STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA
TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

DISCIPLINE: ELECTRICAL AND MECHANICAL ENGINEERING												**SEMESTER: 4TH**
SL NO	**SUBJECT CODE**	**SUBJECT**	**PERIODS**			**EVALUATION SCHEME**						
			L	**T**	**P**	**INTERNAL EXAM**			**END SEM EXAM**	**TERM WORK**	**PRACTICAL EXAM**	**TOTAL MARKS**
						TA	**CT**	**Total**				
THEORY												
1.	EMT 401	ENERGY CONVERSION - I	4	0	0	10	20	30	70			100
2.	EMT 402	ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT	4	0	0	10	20	30	70			100
3.	EMT 403	GENERATION TRANSMISSION AND DISTRIBUTION	4	0	0	10	20	30	70			100
4.	EMT 404	THERMAL ENGINEERING-II	4	0		10	20	30	70			100
5.	EMT 405	FLUID MECHANICS AND HYDRAULIC MACHINES	4	1	0	10	20	30	70			100
PRACTICAL/TERM WORK												
6.	EMP 401	ELECTRICAL MACHINE LAB-I	0	0	6					25	50	75
7.	EMP 402	FLUID MECHANICS AND HYDRAULIC MACHINES LAB	0	0	6					25	50	75
8.	EMP 403	MECHANICAL WORKSHOP PRACTICE	0	0	6					50	50	100
GRAND TOTAL			**20**	**1**	**18**	**50**	**100**	**150**	**350**	**100**	**150**	**750**

Total Contact hours per week: 39
Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assessment, CT- Class test
Minimum Pass Mark in each Theory Subject is 35% and in Practical subject is 50%

ENERGY CONVERSION – I

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMT 401	Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester examination:	70

A. RATIONALE

Energy Conversion-I deals with DC machines and transformers. The application of DC generators and motors in modern industries are still in practice. The electrical technicians have to look after the installation, operation, maintenance and control of such machine. So the knowledge of these machines is felt essential. Transformers of various voltage ratios and KVA ratings are in wide use in industries as well as in distribution and transmission. So an early knowledge of the technicians about transformers is necessary for which it is dealt with broadly in the fourth semester syllabus.

B. OBJECTIVES

1. To acquire knowledge of construction, characteristic and control of the DC machines.
2. To acquire knowledge on performance of DC machines and transformers of all types.
3. To acquire knowledge of testing and maintenance of transformers and DC machines.

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
1.	DC GENERATORS	19
2.	DC MOTROS	19
3.	SINGLE PHASE TRANSFORMER	22
4.	AUTO TRANSFORMER	05
5.	THREE PHASE TRANSFORMER	05
	Total	**70**

D. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. D.C Generator

1.1. Explain principle of operation
1.2. Explain Constructional feature
1.3. Armature winding, back pitch, Front pitch, Resultant pitch and commutator- pitch.
1.4. Simple Lap and wave winding (problems on winding diagram)
1.5. Explain Different types of D.C. machines Shunt, Series and Compound machine with problem solving methods.
1.6. Derive EMF equation of DC generators. (Solve problems)
1.7. Explain Armature reaction in D.C. machine & commutation.
1.8. Explain Methods of improving commutation (Resistance and emf commutation)
1.9. Explain role of inter poles and compensating winding. (solve problems)
1.10. Characteristics of D.C. Generators with problem solving methods
1.11. State application of different types of D.C. Generators.
1.12. Concept of critical resistance causes of failure of development of emf.
1.13. Explain losses and efficiency of D.C. machines, condition for maximum efficiency and numerical problems.
1.14. Explain parallel operation of D.C. Generators.

2. D. C. MOTORS

2.1 Explain basic working principle of DC motor
2.2 State Significance of back emf in D.C. Motor.
2.3 Derive voltage equation of Motor
2.4 Derive torque (Equation of Armature Torque and shaft Torque) (solve problems)
2.5 Explain performance characteristics of shunt, series and compound motors and their application. (Solve problems)
2.6 Explain methods of starting shunt, series and compound motors, (solve problems)
2.7 Explain speed control of D.C shunt motors by
  2.7.1 Flux control method
  2.7.2 Armature voltage (rheostatic) Control method.
  2.7.3 Solve problems
2.8 Explain speed control of series motors by Flux control method and series parallel method.
2.9 Explain determination of efficiency of D.C. Machine by break test method.
2.10 Explain determination of efficiency of D.C. Machine by Swinburne's Test method.
2.11 Explain Losses & efficiency and condition for maximum power and solve numerical problems.

3. SINGLE PHASE TRANSFORMER

3.1 Explain working principle of transformer.
3.2 Explains Transformer Construction – Arrangement of core & winding in different types of transformer – Brief ideas about transformer accessories such as conservator, tank, breather explosion vent etc.
3.3 Explain types of cooling methods
3.4 State the procedures for Care and maintenance
3.5 Derive EMF equation
3.6 Ideal transformer voltage transformation ratio
3.7 Explain Transformer on no load and on load phasor diagrams.
3.8 Explain Equivalent Resistance. Reactance and Impedance.
3.9 Explain phasor diagram of transformer with winding Resistance and Magnetic leakage. Phasor diagram on load using upf, leading pf and lagging pf.
3.10 Explain Equivalent circuit and solve numerical problems.
3.11 Calculate Approximate & exact voltage drop of a Transformer.
3.12 Calculate Regulation of various loads and power factor.
3.13 Explain Different types of losses in a Transformer. (solve problems)
3.14 Explain Open circuit test.
3.15 Explain Short circuit test.
3.16 Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)
3.17 Explain All Day Efficiency (solve problems)
3.18 Explain determination of load corresponding to Maximum efficiency.
3.19 Explain parallel operation of single phase transformer.

4. AUTO TRANSFORMER

4.1 Explain constructional features.
4.2 Explain Working principle of single phase Auto Transformer.
4.3 State Comparison of Auto transformer with an two winding transformer (saving of Copper)
4.4 State Uses of Auto transformer.
4.5 Explain Tap changer with transformer (on load and off load condition)

5. THREE PHASE TRANSFORMER

5.1 State and show Type of connection – Star-Star, Star-Delta, Delta-Star and Delta – Delta.

5.2 Explain parallel operation and state conditions for Parallel operation.

5.3 Maintenance schedule of power transformer.

Learning Resources:			
Text books:			
Sl.No	**Name of Author**	**Title of the Book**	**Publisher**
1.	B. L. Thareja and A. K. Thareja	Electrical Technology – II	
2.	J. B. Gupta	Electrical Technology	
Reference Books:			
1.	Ashfaq Husain	Electric Machine	
2.	S. K. Bhattarcharya	Electrical Machine	TMH
3.	Jaggi	Testing maintenance and repair of electrical machine and equipment	

N. B. : After completion of each topic the students are required to submit assignment on concepts and Applications. It is also required to solve mathematical problems as when applicable.

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMT 402	Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

A. RATIONALE :

The subject "Electrical measurement and measuring instruments" is important in the field of electrical engineering. The subjects deal with the methods of measuring voltage, current, power, energy, frequency, power factor & parameters like resistance, inductance and capacitance and constructional detail and principle of operation of the instruments used for such measurements. Also it provides the methods to extend the range of low range instruments to measure higher values. A power measurement includes measurement of DC power, AC single phase power and AC three phase power. The detailed classification of all instruments used for the above measurement is dealt up carefully. Also accuracy, precision, resolution and errors and their correction are very important and have been fully discussed.

B. OBJECTIVES :

1. To acquire the knowledge of selecting various types of instruments for similar purpose like measurement of voltage, current, power factor, frequency etc.
2. To learn the connection of different types of electrical measuring instruments.
3. To learn the adjustment of different instruments.
4. To understand the working principle and construction of the electrical instruments.
5. To solve different numerical problems associated with the instruments based on their design Formula.

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
1.	Measuring instruments	07
2.	Analog ammeters and voltmeters	10
3.	Wattmeter and measurement of power	07
4.	Energy meters and measurement of energy	06
5.	Measurement of speed, frequency and power factor	05
6.	Instrument transformer	08
7.	Measurement of resistance	06
8.	Measurement of inductance and capacitance	06
9.	Digital instruments	05
	TOTAL	**60**

D. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. MEASURING INSTRUMENTS **07**

1.1 Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance.

1.2 Classification of measuring instruments.

1.3 Explain Deflecting, controlling and damping arrangements in indicating type of instruments.

1.4 Calibration of instruments.

2. ANALOG AMMETERS AND VOLTMETERS **10**

Describe Construction, principle of operation, errors, ranges merits and demerits of

2.1 Moving iron type instruments.
2.2 Permanent Magnet Moving coil type instruments.
2.3 Dynamometer type instruments
2.4 Rectifier type instruments
2.5 Induction type instruments
2.6 Extend the range of instruments by use of shunts and Multipliers.
2.7 Solve Numerical

3. WATTMETERS AND MEASUREMENT OF POWER **07**

3.1 Describe Construction, principle of working of Dynamometer type wattmeter and
3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction
3.3 Discuss L P F Electro – Dynamometer type wattmeter
3.4 Discuss Induction type watt meters
3.5 Measurement of Power in Single Phase and Three Phase Circuit.

4. ENERGYMETERS AND MEASUREMENT OF ENERGY **06**

4.1 Introduction
4.2 Single Phase and poly phase Induction type Energy meters – construction, working principle and their compensation and adjustments.
4.3 Testing of Energy Meters

5. MEASUREMENT OF SPEED, FREQUENCY AND POWER FACTOR **05**

5.1 Tachometers, types and working principles
5.2 Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters.
5.3 Principle of operation and working of Dynamometer type single phase and three phase power factor meters.
5.4 Synchroscopes – objectives and working.
5.5 Phase Sequence Indicators and its working.

6. INSTRUMENT TRANSFORMER **08**

6.1 Explain Current Transformer and Potential Transformer.
6.2 Explain Ratio error, Phase Angle error and Burden
6.3 Clamp – On Ammeters
6.4 State Use of CT and PT

7. MEASUREMENT OF RESISTANCE **06**

7.1 Classification of resistance
7.2 Explain Measurement of low resistance by voltage drop and potentiometer method & its use to Measure resistance.
7.3 Explain Measurement of medium resistance by wheat Stone bridge method and substitution Method.
7.4 Explain Measurement of high resistance by loss of charge method.
7.5 Explain construction & principle of operations (meggers) insulation resistance & Earth resistance megger.
7.6 Explain construction and principles of Multimeter.

8. MEASUREMENT OF INDUCTANCE NAD CAPACITANCE **06**

Explain measurement of inductance by

8.1 Maxewell's Bridge method.
8.2 Owen Bridge method

Explain measurement of capacitance by

8.3 De Sauty Bridge method

8.4 Schering Bridge method
8.5 LCR Bridge method

9. DIGITAL INSTRUMENTS **05**

9.1 Digital Voltmeters (DVM)
9.2 Characteristic of Digital Meters
9.3 Digital Multimeters

Learning Resources:			
Text books:			
Sl.No	**Name of Author**	**Title of the Book**	**Publisher**
1.	A.K. Sawhney	Electric Measurement and Measuring instruments	Dhanpat
Reference Books:			
1.	J. B. Gupta	Electrical and Electronics Measuring instruments and Measurement	
2.	E.W. Golding & H Widdis	Electrical Measurement and Measuring instruments	

N. B. : After completion of each topic the students are required to submit assignment on concepts and Applications. It is also required to solve mathematical problems as when applicable.

GENERATION TRANSMISSION & DISTRIBUTION

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMT 403	Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

A. RATIONALE :

Power system comprises generation, transmission and distribution. In this subject generation, transmission and distribution, types of generation schemes, transmission with transmission loss and efficiencies, different type of sub-stations, different type of distribution schemes, EHV AC and HV DC overhead transmission, underground cable transmission and economic aspects involved are dealt with. Further, types of tariff are briefly included to give brief and overall idea to the technicians.

B. OBJECTIVES :

To acquire knowledge of:

1. Different schemes of generation with their block diagram.
2. Mechanical and electrical design of transmission lines and numerical problems.
3. Types of cables and their methods of laying and testing.
4. Different schemes of distribution with problem solving
5. Different types of sub-stations.
6. Economic aspects of power supply system with problem and type of tariff of electricity.

C. TOPIC WISE DISTRIBUTION OF PERIODS.

Sl. No.	Topics	Periods
1.	Generation of electricity	07
2.	Transmission of electric power	05
3.	Over head line	07
4.	Performance of short & medium lines	07
5.	EHV transmission	07
6.	Distribution System	07
7.	Underground cable	06
8.	Economic Aspects	06
9.	Types of tariff	03
10.	Substation 05	
	Total	**60**

D. COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES.

1. GENERATION OF ELECTRICITY

1.1 Give Elementary idea on generation of electricity from Thermal / Hydel / Nuclear Power station.

1.2 Draw layout of generating stations.

2. TRANSMISSION OF ELECTRIC POWER

2.1 Draw layout of transmission and distribution scheme.
2.2 Explain voltage Regulation & efficiency of transmission.
2.3 State and explain Kelvin's law for economical size of conductor.
2.4 Explain corona and corona loss on transmission lines.

3. OVER HEAD LINES

3.1 State types of supports, size and spacing of conductor.
3.2 Types of conductor materials.
3.3 State types of insulator and cross arms.
3.4 Derive for sag in overhead line with support at same level and different level (approximate formula effect of wind, ice and temperature on sag simple problem)

4. PERFORMANCE OF SHORT & MEDIUM LINES

4.1 Calculation of regulation and efficiency.

5. EHV TRANSMISSION

5.1 Explain EHV AC transmission.
5.2 Explain Reasons for adoption of EHV AC transmission.
5.3 Problems involved in EHV transmission.
5.4 Explain HV DC transmission.
5.5 State Advantages and Limitations of HVDC transmission system.

6. DISTRIBUTION SYSTEMS

6.1 Introduction to Distribution System. Explain Connection Schemes of Distribution System –
(Radial, Ring Main and Inter connected system)
6.2 Explain DC distributions (a) Distributor fed at one End (b) Distributor fed at both the ends (c) Ring distributors.
6.3 Explain AC distribution system. Explain Method of solving AC distribution problem.
6.4 Explain three phase four wire star connected system arrangement.

7. UNDERGROUND CABLES

7.1 Explain cable insulation and classification of cables.
7.2 State Types of L. T. & H.T. cables with constructional features.
7.3 State and Explain Methods of cable lying.
7.4 State methods of Localisation of cable faults – Murray and Varley loop test for short circuit fault/Earth fault.

8. ECONOMIC ASPECTS

8.1 State and explain causes of low power factor.
8.2 Explain methods of improvement of power factor.
8.3 Define & explain Load curves.
8.4 Define & explain Demand factor.
8.5 Define & explain Maximum demand.
8.6 Define & explain Load factor.
8.7 Define & explain Diversity factor.
8.8 Define & explain Plant capacity factor.
8.9 Define & explain peak load and Base load on power station

9. TYPES OF TARIFF

9.1 Explain flat rate and two part tariff and block rate tariff with problems

10. SUBSTATION

10.1 Draw and explain layout of LT. HT and EHT substation.

10.2 Draw and Explain Earthing of Substation, transmission and distribution lines.

Learning Resources:			
TEXT BOOKS:			
Sl.No	**Name of Author**	**Title of the Book**	**Publisher**
1.	V. K. Mehta	Electrical power	
2.	D. P. Kothari	Power System Engineering	
REFERENCE BOOKS:			
1	S. L. Uppal	A course of electrical power system	
2	Sony Gupta, Bhat Nagar	A course of electrical Power	

THERMAL ENGINEERING-II

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMT 404	Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

Course Objectives:

- Students will develop an ability towards
- Comprehending major theoretical cyclic processes using vapor and gas as working substances and computing work done and efficiencies thereof.
- Comprehending heat transfer modes and computing heat transferred through conduction, convection and radiation from simple structures.
- Comprehending refrigeration cycles in practice and computing coefficient ofm performance and efficiencies.

Chapter	Topics	Contents	Hours
1.	**Vapor Power Cycles**		12
	1.1	Steam power plant lay out	
	1.2	Steam power plant cycle	
	1.3	Carnot vapor cycle	
	1.4	Rankine vapor cycle	
	1.5	Modifications to Rankine vapor cycles	
	1.6	Qualities of ideal working fluid for vapor power cycle	
	1.7	Binary vapor cycles	
2	**Gas Power cycles**		12
	2.1	Concept of IC Engine	
	2.2	Otto cycle	
	2.3	Diesel cycle	
	2.4	Dual cycle	
	2.5	Comparison of Otto, Diesel and dual cycles	
	2.6	2S and 4S engines and differences thereof	
3	**Fuels and Combustion**		10

	3.1	Hydrocarbon fuels	
	3.2	Combustion reactions (Explanation only), concept of stoichiometric combustion, complete combustion and incomplete combustion	
	3.3	Enthalpy of formation, enthalpy of reaction	
	3.4	Heating values for fuels	
	3.5	Quality of IC Engine fuels: Octane Number and Cetane number	
4	**Heat Transfer**		16
	4.1	Modes of heat transfer	
	4.2	Fourier law of heat conduction, thermal conductivity	
	4.3	Steady state heat conduction in solids (Plane wall, hollow cylinder, hollow sphere)	
	4.4	Convective heat transfer, Newton's law of cooling	
	4.5	Radiation heat transfer, Stefan Boltzman Law	
	4.6	Theories of radiation: Maxwell's theory, Max Planck's theory; Black body radiation	
	4.7	Surface absorption, reflection and transmission	
	4.8	Kirchoff's law relating to spectral emissive power to absoptivity	
	4.9	Heat exchangers: concept, application and classification	
5	**Refrigeration cycles**		10
	5.1	Concept of refrigerators and heat pumps	
	5.2	Reversed Carnot cycle and its limitations	
	5.3	Ideal vapor compression refrigeration cycle	
	5.4	Actual vapor compression refrigeration cycle	
	5.5	Gas refrigeration cycle	

Learning Resources:

Text Books: Engineering Thermodynamics, P. Chattopadhyay

Thermal Engineering: Mahesh M Rathore

FLUID MECHANICS AND HYDRAULIC MACHINES

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMT 405	Semester	4th
Total Period:	75	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Tutorial:	1 P/W	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

Course Objectives

Students will develop an ability towards

- Comprehending fluid properties and their measurements
- Realizing conditions for floatation
- Applying Bernoulli's theorem
- Determining work done and efficiency in hydraulic machines

1.0 Properties of Fluid

1.1 Definitions and Units of Density, Specific weight, specific gravity, specific volume 5

1.2 Definitions and Units of Dynamic viscosity, kinematic viscosity, surface tension

Capillary phenomenon

2.0 Fluid Pressure and its measurements 8

2.1 Definitions and units of fluid pressure, pressure intensity and pressure head

2.2 Concept of atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure

2.3 Pressure measuring instruments

Manometers: Simple and differential

Bourden tube pressure gauge

(Simple Numerical)

3.0 Hydrostatics 8

3.1 Definition of hydrostatic pressure

3.2 Total pressure and centre of pressure on immersed bodies

(Simple Numericals)

3.3 Archimedis' principle, concept of buoyancy, metacentre and metacentric height

3.4 Concept of floatation

4.0 Fluid Flow 10

4.1 Types of fluid flow

4.2 Continuity equation (Statement and proof for one dimensional flow)

4.3 Bernoulli's theorem (Statement and proof)

Applications and limitations of Bernoulli's theorem (Venturi meter, pitot tube)

(Simple Numericals)

4.4 Definition of orifices, Orifice coefficients (Cc, Cv, Cd and relation among them)

5.0 Flow through pipe 10

5.1 Definition of pipe, laws of fluid friction

5.2 Head loss due to friction: Darcy's and Chezy's formula)

5.3 Hydraulic gradient and total gradient line

6.0 Impact of jets 10

6.1 Impact of jet on fixed and moving vertical flat plates, derivation of work done on series of vanes and condition for maximum efficiency

6.2 Impact of jet on moving curved vanes, illustration using velocity triangles, derivation of work done, efficiency

(Simple Numericals)

7.0 Hydraulic turbines 12

7.1 Layout and features of hydroelectric power plant

7.2 Definition and classification of hydraulic turbines

7.3 Construction and working principle of Impulse turbine (Pelton wheel)

Velocity triangle of a single bucket, work done and efficiency in Pelton wheel (Numerical Problems)

7.4 Construction and working principle of Reaction turbine (Francis turbine)

Velocity triangle, work done and efficiency

(Numerical Problems)

Construction and working principle of Kaplan turbine

8.0 Hydraulic Pumps 12

8.1 Definition and classification of pumps

8.2 Centrifugal Pumps

Construction and working principles, velocity diagram of a single impeller, work done

and efficiency (Numerical Problems)

Concept of multistage centrifugal pumps

Cavitation-Causes and its effect

8.3 Reciprocating Pumps

Construction and working principle of single acting and double acting reciprocating pumps

8.4 Concept of slip and negative slip

Learning Resources:

Text Books:	Title of Book	Author
	Fluid Mechanics and Hydraulic Machines	R K Bansal
	Hydraulics, Fluid mechanics and Fluid machines	S Ramamrutham
Reference	Hydraulics and fluid mechanics including hydraulic machines	Modi and Seth
	Fluid Mechanics and Machinery	C S P Ojha, R Berndtsson, P N Chandramouli

ELECTRICAL MACHINE LAB -I

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMP 401	Semester	4th
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P / week	Term Work	25
Maximum marks:	75	End Semester Examination:	50

1. Identification of different terminals of a DC machine by Lamp method and multi-meter & measure insulation resistance.
2. Dimensional and material study of various parts of a DC machine.
3. Plot OCC of a DC shunt generator at constant speed and determine critical resistance from the graph.
4. Perform parallel operation of DC generator.
5. Study of Two point starter, connect and run a DC series motor
6. Study of Three point starter, connect and run a DC shunt motor & measure the no load current.
7. Study of Four point starter, connect and run a DC compound motor with differential, cumulative, short shunt and long shunt field connection.
8. Control the speed of a DC shunt motor by field control method.
9. Control the speed of a DC shunt motor by armature voltage control method.
10. Determine the Load characteristic of a DC shunt motor.
11. Determine the efficiency of a DC machine by brake test method.
12. Identification of terminals, determination of voltage regulation of a single phase transformer and connect them in parallel.
13. Perform OC and SC test of a three phase transformer to determine the losses, efficiency and transformer parameters to draw equivalent circuit.

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMP 402	Semester	4th
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P/W	Term Work	25
Maximum marks:	75	End Semester Examination:	50

Course Objectives:

Students will develop an ability towards

- Measure pressure using different pressure measuring instruments
- Experimentally verify Bernoulli's theorem
- Determination of hydraulic coefficients

Performance evaluation in hydraulic machines

Sr No	Content
1	Study of pressure measuring devices (manometer, Bourdon tube pressure gaguge)
2	Verification of Bernoulli's theorem
3	Determination of Cd from venturimeter
4	Determination of Cc, Cv, Cd from orifice meter
5	Determine of Darcy's coefficient from flow through pipe
6	Performance test in impulse turbine
7	Study of dissected models of turbines and pumps
8.	Performance test in reaction turbine
9.	Performance test in centrifugal pump
10.	Performance test in reciprocating pump

MECHANICAL WORKSHOP PRACTICE

Name of the Course: Diploma in ELECTRICAL AND MECHANICAL ENGINEERING			
Course code:	EMT 403	Semester	3rd
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

1. Carpentry:

1 . 1 Name of carpentry tools and uses

1 . 2 Different operations

a. Sawing
b. Planning
c. Chiseling

1 . 3 Measuring & Marking

1 . 4 Different types of timbers used by carpenters, substitutions of timbers.

1 . 5 Jobs :

a. Slot. Notch
b. Mortise and tenon joint
c. Single dovetail joint

2. Turning

Study of S. C. Lathes and their accessories, practice in lathe work involving various operations such as plane turning, step turning, tapper turning, knuckling and external V. Threading. (One job only.)