

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 3rd Semester *MECHATRONICS 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		Machine tool Technology	4		-	20	80	3	100
Th.2		Electrical Engg. Science & Electronic Circuit	4		-	20	80	3	100
Th.3		Digital Electronics	4		-	20	80	3	100
Th.4		Engg. Metrology	4		-	20	80	3	100
Th.5		Environmental studies	4		-	20	80	3	100
		<i>Total</i>	20			100	400	-	500
Practical									
Pr.1		Auto cad	-	-	4	25	50	3	75
Pr.2		Work shop practice	-	-	5	25	50	3	75
Pr.3		Electrical Lab practice	-	-	4	25	25	3	50
Pr.4		Electronics Lab practice	-	-	3	25	25	3	50
		<i>Student Centred Activities(SCA)</i>			3				
		<i>Total</i>	-	-	19	100	150	-	250
		Grand Total	20		19	200	550	-	750

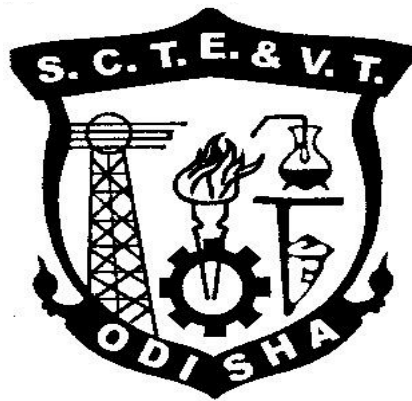
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration

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 3RD SEMESTER
For
DIPLOMA IN MECHATRONICS ENGINEERING
(Effective FROM 2019-20 Sessions)



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

Th1. MACHINE TOOL TECHNOLOGY

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	MCT 301	Semester	3 RD
Total Period:	60	Examination	3hrs
Theory periods:	4 P/W	Teacher's Assessment:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

A machine tool is machine for shaping of machining metal or other rigid. This is the application between ordinary machine tools and equipment with advanced technology, It is simple acquisition of machine tool technology and mechanics.

B. GENERAL OBJECTIVE:

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

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Safety	01
2	Bench work & fitting	06
3	Theory of metal cutting	05
4	Cutting fluid & its importance	01
5	Drilling machine	06
6	Lathe machine	10
7	Milling machine	10
8	Grinding machine	08
9	Shaper, planer, slotter	08
10	Press & press tools	05
Total:		60

D. SUBJECT CONTENT:

1. SAFETY

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

2. Bench work and fitting

- 2.1 Hand tools and devices, Bench Layouts, Types of vices, Types and specification of files, Hack shaw frame and blades, Types of chisel and angles, Hammer and types of hammer, scraper and its types.
- 2.2 Fitting operations: chipping, filing, scrapping, grinding, marking, sawing drilling, Reaming, dieling, tapping etc.

3. Theory of metal cutting

- 3.1 Theory of chip removal, orthogonal and oblique cutting, speed feed & depth of cut.
- 3.2 Cutting tool material & its properties. Geometry of single point
- 3.3 Cutting tool.

4. Cutting fluids and its importance

- 4.1 Importance of cutting fluids, types and its application.

5. Drilling machine

- 5.1 Introduction to drilling machine, Types, specification, mechanism operation, Work holding and tool holding devices.
- 5.2 Drills—Nomenclature of twist drill, types, material, size designation as per ISI, sharpening of drills, counter boring & water sinking.
- 5.3 Reamers and Taps—Types, importance and operation.

6. Lathe machine

- 6.1 Introduction to Lathe, types of Lathe, parts of Lathe-Bed, Headstock, Tailstock carriage, & Lead screw. Lathe accessories & attachments.
- 6.2 Driving mechanism, feed mechanism, thread cutting.
- 6.3 Lathe operations—Plain, step, taper turning & its calculation, facing etc.
- 6.4 Function and nomenclature of screw threads, types of thread-acme, knuckle, buttress, trapezoidal, square metric, BSW.

7. Milling machine.

- 7.1 Introduction to milling machine, Types, attachment and accessories work and tool holding devices.
- 7.2 Geometry of milling cutter, cutting speed, feed, & depth of cuts.
- 7.3 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.

- 8.1 Introduction to grinding machine types.
- 8.2 Grinding operations-Types, wet and dry grinding.
- 8.3 Grinding wheel—Specification, abrasive, grain, grade, structure, and types of wheel, dressing of wheel, mounting and balancing and its importance.

9. Shaper, planer, slotter

- 9.1 Introduction, working principle of shaper, planer & slotter.
- 9.2 Quick return mechanism, shaper tool, planer tool, slotter tool.

10. Presses and press tools

- 10.1 Classifications, constructional features, types, working principle
- 10.2 Press tools—Punch, die, material, clearance between punch & die. Types of dies. Press working- Various working operations, its definition.

Syllabus to be covered up to I.A.

Chapter: 1, 2, 3, 4 and 5

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

Th2. ELECTRICAL ENGG.SCIENCE & ELECTRONIC CIRCUIT

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	ELT 321	Semester	3 RD
Total Period:	60	Examination	3hrs
Theory periods:	4 P/W	Teacher's Assessment:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONAL:

The multi dimensional course gives exposure about electrical machines ,widely used electrical machines and application of electronics science.

B. GENERAL OBJECTIVE:

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

1. To study design and build different types of transforms.
2. To study and understand the construction and work of DC Generator types and their characteristics.
3. To study and understand various types of Motors and its control.
4. To study the operation of various special purpose Motors.

C. Topic wise distribution of periods:

Sl. No.	Topics	Period
1	Transformers	06
2	Dc generators	04
3	Induction motors	07
4	Special purpose motors	06
5	Diode and transistor	06
6	Power amplifier	06
7	Differential amplifier	05
8	Operational amplifier	05
9	Linear op amp circuits	06
10	Non linear op amp circuits	10
11	Regulated power supplies	03
Total:		60

D. SUBJECT CONTENT:

UNIT-1

1.0 TRANSFORMERS

- 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
- 1.6 Losses and Efficiency of a Transformer
- 1.7 Auto Transformers- Principle & working
- 1.8 Protection system of transformer (Buchholz relay, PRV, OSR etc)

UNIT-2

2.0 GENERATORS

- 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

UNIT—3

3.0 INDUCTION MOTORS

- 3.1 General Principle & Construction
- 3.2 Classification of Ac Motors
- 3.3 Single phase and Three phase Induction Motors
- 3.4 Starting of Induction Motor
- 3.5 Relationship between Slip, Torque
- 3.6 Power stages in Induction Motor¹
- 3.7 Speed Control of an Induction Motor¹
- 3.8 Different types of starter (DOL, RDOLetc)

UNIT---4

4.0 SPECIAL PURPOSE MOTORS

- 4.1 Universal motors and its spatiality
- 4.2 Stepper Motors and Hysteresis motor and PMDC Motor, .
- 4.3 Servo Motor, Repulsion Motors, Reluctance Motor

UNIT--5

5.0 DIODE AND TRANSISTOR

- 5.1 Application of Diode as Half wave & full wave rectifier
- 5.1 Clipper & Clamper Circuit
- 5.2 C E, C, B & C.C type of configurations
- 5.3 Characteristics of transistor & its working as an amplifier

6.0 POWER AMPLIFIERS

- 6.1 Amplifier Terms—DC Load Line—AC Load Line
- 6.2 Classes of Operations
- 6.3 Types of Coupling and Frequency ranges, Power Rating of a Transistor.
- 6.4 Frequency effects, Frequency Response of an amplifier Decibel Power & Voltage Gain

7.0 DIFFERENTIAL AMPLIFIERS

- 7.1 Introduction
- 7.2 DC and AC Analysis of Differential Amplifiers
- 7.3 Input Characteristics
- 7.4 Common Mode Gain and CMRR
- 7.5 Simple Problems on Differential Amplifiers

UNIT--6

8.0 OPERATIONAL AMPLIFIERS

- 8.1 Introduction & Pin Configuration of Op Amp 741
- 8.2 Block Diagram of 741 Op Amp
- 8.3 Op Amp Parameters—Slew Rate, Bias, Offset, Input & Output Impedance
- 8.4 Ideal Op-Amp and Open and loop operation of-Amp
Data sheet of Op-Amp 741

9.0 LINEAR OP AMP CIRCUITS

- 9.1 Inverting Amplifier Circuits—Applications
- 9.2 Non inverting Amplifier circuits--Applications
- 9.3 Voltage follower, Instrumentation Amplifier & Summing Amplifiers Circuits

UNIT--7

10.0 NON LINEAR OP AMP CIRCUITS

- 10.1 Comparator Circuits and Zero Crossing detector
- 10.2 Integrator and Differentiator
- 10.3 V/I convertor, I/V convertor
- 10.4 Waveform Generators-Square, Triangular, Saw tooth Waveform and Converter

11.0 REGULATED POWER SUPPLIES

- 11.1 Series and Shunt Regulators
- 11.2 Linear and Switching Regulations
- 11.3 Variable Regulators—LM317

Syllabus to be covered up to I.A.

Chapter: 1, 2, 3 ,4 and 5

Learning Resources:			
SI.No	Title of the Book	Name of Authors	Name of Publisher
1	Electrical Technology	B.L.Thereja (Volume—II)	
2	Electrical Machines	H. Cotton	
3	ElectricalMachines	J.B. Guptha	
4	Basic Electrical Engg (Schame's series)	Cathey	
5	Basic Electrical Engineering	Kothari &Nagrath	
6	Electronic Principles	Malvino	
7	Linear Integrated Circuits	D.RoyChoudhury Skail Jain	
8	OP-AMPS and Linear Integrated Circuits	RamakantA.Gaya kwad	
9	Liner Integrated circuits	Salvahanvan	
1 0	Basic Electronics & Linear Circuits	Bhargva	

Th.3 - DIGITAL ELECTRONICS

(Common to ETC, AE&I, CSE, IT, EIC, Mechatronics)

Theory	: 4 Periods per week	I.A.	: 20 Marks
Total Periods	: 60 Periods	Term End Exam	: 80 Marks
Examination	: 3 Hours	TOTAL MARKS	: 100 Marks

Chapter wise Distribution of periods with Total periods

Sl. No.	Topics	Periods
1.	Basics of Digital Electronics	12
2.	Combinational logic circuits	12
3.	Sequential logic circuits	12
4.	Registers, Memories & PLD	08
5.	A/D and D/A Converters	07
6.	Logic Families	09
TOTAL		60

Rationale:

Today term digital has become a part of our everyday life. The tremendous power and usefulness of digital electronics can be seen from the wide variety of industrial and consumer products, such as automated industrial machinery, computers, microprocessors, pocket calculators, digital watches, microcontrollers, Digital life support machines, real time systems and clocks, TV games, etc. which are based on the principles of digital electronics. The areas of applications of digital electronics have been increasing every day. In fact, digital systems have invaded all walks of life. This subject will very much helpful for student to understand clearly about the developmental concept of digital devices

Objective:

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

1. Explain Binary, Octal, Hexadecimal number systems and compare with decimal system.
2. Perform binary addition, subtraction, Multiplication and Division.
3. Write 1's complement and 2's complement numbers for a given binary number & Perform subtraction
4. Compare weighted and Un-weighted codes and its applications
5. State Boolean expressions for the given statement of the problem
6. State De-Morgan's theorems & Apply De Morgan's theorems and other postulates to simple Boolean expressions.
7. Use Karnaugh Map to simplify Boolean Expression (upto3 variables only).
8. Implement of Logic Gates, i.e. AND, OR, NOT operators with truth table.
9. Working of combinational logic circuits, function of the Half-adder, full-adder.
10. Explain 2's complement parallel adder/subtractor circuit.
11. Working of Serial & parallel adder with block diagram/circuit diagram
12. Explain the Operation of 4x1 Multiplexer & 1x4 De-Multiplexer, Decoders, Encoder, comparator.
13. Understanding the working of Sequential Logic circuits
14. Construct SR, JK, D, T, Master Slave Flip Flop.
15. Counters and different types and operations
16. Explain the working of Registers and memories & PLD
17. Explain various types of memories, Differentiate between ROM and RAM
18. Working of A/D and D/A converters & Necessity of A/D and D/A converters.
19. Explain Various logic families and Characteristics of Digital ICs

Detailed Contents:

Unit-1: Basics of Digital Electronics

- 1.1 Number System-Binary, Octal, Decimal, Hexadecimal - Conversion from one system to another number system.
- 1.2 Arithmetic Operation-Addition, Subtraction, Multiplication, Division, 1's & 2's complement of Binary numbers & Subtraction using complements method
- 1.3 Digital Code & its application & distinguish between weighted & non-weight Code, Binary codes, excess-3 and Gray codes.
- 1.4 Logic gates: AND, OR, NOT, NAND, NOR, Exclusive-OR, Exclusive-NOR--Symbol, Function, expression, truth table & timing diagram
- 1.5 Universal Gates & its Realisation
- 1.6 Boolean algebra, Boolean expressions, Demorgan's Theorems.
- 1.7 Represent Logic Expression: SOP & POS forms
- 1.8 Karnaugh map (3 & 4 Variables) & Minimization of logical expressions, don't care conditions

Unit-2: Combinational Logic Circuits

- 2.1 Half adder, Full adder, Half Subtractor, Full Subtractor, Serial and Parallel Binary 4 bit adder.
- 2.2 Multiplexer (4:1), De-multiplexer (1:4), Decoder, Encoder, Digital comparator (3 Bit)
- 2.3 Seven segment Decoder
(Definition, relevance, gate level of circuit Logic circuit, truth table, Applications of above)

Unit-3: Sequential logic Circuits

- 3.1 Principle of flip-flops operation, its Types,
- 3.2 SR Flip Flop using NAND, NOR Latch (un clocked)
- 3.3 Clocked SR, D, JK, T, JK Master Slave flip-flops-Symbol, logic Circuit, truth table and applications
- 3.4 Concept of Racing and how it can be avoided.

Unit-4: Registers, Memories & PLD

- 4.1 Shift Registers-Serial in Serial -out, Serial- in Parallel-out, Parallel in serial out and Parallel in parallel out
- 4.2 Universal shift registers-Applications.
- 4.3 Types of Counter & applications
- 4.4 Binary counter, Asynchronous ripple counter (UP & DOWN), Decade counter. Synchronous counter, Ring Counter.
- 4.5 Concept of memories-RAM, ROM, static RAM, dynamic RAM, PS RAM
- 4.6 Basic concept of PLD & applications

Unit-5: A/D and D/A Converters

- 5.1 Necessity of A/D and D/A converters.
- 5.2 D/A conversion using weighted resistors methods.
- 5.3 D/A conversion using R-2R ladder (Weighted resistors) network.
- 5.4 A/D conversion using counter method.
- 5.5 A/D conversion using Successive approximate method

Unit-6: LOGIC FAMILIES

- 6.1 Various logic families & categories according to the IC fabrication process

- 6.2 Characteristics of Digital ICs- Propagation Delay, fan-out, fan-in, Power Dissipation ,Noise Margin ,Power Supply requirement &Speed with Reference to logic families.
- 6.3 Features, circuit operation &various applications of TTL(NAND), CMOS (NAND & NOR)

Coverage of Syllabus upto Internal Exams (I.A.)

Chapter 1,2,3

Books Recommended

SI No.	Name of Authors	Title of Book	Name of Publisher:
1	<i>RP JAIN</i>	<i>Modern Digital Electronics</i>	<i>TMH</i>
2	<i>Ananda Kumar</i>	<i>Fundamental of Digital Electronics</i>	<i>PHI Publication</i>
3	<i>P.RAJA</i>	<i>Digital Electronics</i>	<i>SCITECH Publication</i>
4	<i>S.Salivahanan ,S.Arivazhagan</i>	<i>Digital Circuits Design</i>	<i>VIKAS Pub House</i>
5	<i>M. Morris Mano</i>	<i>Digital Logic and Computer Design</i>	<i>MGH</i>
6	<i>Dr. R. S. Sedha</i>	<i>Digital Electronics</i>	<i>S. chand</i>

Th4. ENGG. METROLOGY

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	MCT 302	Semester	3 RD
Total Period:	60	Examination	3hrs
Theory periods:	4 P/W	Teacher's Assessment:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONAL:

It is the field of knowledge concerned with mechanical measurements and includes both the theoretical and practical exposure of various measuring instrument and inspection gauges.

B. GENERAL OBJECTIVE :

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

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.

C. Topic wise distribution of periods:		
Sl. No.	Topics	Period
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
Total:		60

D. 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.
- 9.3 Calibration and color coding

10.0 Metrology software

10.1 Spatial analyser

10.2 X-ray Metrology system.

Syllabus to be covered up to I.A.

Chapter: 1, 2, 3, 4 and 5

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

Th5. ENVIRONMENTAL STUDIES (Common to all Branches)

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

A. RATIONALE:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every student in order to take care of the environmental aspect in each and every activity in the best possible manner.

B. OBJECTIVE:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

C. Topic wise distribution of periods:		
Sl. No.	Topics	Period
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	10
3	Systems	08
4	Biodiversity and it's Conservation	08
5	Environmental Pollution	12
6	Social issues and the Environment	10
7	Human population and the environment	08
	Total:	60

D. COURSE CONTENTS

1. **The Multidisciplinary nature of environmental studies:**
 - 1.1 Definition, scope and importance.
 - 1.2 Need for public awareness.
2. **Natural Resources:**

Renewable and non-renewable resources:

- a) Natural resources and associated problems.
 - 2.1.1. Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
 - 2.1.2. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
 - 2.1.3. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
 - 2.1.4. Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, .
 - 2.1.5. Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
 - 2.1.6. Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification.
- b) Role of individual in conservation of natural resources.
- c) Equitable use of resources for sustainable life styles.

3. **Systems:**

- 3.1. Concept of an eco-system.
- 3.2. Structure and function of an eco-system.
- 3.3. Producers, consumers, decomposers.
- 3.4. Energy flow in the eco systems.
- 3.5. Ecological succession.
- 3.6. Food chains, food webs and ecological pyramids.
- 3.7. Introduction, types, characteristic features, structure and function of the following eco system:
- 3.8. Forest ecosystem:
- 3.9. Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

4. **Biodiversity and it's Conservation:**

- 4.1. Introduction-Definition: genetics, species and ecosystem diversity.
- 4.2. Biogeographically classification of India.
- 4.3. Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values.
- 4.4. Biodiversity at global, national and local level.
- 4.5. Threats to biodiversity:Habitats loss, poaching of wild life, man wildlife conflicts.

5. **Environmental Pollution:**

5.1. Definition Causes, effects and control measures of:

- a) Air pollution.
- b) Water pollution.
- c) Soil pollution
- d) Marine pollution

- e) Noise pollution.
- f) Thermal pollution
- g) Nuclear hazards.

5.2. Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

5.3. Role of an individual in prevention of pollution.

5.4. Disaster management: Floods, earth quake, cyclone and landslides.

6. Social issues and the Environment:

6.1. Form unsustainable to sustainable development.

6.2. Urban problems related to energy.

6.3. Water conservation, rain water harvesting, water shed management.

6.4. Resettlement and rehabilitation of people; its problems and concern.

6.5. Environmental ethics: issue and possible solutions.

6.6. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.

6.7. Air (prevention and control of pollution) Act.

6.8. Water (prevention and control of pollution) Act.

6.9. Public awareness.

7. Human population and the environment:

7.1. Population growth and variation among nations.

7.2. Population explosion- family welfare program.

7.3. Environment and human health.

7.4. Human rights.

7.5. Value education

7.6. Role of information technology in environment and human health.

Syllabus coverage up to Internal assessment

Chapters: 1, 2 and 3.

Learning Resources:

Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Textbook of Environmental studies	Erach Bharucha	#UGC
2.	Fundamental concepts in Environmental Studies	D.D. Mishra	S.Chand & Co-Ltd
3.	Text book of Environmental Studies	K.Raghavan Nambiar	SCITECH Publication Pvt. Ltd.
4.	Environmental Engineering	V.M.Domkundwar	Dhanpat Rai & Co

Pr1. AUTO CAD

Name of the Course: Diploma in MECHATRONICS ENGINEERING			
Course code:	MCP 301	Semester	3 RD
Total Period:	90	Examination	4hrs
Lab periods:	6 P/W	Sessional	25
Maximum marks:	75	End Semester Examination:	50

RATIONALE:

This technology now-a-days is extremely used by many manufacturers both large and small used multiple 2D and 3D authorizing systems sometimes using single design project or functions. By using CADD software we can produce the job piece any geometry with high accuracy and safety.

1.0	INTRODUCTION TO COMPUTERS AND ITS APPLICATIONS	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.	01
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	INTRODUCTION TO AUTO CAD	40
2.1	Importance of Auto CAD menu selection, begin new drawing, editing10 existing drawing and practice simple drawing.	10
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, Oops, 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 |

Pr2. 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:	6 P/W	Sessional	25
Maximum marks:	75	End Semester Examination:	50

A. RATIONAL:

This technology helps us to produce some practical products in workshop and gain handsome practice about different equipments and lessening works .

B. OBJECTIVES :

On completion of the lab course the student will be able to:

1. Introduced to importance to different angles required for single point cutting tool.
2. Practicing for different angle grinding on pedestal grinding machine.
3. Introduced to lathe machine and different turning operations.
4. Practicing various turning operations such as straight, steps, taper etc.
5. Practicing of die passing on lathe machine.
6. Introduced to milling to milling machine and different milling operations.
7. Practicing the setting of work piece on machine.
8. Practicing of various milling operations such as face, step millings etc.
9. Introduced to surface grinding, cylindrical grinding machine and its operations.
10. To understand the importance of grinding and practicing different surface grinding .
11. Practicing sheet metal fabrication and to understand as importance.
12. Introduced to welding process and welding machine.
13. Practicing edge preparation and welding operations.
14. Practice on shaper, planer and shotter.

SLNO	Exercise	Periods
1	Study on workshop safety and idea about all Machines	05
2	Try square	05
3	Familiar with Vice, Hacksaw, Files, Chisel ,Hammer, Scraper .	10
4	Practice on Drilling Machine	10
5	Different Types of Operation on Lathe Machine	10
6	Practice on Milling Machine	10
7	Practice on Surface Grinding Machine	10
8	Practice on Shaper Machine	08
9	Practice on Planner Machine	08
10	Practice on Slotter Machine	04
11	Sheet Metal Operation	10

Pr3. 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:	4 P/W	Sessional	25
Maximum marks:	50	End Semester Examination:	25

A. RATIONAL:

This creates a wider exposure handsome practices of electrical machines as well as practical results.

B. COURSE OBJECTIVES:-

This will become helpful to know about practical use of different types of electrical machines and will compare the theoretical response from its practical output.

SL.NO	TOPIC	PERIODS
	TRANSFORMERS	08
01	Transformer Familiarization.	01
02	Transformation Ratio, Polarity lest and measurement of internal resistance/.	01
03	Load test on Single phase Transformer.	02
04	Three phase Transformer Star and Delta Connection	04
	GENERATORS	
05	Open circuit characteristics on DC Separately excited Generator	02
06	Open circuit characteristics on DC Self excited Generator	04
07	Open circuit characteristics on DC Self excited Generator	04
08	Load test on DC Generator.	02
	MOTORS	
09	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

Pr4. ELECTRONICS LAB PRACTICE

Name of the Course: Diploma in MECHATRONICS ENIGINEERING			
Course code:	ELP 321	Semester	3 RD
Total Period:	45	Examination	4hrs
Lab periods:	3 P/W	Sessional	25
Maximum marks:	50	End Semester Examination:	25

A. RATIONAL:

This will helpful for handsome practice of basic electronics circuits for its application.

B. COURSE OBJECTIVES:-

The course objective is to understand the theoretical work as well as practical response of electronic circuits using active component.

SI no	Major topics	Total periods 45
1	Introduction and familiarization	08
2	Rectifiers, clippers and clampers	10
3	Transistor Characteristics	17
4	Characteristics of FET	10

C. 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} s I_n
 - (iii) V_{BE} s 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

Equipments list

SL.NO	Equipments	Specification	Quantity
	WORKSHOP PRACTICE		
01	Bench vice		20
02	Drilling Machine	Drilling capacity 40 mm, Spindle travel 190mm,motor-2hp,Speed -1440Rpm.	02
03	Milling	Working Surface -1050*250mm,Motor-2hp, Speed-1440Rpm.,Feed-3types	04
04	Lathe	Bed Length-1350mm,Centre Height-150mm.,Motor-2hp,3and 4 Jaw Chuck	08
05	Surface grinder	250*450mm,Maximum height 275mm.,Motor-1hp,Spindle speed-2800rpm	04
06	Try Square		10
07	Shaper		04
08	Slotter		02
09	Planner		02
	AUTOCAD LAB		
10	Computer with AutoCAD 2000 Software		30
	ELECTRICAL LAB		
11	Single Phase Transformer	1 KVA	01
12	Star Delta Starters		04
13	DC Separately excited Generator		02
14	DC Self excited Generator		02
15	DC Motor		02
16	Shunt Motor		02
17	Induction Motor		02
18	3 Phase Motor		02
	ETC LAB		
19	Single Channel CRO	20 MHz	08
20	Dual Channel CRO	30 MHz	08
21	Trainer for verification of Clipper, Clamper, Voltage develop and transistor Characteristics with base arrangement		08
22	FET Trainer		06