantages ratio of driving tension rope drive, numericals.

TOPIC: 04 – GEAR DRIVES:

- 04.01 Toothed Gearing, introduction, terminology, advantages and disadvantages, classification.
- 04.02 Gear trains, Simple gear trains, compound gear trains, velocity ratio.
- 04.03 Design of spur gear (to find no of teeth) simple problems.

TOPIC: 05 – GOVERNORS:

- 05.01 Introduction, function, terminology, classification, comparison with flywheel.
- 05.02 Watt governor, Porter governor.
- 05.03 Hartnell governor.
- 05.04 Effort and power of a porter governor.
- 05.05 Hunting sensitiveness and stability of governor, isochronous governor.

TOPIC: 06 – TURNING MOMENT & FLYWHEEL:

- 06.01 Fluctuation of energy, determination of maximum fluctuation energy, co-efficient of fluctuation of energy.
- 06.02 Flywheel, co-efficient of fluctuation of speed, energy stored in a flywheel. Dimensions of the flywheel rim, Numericals.

TOPIC: 07 – BRAKES:

- 07.01 Introduction, materials for brake lining, classification.
- 07.02 Single block brakes, double block shoe brake.
- 07.03 Simple band brake, Differential band brake, Band and block brake.
- 07.04 Dynamometer, & Rope Brake dynamometer. Numericals.

TOPIC: 08 – CAM:

- 08.01 Introduction, classification, terminology.
- 08.02 Displacement, velocity and acceleration diagrams when the follower moves with uniform velocity.
- 08.03 Construction of cam profile for a radial cam, profile of cam when the axis of follower passes through the axis of cam shaft.

TOPIC: 09 – VIBRATION & BALANCING:

- 09.01 Vibration, classification, natural frequency of free longitudinal and transverse vibrations.
- 09.02 Balancing, classification, balancing of single rotating mass by a single mass rotating in the same plane, balancing of a single rotating mass by two masses

HYDRAULICS & FLUID MECHANICS

Subject Code 25405	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	05	-	-	Internal Exam.	:	20

Rationale:

Water Management has a prime importance in the development of any country. This management covers the qualities of drinking water, its viability, controlling of flow of water, its pressure calculation, different effects produced on the objects by it. The energy associated with it i.e. Hydraulic energy & its use.

Now a day it is a great task to control the flood and desert. A diploma holder technician must have the capacity to control the natural hazards occurred due to water or to develop new cultivated area from desert lands. Seeing the today's requirement this paper, fluid mechanics has been designed.

Objective:

The student should be able to:

- (i) Analyze the difference of drinking and not drinking water and should know the principles to convert not drinking water into drinking water.
- (ii) Measure pressure to ensure safe working of submerged objects.
- (iii) Calculate the specific gravity & wet of fluid on/in an object.
- (iv) Assess the requirements of service water for the house.
- (v) Maintain & regulate the flow of fluids in a pipe line. And at last should have the basic concepts of almost all types of problems related to water.

<u>S. No.</u>	<u>Topics</u>	<u>Periods</u>
01	Basic Concepts of Fluids	(12)
02	Hydrostatic Forces on Surfaces	(06)
03	Hydro Kinematics & Dynamics	(08)
04	Orifice	(04)
05	Loss of Head	(04)
06	Mouthpieces & Pipes	(06)
07	Hydraulic Gradient	(06)
08	Branching of Pipes & Transmission of Power through Pipes	(08)
09	Impact of Jet & Water Turbine	(06)
		(60)

CONTENTS:

TOPIC: 01 – BASIC CONCEPTS OF FLUID :

- 01.01 Fluid (Definition & its types). Formula for Newtonian Fluid Concept of hydraulics/ F.M. classification of hydraulics Hydrostatics, hydro kinematics.
- 01.02 Properties of Water – Specific gravity, surface tension, viscosity, cohesion-adhesion.
- 01.03 Types of Pressures – Atmospheric gauge, vacuum, vapour etc. & its units. Pressure measuring Instruments – Barometer, Simple Manometer, Differential Manometer, Inverted manometer, Enlarged End Manometer – Numerical problems.
- 01.04 Mechanical gauges – Borden tube, diaphragm, dead weight pressure.
- 01.05 Types of flow – Stream, streak, uniform, non-uniform, steady, unsteady, laminar, turbulent, compressible, incompressible, rotational, irrotational, path line, streamline, stream tube – definition only, Reynolds No. & its application in laminar & turbulent flow over a plate.

TOPIC: 02 – HYDROSTATIC FORCES ON SURFACES:

- 02.01 Total Pressure and Centre of Pressure, pressure at a point in a liquid, centre of pressure, total for on-horizontal surface area, vertical surface area & inclined surface area. Practical application on Centre of Pressure, Pressure diagram. Resultant Pressure, Sluice gate, lock gate, masonry wall and dam.

TOPIC: 03 – HYDROKINEMATICS & DYNAMICS:

- 03.01 Equation of continuity of flow – Discharge of rate of flow & its units. Equation of continuity of flow. Potential or static head, static energy, pressure head and pressure energy, kinetic head and kinetic energy, conversion of one energy into another energy.

03.02 Bernoulli's theorem and its proof – Numerical problems. Practical application of Bernoulli's theorem, venturimeter, pitot tube, measurement of flow through pipes with the help of venturimeter (horizontal) Derivation of formula for the discharge, venturimeter constant, Numerical problem.

TOPIC: 04 – ORIFICE:

04.01 Definition & types, Vena contracta, C_C , C_V , C_D – Relation among them. Practical application – Numerical problem.

TOPIC: 05 – LOSS OF HEAD:

05.01 Loss of head due to sudden enlargement and sudden contraction, Derivation of formula, head loss at entrance & exit of pipe, loss of head due to obstruction in the path of flow, its practical use – Numerical problem.

TOPIC: 06 – MOUTHPIECES AND PIPES:

06.01 Difference between pipe and mouthpieces. Use of mouthpieces, friction loss in pipes, definition of pipes and channels, Wetted perimeter, hydraulic mean depth, loss of head due to friction in pipes. Chezy's Equation, Chezy's Constant, Darcy or Weishback Equation, Darcy's Coefficient.

TOPIC: 07 – HYDRAULIC GRADIENT:

07.01 Discharge through pipes, Free discharge, discharging in another vessel through simple and compound pipes. Equivalent size of compound pipes. Siphon – Numerical problem

TOPIC: 08 – BRANCHING OF PIPES & TRANSMISSION OF POWER THROUGH PIPES :

08.01 Pipes in parallel, discharge through each pipe, Flow through a diversion or bypass, branching of pipes. Flow through each pipe.

08.02 Hydraulic transmission of power through pipes, its practical uses.

08.03 Nozzle – definition flow through nozzle at the end of the pipe line. Transmission efficiency and maximum available H.P. Determination of dia of nozzle for supplying maximum horse power.

TOPIC: 09 – IMPACT OF JET & TURBINES:

09.01 Introduction force of the jet impinging normally on fixed plate, hinged plate, moving plate and on a series of moving vanes, Force of the jet on a fixed curved vanes and on a moving curved vanes – Numerical problem.

09.02 Petton, Francis and Kaplan turbine velocity diagram, work done, power and efficiency.

09.03 Centrifugal pump-working principle, velocity diagram, manometer efficiency reciprocating pump working principle only.

Books Recommended:

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|----|---|------------------------------|
| 1. | A Text Book of Fluid Mechanics & Machines | - R.S. Khurmi, S.Chand & Co. |
| 2. | Fluid Mechanics & Hydraulic Machines | - R.K. Bansal |
| 3. | Hydraulics & Hydraulic Machines | - Dr. Jagdish Lal |

WORKSHOP PRACTICE

Subject Code 25406	Practical			No of Period in one session : 120		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	40
	-	-	09	Internal Exam.	:	10

Rationale & Objective:

A Diploma holder technician should get more opportunity to know about machines, equipments & its operations which will help to be more confident & practical.

S. No. Topics Periods

A	Machine Shop
B	Welding Shop
C	Foundry Shop
D	Fitting Shop

CONTENTS:

TOPIC: A – MACHINE SHOP:

- A.01 Safety precautions, Machine cleaning, checking, making ready for operation. Selection of tools, preparing it in ready condition (tool sharpening)
- A.02 Lathe:
Setting of job on three jaw, four jaw check, centering, tool/tools fitting, adjustment of tail stocks (if required).
Practice of operations: Turning, facing, taper turning on sample jobs. Job configuration checking.
Preparing a job by above processes (Sessional Preparation)
- A.03 Shaper:
Study of quick return mechanism.
Repair of faults (minor) in machines.
Tool setting on Ram.
Practice of feed depth of cut, no. of pass on sample job.
Preparation of V block on a sample job.
- A.04 Drilling:
Checking of drill bit.
Making of sample blind hole.
Making hole in a tapered job/V block.

TOPIC: B – WELDING SHOP:

- B.01 Safety precautions, handling of tools & equipment.
- B.02 Gas welding: Flame adjustment, practical on welding, soldering & brazing on two parts (sample job).
- B.03 Electric welding:
(i) Flame adjustment, use of electrodes on jobs (T- shape, L-shape), Coarse & fire welding.
(ii) Preparation of chair & grill.

TOPIC: C – FOUNDRY SHOP:

- (Pattern, Moulding & Cutting)
- C.01 Tools, cope, drag. Different types of pattern – introduction & use.
- C.02 Preparation of foundry sand.
- C.03 Demonstration & handling of mould (A sample mould should be prepared by teacher/Institute)
- C.04 Preparation of different types of moulds using single piece, spit or any available pattern – at least 3 moulds should be prepared by each student.
- C.05 Taking photographs of different moulds prepared by students.
- C.06 Non-Fe Casting of one of the above.

TOPIC: D – FITTING SHOP:

- D.01 Tools – Introduction & its use.
- D.02 Different processes (Sawing, filing, drilling, tapping, dieing, scraping, reaming etc.)
- D.03 Different types of fitting – Round fitting, Square fitting, Triangular fitting etc.
- D.04 Use of above D. 02 & D.03 on sample jobs, L-shape, T-shape etc.
- D.05 Practical Use of fitting.
- D.06 Preparation of threads in pipes using tap & die – sessional preparation.

HYDRAULICS & FLUID MECHANICS LAB

Subject Code 25407	Practical			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	40
	-	-	04	Internal Exam.	:	10

Rationale:

Water Management has a prime importance in the development of any country. This management covers the qualities of drinking water, its viability, controlling of flow of water, its pressure calculation, different effects produced on the objects by it. The energy associated with it i.e. Hydraulic energy & its use.

Now a day it is a great task to control the flood and desert. A diploma holder technician must have the capacity to control the natural hazards occurred due to water or to develop new cultivated area from desert lands. Seeing the today's requirement this paper, fluid mechanics has been designed.

Objective:

The student should be able to:

- (vi) Analyze the difference of drinking and not drinking water and should know the principles to convert not drinking water into drinking water.
- (vii) Measure pressure to ensure safe working of submerged objects.
- (viii) Calculate the specific gravity & wet of fluid on/in an object.
- (ix) Assess the requirements of service water for the house.
- (x) Maintain & regulate the flow of fluids in a pipe line. And at last should have the basic concepts of almost all types of problems related to water.

TOPIC: A – HYDRAULICS LABORATORY:

Following experiments to be done:

- 01 Determination of C_C , C_V , C_D of discharge through Orifice.
- 02 Determination of Metacentric height of a Ship. (Experimental method),
- 03 Verification of Bernaulli's Equation,
- 04 Friction Loss in pipes
- 05 Discharging through notch.
- 06 Hardness test of (different types of samples) water.
- 07 Conversion of non-drinking water into drinking water.

WORKSHOP PRACTICE

Subject Code 25408	Sessional			No of Period in one session :		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	30
	-	-	-	Internal Exam.	:	20

Rationale & Objective:

A Diploma holder technician should get more opportunity to know about machines, equipments & its operations which will help him to be more confident & practical.

Sl. No. Topics

- A Machine Shop
- B Welding Shop
- C Foundry Shop
- D Fitting Shop

CONTENTS:

TOPIC:A – MACHINE SHOP:

- A.01** Safety precautions, Machine cleaning, checking, making ready for operation. Selection of tools, preparing it in ready condition (tool sharpening)
- A.02 Lathe:**
- (i) Setting of job on three jaw, four check, centering, tool/tools fitting, adjustment of tail stocks (if required).
 - (ii) Practice of operations: Turning, facing, taper turning on sample jobs. Job configuration checking.
 - (iii) Preparing a job by above processes (Sessional Preparation)
- A.03 Shaper:**
- (i) Study of quick return mechanism.
 - (ii) Repair of faults (minor) in machines.
 - (iii) Tool setting on Ram.
 - (iv) Practice of feed depth of cut, no. of pass on sample job.
 - (v) Preparation of V block on a sample job.
- A.04 Drilling:**
- (i) Checking of drill bit.
 - (ii) Making of sample blind hole.
 - (iii) Making hole in a tapered job/V block.

TOPIC:B – WELDING SHOP:

- B.01 Safety precautions, handing of tools & equipment.
- B.02 Gas welding: Flame adjustment, practical on welding, soldering & brazing on two parts (sample job)
- B.03 Electric welding:
- (i) Flame adjustment, use of electrodes on jobs (T-shape, L-shape), Coarse & fire welding.
 - (ii) Preparation of chair & grill.

TOPIC:C – FOUNDRY SHOP:

(Pattern. Moulding & Cutting)

- C.01 Tools, cope, drag. Different types of pattern – introduction & use.
- C.02 Preparation of foundry sand.
- C.03 Demonstration & handling of mould (A sample mould should be prepared by teacher/Institute).
- C.04 Preparation of different types of moulds using single piece, spit or any available pattern – at least 3 moulds should be prepared by each student.
- C.05 Taking photographs of different moulds prepared by students.
- C.06 Non-Fe Casting of one of the above.

TOPIC:D – FITTING SHOP:

- D.01 Tools – Introduction & its use.
- D.02 Different processes (Sawing, filing, drilling, tapping, dieing, scraping, reaming etc.).
- D.03 Different types of fitting – Round fitting, Square fitting, Triangular fitting etc.)
- D.04 Use of above D.02 & D.03 on sample jobs, L-shape, T-shape etc.
- D.05 Practical Use of fitting.
- D.06 Preparation of threads in pipes using tap & die – sessional preparation.

MACHINE DRAWING

Subject Code 25409	Sessional			No of Period in one session : -		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	60
	-	-	-	Internal Exam.	:	40

Rationale & Objective:

A Diploma holder technician should be able to command the concepts of machines through vigorous practice by copying, plotting, orthographic-isometric conversion, different fastening devices, assembly & disassembly etc.

<u>Sl. No.</u>	<u>Topics</u>	<u>No. of Sheets</u>
01	Introduction	(01)
02	Free Hand Sketching of Machines Parts	(01)
03	Riveting	(01)
04	Nuts and Bolts	(01)
05	Conversion of Isometric Views into Orthographic Projection.	(01)
06	Sectional Views	(01)
07	Assembling of Different Machine Parts from Disassembled Views	(01)
08	Disassembling of Machine Parts from Assembled Views	(01)

8 Sheets