

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

DISCIPLINE: MECHATRONICS ENGINEERING						SEMESTER: 3RD							
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.	MCT 301	MACHINETOOL TECHNOLOGY	4	-	-	10	20	30	70			100	
2.	ELT 321	ELECTRICAL ENGG.SCIENCE	4	-	-	10	20	30	70			100	
3.	ETT 321	BASIC ELECTRONICS	4	-	-	10	20	30	70			100	
4.	ETT 322	DIGITAL ELECTRONICS	4	-	-	10	20	30	70			100	
5.	MCT 302	ENGG. METROLOGY	4	-	-	10	20	30	70			100	
PRACTICAL/TERM WORK													
1	MCP 301	AUTO CAD	-	-	6					25	50	75	
2	MCP 302	WORK SHOP PRACTICE	-	-	6					25	50	75	
3	ELP 321	ELECTRICAL LAB PRACTICE	-	-	4					25	25	50	
4	ETP 322	ELECTRONICS LAB PRACTICE	-	-	3					25	25	50	
GRAND TOTAL			20	-	19	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%

MACHINETOOL TECHNOLOGY

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	MCT 301	Semester	3 rd
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

General objective:

Trainees will be able to understand the mechanical concepts used in various bench works.

SLNO	Major Topics	Time allotted
		Total periods:60
01	Safety	01
02	Bench work & fitting	06
03	Theory of metal cutting	05
04	Cutting fluid & its importance	01
05	Drilling machine	06
06	Lathe machine	10
07	Milling machine	10
08	Grinding machine	08
09	Shaper, planer, slotter	08
10	Press & press tools	05

SUBJECT CONTENT:

1. SAFETY

- a. Safety in workshop, Personal Safety causes of accidents and remedies for it.
- b. Importance Of safety.

2. Bench work and fitting

- a. Hand tools and devices, Bench Layouts, Types of vices, Types and specification of files, Hack saw frame and blades, Types of chisel and angles, Hammer and types of hammer, scraper and its types.
- b. Fitting operations: chipping, filing, scrapping, grinding, marking, sawing, drilling, reaming, dieing, tapping etc.

3. Theory of metal cutting

- a. Theory of chip removal, orthogonal and oblique cutting, speed, feed
- b. & depth of cut.
- c. Cutting tool material & its properties. Geometry of single point
- d. Cutting tool.

4. Cutting fluids and its importance

- a. Importance of cutting fluids, types and its application.
- 5. **Drilling machine**
 - a. Introduction to drilling machine, Types, specification, mechanism
 - b. Operation, work holding and tool holding devices.
 - c. Drills—Nomenclature of twist drill, types, material, size designation as per ISI, sharpening of drills, counter boring & wanter sinking.
 - d. Reamers and Taps—Types, importance and operation.
- 6. **Lathe machine**
 - a. Introduction to Lathe, types of Lathe, parts of Lathe-Bed, Headstock, Tailstock carriage, & Lead screw. Lathe accessories & attachments.
 - b. Driving mechanism, feed mechanism, thread cutting.
 - c. Lathe operations—Plain, step, taper turning & it is calculation, facing etc.
 - d. Function and nomenclature of screw threads, types of thread-acme, knuckle, buttress, trapezoidal, square metric, BSW.
- 7. **Milling machine.**
 - a. Introduction to milling machine, Types, attachment and accessories work and tool holding devices.
 - b. Geometry of milling cutter, cutting speed, feed, & depth of cuts.
 - c. Different types of milling operation: up-milling, down milling, face Milling, side milling, plain milling, end milling, m-milling, gang milling, straddle milling.
- 8. **Grinding machine.**
 - a. Introduction to grinding machine types.
 - b. Grinding operations-Types, wet and dry grinding.
 - c. Grinding wheel—Specification, abrasive, grain, grade, structure, and types of wheel, dressing of wheel, mounting and balancing and its importance.
- 9. **Shaper, planer, slotter**
 - a. Introduction, working principle of shaper, planer & slotter.
 - b. Quick return mechanism, haper took, planer tool, slotter tool.
- 10. **Presses and press tools**
 - a. Classifications, constructional features, types, working principle
 - b. Press tools—Punch, die, material, clearance between punch & die. Types of dies.
 - c. Press working- Various working operations, it's definition.
 - 1. Modern Workshop practice -Wright Bake
 - 2. Industrial safety management -Deshmukh
 - 3. Strength of material -Timmoshanko& young.

Learning Resources:[Text Books]			
Sl.No	Name of Authors	Title of the Book	Name of the publisher
1.	W.A.j Chapman	Work shop Technology (part 1 & part2	
2.	HazarChoudhury	Work shop Technology (part1 & part2)	
3.	H.Gerline	All about Machine Tools	
4.	Wright Bake	Modern Workshop practice	
5.	Deshmukh	Industrial safety management	
6.	Strength of material	Strength of material	

ELECTRICAL ENGG.SCIENCE

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	ELT 321	Semester	3 rd
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 :

- To study design and build different types of transforms.
- To study and understand the construction and work of DC Generator types and their characteristics.
- To study and understand various types of Motors and its control.
- To study the operation of various special purpose Motors.
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MAJOR TOPICS

1. TRANSFORMERS
2. DC GENERATORS
3. DC MOTORS
4. INDUCTION MOTORS
5. SPECIAL PURPOSE MOTORS
6. ALTERNATORS

UNIT-1

1.0 TRANSFORMERS

15

- 1.1 Definition, Construction & Principle of operation
- 1.2 Application of different types of Transforms (Two winding & Auto)
- 1.3 Single phase Transformer
- 1.4 EMF Equation and Voltage Transformers Ratio
- 1.5 Tests on transformers-OC & SC Test
- 1.6 Losses and Efficiency of a Transformer
- 1.7 Three phase Transformer and Connections
- 1.8 Auto Transformers- Principle & working
- 1.9 Parallel operation of 3 phase transformer
- 1.10 Protection system of transformer
(Buchholz relay, PRV, OSR etc)

UNIT-2

1.0 GENERATORS

7

- 2.1 DC Generator principle, Construction & working
- 2.2 Parts of a Generator
- 2.3 EMF Equation of a Generator
- 2.4 Classification of Generators depends on various considerations
- 2.5 AC Generator, principles, Construction & working.

3.0 DC MOTORS

9

- 3.1 Motor principle, Comparison of Motor and Generator principle
- 3.2 Back EMF and Voltage Equation of a Motor

- 3.3 Torque, Armature Torque and Shaft Torque
- 3.4 Rated Speed and Speed Regulation
- 3.5 Speed Control of Dc Motors
- 3.6 Electric Braking of Motors

UNIT—3

4.0	MOTOR CHARACTERISTICS	4
4.1	T vs Ia, Nvs Ia of a DC Shunt motor	
4.2	T vs Ia, Nvs Ia of a DC Series motor	
4.3	T vs Ia, Nvs Ia of a DC Computer motor	
4.4	All types of DC motor application	
5.0	INDUCTION MOTORS	14
5.1	General Principle & Construction	
5.2	Classification of Ac Motors	
5.3	Single phase and Three phase Induction Motors	
5.4	Starting of Induction Motor	
5.5	Relationship between Slip, Torque	
5.6	Power stages in Induction Motor	
5.7	Speed Control of an Induction Motor	
5.8	Different types of starter (DOL, RDOLetc)	
5.9	Different types of motor over load relays, Motor protection	

UNIT---4

6.0	SPECIAL PURPOSE MOTORS	8
6.1	Universal motors and its spatiality	
6.2	Stepper Motors and Hysteresis motor and PMDC Motor, Stepper Motor.	
6.3	Introduction to Servo Motor, Repulsion Motors Reluctance Motor	
7.0	ALTERNATORS	3
7.1	Basic Principle & Details of Construction	
7.2	Stationary Armature & Rotor	
7.3	Speed and Frequency Relation	
7.4	Parallel operation	

Learning Resources:[Text Books]			
Sl.No	Name of Authors	Title of the Book	Name of the publisher
1.	B.L.Thereja	Electrical Technology - Volume—II	
2.	H. Cotton	Electrical Machines	
3.	J.B. Guptha	Electrical Machines	
4.	Cathey	Basic Electrical Engg	
5.	Kothari &Nagrath	Basic Electrical Engineering	
6.	Strength of material	Strength of material	

BASIC ELECTRONICS

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	ETT 321	Semester	3 rd
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 :

- To study about diode and transistor
- To study and analyse the operation of Differential Amplifier
- To Familiarize with Op Amp Parameters.
- To study the applications of liner and non linear Op Amp circuits.
- To Familiarize with the operation of fixed and variable voltage regulators.

MAJOR TOPICS

- 1 DIODE & TRANSISTOR
- 2 POWER AMPLIFIERS
- 3 DIFFERENTIAL AMPLIFIERS
- 4 OPEATIONAL AMPLIFIERS
- 5 LINEAR OP-AMP CIRCUITS
- 6 NON LINEAR OP-AMP CIRCUITS
- 7 FILTERS & OSCILLATORS
- 8 REGULATED POWER SUPPLIES

UNIT-1

4

- 1.0 Application of Diode as Half wave & full wave rectifier
- 1.1 Clipper & Clamper Circuit 1
- 1.2 C E, C, B & C.C type of configurations
- 1.3 Characteristics of transistor & its working as an amplifier

2.0 **POWER AMPLIFIERS**

8

- 3.0 2.1 Amplifier Terms—DC Load Line—AC Load Line
- 2.2 Classes of Operations
- 2.3 Types of Coupling and Frequency ranges, Power Rating of a Transistor.
- 2.4 Frequency effects—Frequency Response of an amplifier Decibel
Power and Voltage Gain

3.0 **DIFFERENTIAL AMPLIFIERS**

7

- 3.1 Introduction
- 3.2 DC and AC Analysis of Differential Amplifiers
- 3.3 Input Characteristics
- 3.4 Common Mode Gain and CMRR
- 3.5 Simple Problems on Differential Amplifiers

UNIT-2

4.0 **OPERATIONAL AMPLIFIERS**

8

- 4.1 Introduction & Pin Configuration of Op Amp 741
- 4.2 Block Diagram of 741 Op Amp
- 4.3 Op Amp Parameters—Slew Rate, Bias, Offset, Input & Output Impedance.

- 4.4 Ideal Op-Amp and Open and loop operation of-Amp
 4.5 Data sheet of Op-Amp 741
5.0 LINEAR OP AMP CIRCUITS
 5.1 Inverting Amplifier Circuits—Applications
 5.2 Non inverting Amplifier circuits--Applications
 5.3 Voltage follower, Instrumentation Amplifier & Summing Amplifiers Circuits.
 5.4 Current Boosters and Current Sources

8

UNIT-3

- 6.0 NON LINEAR OP AMP CIRCUITS**
 6.1 Comparator Circuits and Zero Crossing detector Integrator and Differentiator
 6.2 V/I convertor, I/V convertor
 6.3 Waveform Generators-Square, Triangular, Saw tooth Waveform and Converter
 6.5 Schmitt Triggering circuit
7.0 FILTERS AND OSCILLATORS
 7.1 Ideal Responses
 7.2 Low pass and High pass filters
 7.3 Band Pass, Band Stop and All Pass Filters & Basics about active filters.
 7.4 Sinusoidal Oscillators
 7.5 RC and LC Oscillators
 7.6 Timer IC 555—Pin configuration, Monostable, Astable Operation and its application

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- 8.0 REGULATED POWER SUPPLIES**
 8.1 Power supply characteristics
 8.2 Series and Shunt Regulators
 8.3 Linear and Switching Regulations
 8.4 Variable Regulators—LM317

8

Reference Books :

- 1 Electronic Principles -- Malvino
 2 Linear Integrated Circuits -- D.RoyChoudhury
 Skail Jain
 2 OP-AMPS and Linear Integrated Circuits -- RamakantA.Gayakwad
 3 Liner Integrated circuits -- Salvahanvan
 4 Basic Electronics & Linear Circuits -- Bhargva

Learning Resources:[Text Books]			
Sl.No	Name of Authors	Title of the Book	Name of the publisher
1.	Malvino	Electronic Principles	
2.	D.RoyChoudhury	Linear Integrated Circuits	Sk. Jain
3.	RamakantA.Gayakwad	OP-AMPS and Linear Integrated Circuits	
4.	Salvahanvan	Liner Integrated circuits	
5.	Bhargva	Basic Electronics & Linear Circuits	

DIGITAL ELECTRONICS

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	ETT 322	Semester	3 rd
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

GENERAL OBJECTIVE :

1. To understand the difference between analog and digital system.
2. To familiarize with number system and logic gates.
3. To familiarize with logic circuit design using Boolean expression and Karnaugh map technique.
4. To familiarize with counters and registers.
5. To familiarize with data converters and logic families.
6. To understand timing circuits

Sl.No.	Major Topics	Time allotted Total Periods : 60
1.	Introduction	02
2.	Number Systems and codes	04
3.	Logic gates	04
4.	Boolean algebra and karnaugh maps	06
5.	Combinational logic circuits	10
6.	Latches and flip flops	10
7.	Timers and timing circuits	08
8.	Sequential logic circuits	10
9.	Data Converters	04
10.	Integrated logic families	02

SUBJECT CONTENT :

1.0 Introduction :

Introduction to Digital System – Difference between Analog and Digital Systems. Logic Levels and Pulse Waveforms – Elements and Functions of Digital Logic. Digital Integrated Circuits.

2.0 Number System and Codes :

Decimal, Binary, Octal Hexadecimal Numbers – 9s & 10s Complements – 1s & 2s Complements, Conversion of Number Systems – BCD Code, Digital Codes – Gray, Excess-3 Alphanumeric Codes, ASCH, EBCDIC Codes.

3.0 Logic Gates :

Inverter, AND OR NAND NOR – Gate Propagation Delay Time – Power Dissipation Noise Immunity. Fan In & Out – Loading Considerations.

4.0 Boolean Algebra & Karnaugh Maps :

Boolean Operations – Logic Expressions – Rules and Laws of Boolean Algebra DeMorgan's Theorem – Simplifications of Boolean Expressions – Karnaugh Map.

5.0 Combinational Logic – Circuits :

AND – OR Logic AOL Logic, XOR Logic – Universal Properly of NAND and NOR Logic – Half and Full Adders – Decoders and Encoders – Multiplexers and Demultiplexers – Parity Generators and Checkers.

6.0 Latches & Flip Flops :

Latches – Different Types of Latches – Latch Operation – Flip Flops – Different Types of Flip Flops – Flip Flops Operations – Operating Characteristics – Applications of Flip Flops.

7.0 Timers & Timing Clrcuits :

Multivibrators – One Shot AstableMultivibrators – 555 Timer – Block Diagram – Modes of Operation and Application – ic Mono shots – Application of Timing Circuits.

8.0 Sequential Logic Circuits :

Introduction to Counters – Asynchronous Counters – Synchronous Counters – Up/Down Counters – Cascaded Counters – Counter ICs – Counter Decoding – Counter Applications – Counter Design – Introduction Registers – Types of Registers – SISO SIPO PISO PIPO Bidirectional Still Registers - Shilt Register Counters – Shilt Register Applications.

9.0 Data Converters :

Introduction to D/A Converters – Types of D/A Converters Specifications Applications – Introduction to A/D Converters – Types of A/D Converters Applications.

10.0 Integrated Logic Families :

Introduction to Logic Families – TTL Logic – CMOS Logic – TTL driving CMOS – CMOS driving TTL – ECL Circuits – PL Circuits.

Learning Resources:[Text Books]			
Sl.No	Name of Authors	Title of the Book	Name of the publisher
1.	Thomas L. Floyd	Digital Fundamentals	
2.	Floyd and Jain	Digital Fundamentals	
3.	Samuel C. Lee	Digital Circuit and Logic Design	
4.	Malvino& Leech	Digital Fundamentals	
5.	Mub Still Long	Analog Integrated Circuits	TMH
6.	Mano	Digital Electronics	
7.	Solimiba Lunar Mandil	Digital Electronics	TMH

ENGG. METROLOGY

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	MCT 302	Semester	3 rd
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

GENERAL OBJECTIVE :

1. To familiarize with different measuring instruments and their working principles.
2. Familiarize with marking and marking tools.
3. To make the trainees learn about tolerance.
4. To impart knowledge on different types of gauges.
5. To create understanding on common measuring errors and need to calibrate instruments.

Sl.No.	Major Topics	Time allotted Total Periods : 60
1.	Introduction to Metrology measuring instruments and their importance.	16
2.	Limits Fits and Tolerances	13
3.	Gauges	05
4.	Screw thread Measurements and Surface Texture measurements.	06
5.	Optical Measuring Instruments	04
6.	Comparators	04
7.	Measurement of Mass Weight Force and Torque	06
8.	Speed Measurement.	03
9.	Errors in measurements and Calibration	03

SUBJECT CONTENT :

1.0 Introduction to Metrology, measuring instruments and their importance :

- 1.1 What is measurement, aims, methods of measurements, static measurements and time element in measurement.

2.0 Limits, Fits and Tolerance :

- 2.1 Necessity of tolerance in manufacturing system, Limit System – normal size, basic size, actual size, allowance limits, upper and lower tolerance, unilateral, bilateral.
- 2.2 Fits – Hole basis system and Shaft basis system. Types of fits namely, interference, transition, clearance.
- 2.3 ISO tolerance – 25 fundamental deviations, 18 – tolerance grades, symbols – numeral, letter, deviation – upper and lower.

3.0 Gauges :

- 3.1 Gauges Necessity, types namely limit gauges, optical gauges, pneumatic and electronic, materials for gauges, gauge tolerance, types of limit gauges namely plug gauge, ring gauge etc.
- 3.2 Slip gauges – Description of slip gauge grade, number of blocks, wringing.

4.0 Screw Thread Measurement and Surface Texture Measurement :

- 4.1 Thread parameters, errors in thread pitch, progressive, periodic, irregular error, measurement of various elements – pitch diameter, use of screw thread micrometer, three wire measurements, selection wire diameter, necessary calculation.
- 4.2 Meaning of surface texture, measurement definition, primary texture, secondary texture, lay sampling length, mean line of profile, center line of profile. Method of measuring – comparison method, touch method, visual inspection, microscopic inspection, surface photographs. Direct measurements – stylus probe instruments, parts, skid, stylus, amplifying device, mean for analyzing the trace.

5.0 Optical Measuring Instruments :

- 5.1 Interferometry principle, interference wavelength, wave in face, wave out face formation interference, interference bands and optical flat method of checking.
- 5.2 Tool maker's microscope principle advantages working principles.
- 5.3 Optical projector parts working principles, measuring techniques, comparison method – measurement.

6.0 Comparators :

- 6.1 What is comparator classification based on magnification, advantages and disadvantages.
- 6.2 Mechanical comparator – Types working principles, mechanism etc.
- 6.3 Optical comparator, electronic comparator – working principles, method of use.

7.0 Measurement of Mass, Weight, Force and Torque :

- 7.1 Measuring instruments used for mass, weight, force and torque.

8.0 Speed Measurement :

- 8.1 Introduction, mechanical tachometers, electrical, tachometers, types like contactless, frequency type etc.

9.0 Errors in Measurements and Calibration :

- 9.1 Measurement error, types, controllable and systematic error, calibration error due to temperature pressure.
- 9.2 Calibration of vernier instruments zero errors, parallelism of measuring jaws, calibration of micrometer, zero setting – flatness of measuring jaws.

Learning Resources:[Text Books]			
Sl.No	Name of Authors	Title of the Book	Name of the publisher
1.	R.K. Jain	Engineering Metrology	
2.	R.K. Jain	Mechanical & Industrial Measurement	
3.	M.K. Khare	Dimensional Metrology	
4.	K.J. Jume	Engineering Metrology	
5.	M.W. Raman	Quality Control	
6.	Singh	Industrial Instrumentation & Control	

AUTO CAD

Name of the Course: Diploma in MECHATRONICS ENIGINEERING			
Course code:	MCP 301	Semester	3 rd
Total Period:	90	Examination	4hrs
Lab. periods:	6P/W	Term Work	25
Maximum marks:	75	End Semester Examination:	50

1.0	<u>INTRODUCTION TO COMPUTERS AND ITS APPLICATIONS</u>	22
1.1	Definition of Computer – Computer Applications – Classification Parts of Computer – Functions – I/O Devices – Computer Peripherals Hardware & Software – Categories of Software – Operating System Functions of Operating Systems – Computer Languages.	
1.2	DOS – Internal Commands & External Commands Practice Exercise.	02
1.3	Introduction to Windows Operating System Practice Exercise.	03
1.4	Exploring MS Office (MS Word, MS Excel, MS Power Point)	04
1.5	One simple project in MS Word, MS Excel, MS Power Point.	10
2.0	<u>INTRODUCTION TO AUTO CAD</u>	40
2.1	Importance of Auto CAD menu selection, begin new drawing, editing 10 existing drawing and practice simple drawing.	
2.2	Co-ordinate system in CAD-absolute, relative and polar	05
2.3	Introduction to utility commands – Help, End, Quit, Save, Limits, Units Practice.	05
2.4	Introduction to entity draw commands –Line, Point Circles, Oups, Undo Copy, Move practice.	05
2.5	Introduction to display commands – Zoom, Pan, Redraw practice	05
2.6	Layers and its uses.	05
2.7	Various file formats – export and import of files.	05
3.0	ORTHOGRAPHIC PROJECTIONS CONTINUED	28
3.1	Exercises on drawing the 3 views of different types of objects in 1 st angle Projection.	28

Reference Books :

1. Auto CAD 2000 - George Omura
2. CAD/CAM – Principle & Applications - Rao

WORK SHOP PRACTICE

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	MCP 302	Semester	3 rd
Total Period:	90	Examination	4hrs
Lab. periods:	6P/W	Term Work	25
Maximum marks:	75	End Semester Examination:	50

OBJECTIVES :

- Introduced to importance to different angles required for single point cutting tool.
- Practicing for different angle grinding on pedestal grinding machine.
- Introduced to lathe machine and different turning operations.
- Practicing various turning operations such as straight, steps, taper etc.
- Practicing of die passing on lathe machine.
- Introduced to milling to milling machine and different milling operations.
- Practicing the setting of work piece on machine.
- Practicing of various milling operations such as face, step millings etc.
- Introduced to surface grinding, cylindrical grinding machine and its operations.
- To understand the importance of grinding and practicing different surface grinding .
- Practicing sheet metal fabrication and to understand as importance.
- Introduced to welding process and welding machine.
- Practicing edge preparation and welding operations.
- Practice on shaper, planer and shotter.

Sl.No.	Exercise Name	Periods
1	Tri Square	11
2	Right Hand Knife Tool Grinding	4
3	Straight Roughing Tool Grinding	4
4	Taper Plug Gauge	7
5	Stud	9
6	T—Nut	7
7	Channel Milling	7
8	Parallel Block Grinding	7
9	Tray	4
10	Dust Pan	4
11	Cylinder	4
12	T—weld (Welding Exercise)	6
13	Engraving work Practice	3
14	Practice on shaper, planer and slotter	13

ELECTRICAL LAB PRACTICE

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	ELP 321	Semester	3 rd
Total Period:	60	Examination	4hrs
Lab. periods:	4P/W	Term Work	25
Maximum marks:	50	End Semester Examination:	25

Sl No.	Topic	Periods
TRANSFORMERS		08
1.	Transformer Familiarization.	01
2.	Transformation Ratio, Potently lest and measurement of internal resistance/.	01
3.	Open circuit characteristics on DC Separately excited Generator.	02
4.	Load test on Single phase Transformer.	02
5.	Three phase Transformer Star and Delta Connection	02
GENERATORS		12
6.	Open circuit characteristics on DC Self excited Generator	04
7.	Open circuit characteristics on DC Separately excited Generator.	04
8.	Load test on DC Generator.	04
MOTORS		40
9.	Characteristics of DC Series Motor.	04
10.	Characteristics of DC Shunt Motor.	04
11.	Familiarization of inner / Contractors	04
12.	Speed Control of DC Motor by varying armature voltage.	04
13.	Speed Control of DC Motor by varying Flux.	04
14.	Starting of Induction Motor by Auto Transformer	04
15.	Starting of Induction Motor by star-Delta Starter	04
16.	Starting Induction Motor by D.O.L starter	04
17.	Automatic starting of three phase induction	04
18.	Automatic operation of tow three phase induction motor	04

ELECTRONICS LAB PRACTICE

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	ELP 321	Semester	3 rd
Total Period:	45	Examination	4hrs
Lab. periods:	3P/W	Term Work	25
Maximum marks:	50	End Semester Examination:	25
Sl No.	Major Topics		Time allotted
			Total Period 45
1.	Introduction and familiarization		08
2.	Rectifiers, clippers and clampers		17
3.	Transistor Characteristics		10
4.	Characteristics of FET		10

SUBJECT CONTENT :

1.0 Introduction and Familiarization

- 1.1 Lab safety, usage of toolkit and lab procedure
- 1.2 Familiarization with CRO
- 1.3 Familiarization of resistors by comparing using color codes and DMM
- 1.4 VI – Characteristics Diode.

2.0 Rectifiers, clippers and clampers.

- 2.1 Half wave rectifiers with and without filters.
- 2.2 Full wave rectifiers with and without filters.
- 2.3 Bridge rectifiers with and without filters.
- 2.4 Zener diode characteristic
- 2.5 Zener diode as regulator
- 2.6 Positive and negative clipper circuit using diodes.
- 2.7 Positive and negative clampers using diodes.
- 2.8 Voltage double.

3.0 Transistor Characteristics

- 3.1 Transistor Characteristics
 - (i) I_c VS I_B
 - (ii) V_{BE} vs I_n
 - (iii) V_{BE} VS I_C
- 3.2. Transistor Biasing with voltage divider.
- 3.3. Transistor as switch using LED and photo diode.
- 3.4. CE amplifier, frequency response and Bandwidth.

4.0 Characteristics of FET

- 4.1 Characteristics OF FET – Trans conductance
- 4.2 JEET as switch
- 4.3 Amplifier using JEET
- 4.4 Analog multiplexer using JGET.
- 4.5 Input and Transfer Characteristics of MOSFET
- 4.6 MOSFET as switch