STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 4th Semester (Electrical and Mechanical Engineering) (wef 2019-20)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Electrical Machine*	4	1	-	20	80	3	100
Th.2		Fluid Mechanics &Hydraulics Machine	4	1	-	20	80	3	100
Th.3		Electrical Measurement & Instrumentation*	4	-	-	20	80	3	100
Th.4		Generation, Transmission and Distribution*	4		-	20	80	3	100
		Total	16	02		80	320	-	400
		Practical							
Pr.1		Electrical Machine Lab			6	50	50	3	100
Pr.2		Fluid Mechanics &Hydraulics Machine Lab			6	50	50	3	100
Pr.3		Workshop Practice-III			6	50	100	3	150
Pr.4		Student Centered Activities(SCA)		-	3				
		Total	-	-	*21*	*150*	*200*	-	*350*
		Grand Total	**16**	**02**	**21**	**230**	**520**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.									
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester									

CURRICULLUM OF 4TH SEMESTER

For

DIPLOMA IN ELECTRICAL & MECHANICAL ENGINEERING

(Effective FROM 2019-20 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

Th1. ELECTRICAL MACHINE

Name of the Course: Diploma in Electrical & Mechanical Engineering			
Course code:		Semester	4th
Total Period:	60L+ 15T	Examination	3 hrs
Theory periods:	5P/week	IA Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

The application of Rotary and Static Electrical machines find extensive use in modem industries is still in practice. The Electrical machine subject is intended to provide insight the concept of different Electrical Machines with their operation and control. This subject also deals with the fundamental concept of single phase and three phase AC machines.

B. OBJECTIVE:

After Completion of the Subject students will be able to:

1. Understand property & use of Electrical conducting & insulating materials.
2. Explain working principle & construction of DC generator.
3. Explain construction & working principle of motor & speed control of DC motor.
4. Discuss AC fundamentals.
5. Explain Construction & principle of transformer.
6. Describe principle of working of three-phase Induction motor.
7. Describe principle of single-phase motor.

C. TOPIC WISE DISTRIBUTION OF PERIODS:

Sl. No.	Topic	Periods
1.	Electrical material	04
2.	DC generator	10
3.	DC motor	08
4.	Ac circuits	08
5.	Three phase supply	04
6.	Transformer	08
7.	Induction motor	10
8.	Single phase induction motor	05
9.	Alternator	03
	TOTAL	**60**

D. COURSE CONTENT:

1. ELECTRICAL MATERIAL:

1.1. Properties & uses of different conducting material.
1.2. Properties & use of various insulating materials used electrical engineering.
1.3. Types of Magnetic materials & their uses.

2. DC GENERATOR:

2.1. Basic working principle, constructional feature of DC Generator.
2.2. Classification of DC generator with voltage equation.
2.3. Derivation of EMF equation & simple problems.
2.4. Applications of DC generators.
2.5. Parallel operation of DC generators.

3. DC MOTOR:

3.1. Working Principle of a DC motor.
3.2. Concept of development of torque & back EMF in DC motor. (simple problems)
3.3. Derive equation relating to back EMF, Current, Speed and Torque equation.
3.4. Classification of DC motors & their characteristics
3.5. Application of DC motors.
3.6. State & explain three point & four point stator of DC motor.
3.7. Speed control of DC motor by field control and armature voltage control method.
3.8. Explain power stages of DC motor & derive Efficiency of a DC motor.

4. AC CIRCUITS:

4.1. State Mathematical representation of phasors, significant of operator "J".
4.2. Addition, Subtraction, Multiplication and Division of phasor quantities.
4.3. Explain AC series circuits containing resistance, capacitances, Concept of active, reactive and apparent power and Q-factor of series circuits. (Solve related problems)
4.4. Find the relation of AC Parallel circuits containing Resistances, Inductance and Capacitances Q-factor of parallel circuits

5. THREE PHASE SUPPLY:

5. 1 Star and Delta circuit.
5. 2 Line and Phase relationship
5. 3 Power equation with numerical problems

6. TRANSFORMER:

6. 1 State construction & working principle of transformer.
6. 2 Derive of EMF equation of transformer, voltage transformation ratio.
6. 3 Discuss operation of transformer on no-load with phasor diagram.
6. 4 Operation of transformer on load condition in secondary with phasor diagram for different load.
6. 5 Types of losses in Single Phase (1-ø) Transformer.
6. 6 Open circuit & short-circuit test (simple problems).
6. 7 Parallel operation of Transformer.

7. INDUCTION MOTOR:

7. 1 Constructional feature and types of three-phase induction motor.
7. 2 Principle of development of rotating magnetic field in the stator.
7. 3 Working principle of three phase induction motor.
7. 4 Slip speed and slip of induction motor.
7. 5 Establish relation between torque, rotor current and power factor.
7. 6 Explain starting of an induction motor by using DOL and Star-Delta stator.
7. 7 Industrial use of induction motor.

8. SINGLE PHASE INDUCTION MOTOR:

8. 1 Explain construction features and principle of operation of capacitor type and shaded pole type of single-phase induction motor.
8. 2 Explain construction & operation of AC series motor.

9. ALTERNATOR:

9. 1 Concept of alternator & its application.

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3, and 4.

LEARNING RESOURCES:			
Sl.No	**Title of the Book**	**Name of Authors**	**Name of the publisher**
1.	Fundamental of Electrical Engg	B.L.Theraja	S Chand
2.	Electrical Machines	Dr.S.K.Bhattachary	TMH
3.	Electrical Technology	H.Cotton	Pitman
4.	Principle of Electrical Machine	V K Mehta & R Mehta	S Chand

Th2. FLUID MECHANICS AND HYDRAULIC MACHINES

Name of the Course: Diploma in Electrical & Mechanical Engineering			
Course code:		Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. 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

B. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
1.	Properties of Fluid	04
2.	Fluid Pressure and its measurements	06
3.	Hydrostatics	06
4.	Fluid Flow	08
5.	Flow through pipe	08
6.	Impact of jets	08
7.	Hydraulic turbines	10
8.	Hydraulic Pumps	10
	Total	**60**

C. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. Properties of Fluid

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

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

2. Fluid Pressure and its measurements

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. Hydrostatics

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.	**Fluid Flow** 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.	**Flow through pipe** 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.	**Impact of jets** 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.	**Hydraulic turbines** 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). 7.4 Velocity triangle of a single bucket, work done and efficiency in Pelton wheel (Numerical Problems) 7.5 Construction and working principle of Reaction turbine (Francis turbine) 7.6 Velocity triangle, work done and efficiency (Numerical Problems) 7.7 Construction and working principle of Kaplan turbine
8.	**Hydraulic Pumps** 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

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3, 4 and 5.

Learning Resources:			
Sl.No	**Title of the Book**	**Name of Author**	**Publisher**

1.	Fluid Mechanics and Hydraulic Machines	R K Bansal	
2.	Hydraulics, Fluid mechanics and Fluid machines	S Ramamrutham	
3.	Hydraulics and fluid mechanics including hydraulic machines	Modi and Seth	
4.	Fluid Mechanics and Machinery	C S P Ojha, R Berndtsson, P N Chandramouli	

Th3.ELECTRICAL MEASUREMENT & INSTRUMENTATION

(Common to Electrical)

Name of the Course: Diploma in Electrical & Mechanical Engineering			
Course code:		Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4P / week	Internal Assessment :	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE :

The subjects deal with the methods of measuring voltage, current, power, energy, frequency, power factor & line parameters, 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. Also accuracy, precision, resolution and errors and their correction are very important and have been fully discussed. Since the whole system is a combination of analog and digital system in Industry, the topics of both the system have been studied along with the topics of sensors, their characteristics and their interfacing with analog and digital system under this subject.

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.
6. To acquire knowledge of the construction, characteristics and methods of usage of sensors and transducers.

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
1.	Measuring instruments	05
2.	Analog ammeters and voltmeters	10
3.	Wattmeter and measurement of power	08
4.	Energy meters and measurement of energy	08
5.	Measurement of speed, frequency and power factor	07
6.	Measurement of Resistance, Inductance& Capacitance	08
7.	Sensors And Transducer	09
8.	Oscilloscope	05
	TOTAL	**60**

D. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. MEASURING INSTRUMENTS

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

2.1. Describe Construction, principle of operation, errors, ranges merits and demerits of:
  2.1.1 Moving iron type instruments.
  2.1.2 Permanent Magnet Moving coil type instruments.
  2.1.3 Dynamometer type instruments
  2.1.4 Rectifier type instruments
  2.1.5 Induction type instruments
2.2 Extend the range of instruments by use of shunts and Multipliers.
2.3 Solve Numerical

3. WATTMETERS AND MEASUREMENT OF POWER

3.1 Describe Construction, principle of working of Dynamometer type wattmeter. (LPF and UPF type)
3.2 The Errors in Dynamometer type wattmeter and methods of their correction.
3.3 Discuss Induction type watt meters.

4. ENERGYMETERS AND MEASUREMENT OF ENERGY

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

5. MEASUREMENT OF SPEED, FREQUENCY AND POWER FACTOR

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.

6. MEASUREMENT OF RESISTANCE, INDUCTANCE& CAPACITANCE

6.1 Classification of resistance
  6.1..1. Measurement of low resistance by potentiometer method. .
  6.1..2. Measurement of medium resistance by wheat Stone bridge method.
  6.1..3. Measurement of high resistance by loss of charge method.
6.2 Construction, principle of operations of Megger & Earth tester for insulation resistance and earth resistance measurement respectively.
6.3 Construction and principles of Multimeter. (Analog and Digital)
6.4 Measurement of inductance by Maxewell's Bridge method.
6.5 Measurement of capacitance by Schering Bridge method

7. SENSORS AND TRANSDUCER

7.1. Define Transducer, sensing element or detector element and transduction elements.
7.2. Classify transducer. Give examples of various class of transducer.
7.3. Resistive transducer
  7.3.1 Linear and angular motion potentiometer.
  7.3.2 Thermistor and Resistance thermometers.

7.3.3 Wire Resistance Strain Gauges

7.4. Inductive Transducer

7.4.1 Principle of linear variable differential Transformer (LVDT)

7.4.2 Uses of LVDT.

7.5. Capacitive Transducer.

7.5.1 General principle of capacitive transducer.

7.5.2 Variable area capacitive transducer.

7.5.3 Change in distance between plate capacitive transducer.

7.6. Piezo electric Transducer and Hall Effect Transducer with their applications.

8. OSCILLOSCOPE

8.1. Principle of operation of Cathode Ray Tube.

8.2. Principle of operation of Oscilloscope (with help of block diagram).

8.3. Measurement of DC Voltage & current.

8.4. Measurement of AC Voltage, current, phase & frequency.

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3 and 4.

Learning Resources:			
Sl.No	**Title of the Book**	**Name of Author**	**Publisher**
1.	Electrical & Electronic Measurements and Instrumentation	R.K.Rajput	S.Chand
2.	Electric Measurement and Measuring instruments	A.K. Sawhney	Dhanpat Rai & Co
3.	Electrical and Electronics Measuring instruments and Measurement	J. B. Gupta	S K Kataria & Sons
4.	Electrical Measurement and Measuring instruments	E.W. Golding & H Widdis	Wheeler Publishing
5.	Industrial Instrumentation and Control	S K Singh	TMH Ltd.
6.	Electrical and Electronic Measurement and Instrumentation.	S K Bhattacharya	Vikas

Th4. GENERATION TRANSMISSION & DISTRIBUTION

(Common to Electrical)

Name of the Course: Diploma in Electrical & Mechanical Engineering			
Course code:		Semester	4th
Total Period:	75 (60L + 15T)	Examination	3 hrs
Theory periods:	4P / week	Internal Assessment	20
Tutorial:	1 P / week		
Maximum marks:	100	End Semester Examination:	80

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 students.

B. OBJECTIVES :

After completion of this subject the student will be able to:

1. Different schemes of power 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 Elementary idea on generation of electricity from Thermal, Hydel, Nuclear, Power station.

1.2 Introduction to Solar Power Plant (Photovoltaic cells).
1.3 Layout diagram of generating stations.

2. TRANSMISSION OF ELECTRIC POWER

2.1 Layout of transmission and distribution scheme.
2.2 Voltage Regulation & efficiency of transmission.
2.3 State and explain Kelvin's law for economical size of conductor.
2.4 Corona and corona loss on transmission lines.

3. OVER HEAD LINES

3.1 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 Sag in overhead line with support at same level and different level. (approximate formula effect of wind, ice and temperature on sag)
3.5 Simple problem on sag.

4. PERFORMANCE OF SHORT & MEDIUM LINES

4.1. Calculation of regulation and efficiency.

5. EHV TRANSMISSION

5.1 EHV AC transmission.
5.1..1. Reasons for adoption of EHV AC transmission.
5.1..2. Problems involved in EHV transmission.
5.2 HV DC transmission.
5.2..1. Advantages and Limitations of HVDC transmission system.

6. DISTRIBUTION SYSTEMS

6.1 Introduction to Distribution System.
6.2 Connection Schemes of Distribution System: (Radial, Ring Main and Inter connected system)
6.3 DC distributions.
6.3.1 Distributor fed at one End.
6.3.2 Distributor fed at both the ends.
6.3.3 Ring distributors.
6.4 AC distribution system.
6.4.1. Method of solving AC distribution problem.
6.4.2. Three phase four wire star connected system arrangement.

7. UNDERGROUND CABLES

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

8. ECONOMIC ASPECTS

8.1 Causes of low power factor and methods of improvement of power factor in power system.

8.2 Factors affecting the economics of generation: (Define and explain)

8.2.1 Load curves.
8.2.2 Demand factor.
8.2.3 Maximum demand.
8.2.4 Load factor.
8.2.5 Diversity factor.
8.2.6 Plant capacity factor.

8.3 Peak load and Base load on power station.

9. TYPES OF TARIFF

9.1. Desirable characteristic of a tariff.

9.2. Explain flat rate, block rate, two part and maximum demand tariff. (Solve Problems)

10. SUBSTATION

10.1 Layout of LT, HT and EHT substation.
10.2 Earthing of Substation, transmission and distribution lines.

Syllabus coverage up to Internal assessment

Chapters: 1, 2, 3, 4 and 5.

Learning Resources:			
Sl.No	**Title of the Book**	**Name of Author**	**Publisher**
1.	Principles of Power System	V. K. Mehta	S Chand
2	A text book of Power System Engineering	A Chakrabarti, M L Soni, P V Gupta, U S Bhatnagar	Dhanpat Rai & Co
3.	A course of electrical power system	S. L. Uppal	Khanna publisher
4.	Power System Engineering	D. P. Kothari, IJ Nagrath	TMH

Pr1. ELECTRICAL MACHINE LAB

Name of the Course: Diploma in Electrical & Mechanical Engineering			
Course code:		Semester	4th
Total Period:	90	Examination	3 hrs
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

A: RATIONALE:

This Lab gives understanding of different Electrical Machine i.e. Transformer, DC / AC Generator & Motor etc. The students will able to identify different parts; perform testing of terminals and insulation testing, connections and running of the machines. They will be able to measure the electrical parameters to determine regulation & efficiency with speed control of motors. Common electrical skill improvement exercises are to be performed.

B: OBJECTIVES:

On completing of this Laboratory Course the students will able to:

1 Test the AC and DC machines, connect & run.
2 To determine, power consumption, efficiency and regulation.
3 To determine the machine Control and the speed of motors.

C: COURSE CONTENT OF SPECIFIC OBJECTIVE:

1. Measurement of Power of a single phase AC supplied load by voltmeter, ammeter and power factor meter and verification of result connecting a watt meter.
2. Measurement of three phase power using two watt meter method.
3. Study of different parts and identification of terminals and testing of insulation resistance of a DC machine, Run a DC shunt Generator & measure speed.
4. Study of 3 point & 4 point starter.
5. Speed variation of DC shunt motor by field control and armature voltage control method.
6. Parallel operation of DC generators.
7. Connect & run a 3-phase Induction Motor using DOL & star-delta stator.
8. Identification of terminals and determination of transformation ratio of a single phase transformer.
9. Determine voltage regulation of transformer by direct loading.
10. To perform short circuit & open circuit test & find the losses & efficiency.
11. Construct switch board using cut-out, switches, plugs, holder and two ways Switch.

Pr2. FLUID MECHANICS & HYDRAULICS MACHINE LAB

Name of the Course: Diploma in Electrical & Mechanical Engineering			
Course code:		Semester	4th
Total Period:	90	Examination:	3 hrs
Lab. periods:	6 P / week	Sessional:	50
Maximum marks:	100	End Semester Examination ::	50

A. **Course Objectives:**

Students will develop an ability towards

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

B. Performance evaluation in hydraulic machines

1. Study of pressure measuring devices (manometer, Bourdon tube pressure gauge)
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

Pr3. WORKSHOP PRACTICE - III

Name of the Course: Diploma in Electrical & Mechanical Engineering			
Course code:		Semester	4th
Total Period:	90	Examination:	3 hrs
Lab. periods:	6 P / week	Sessional:	50
Maximum marks:	150	End Semester Examination ::	100

Course Objectives:

Students will develop an ability towards

1. Preparing components and jobs using foundry, welding and machining.
2. Realizing process parameters involved and their effects

1. Foundry Practices

1.1. Preparation of: simple moulds.

1.2. Preparation of cores.

1.3. Job involving ferrous/non ferrous casting

2. Welding Practices

2.1. Butt joint through Arc welding

2.2. Lap joint through Gas welding

2.3. Joining two non-ferrous parts through TIG/MIG

3. Machining Practices

3.1. Job involving: drilling, boring.

3.2. Internal threading

3.3. Job involving use of Capstan turret lathe