CURRICULLUM OF
LEVEL 03; 2ND SEMESTER

For

DIPLOMA VOCATIONAL IN PRODUCTION TECHNOLOGY

(Effective FROM 2021-22 Sessions)

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

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR Level 03; 2ND Semester (D.Voc in Production Technology) (wef 2021-22)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		General Foundation Course –I	4	-	-	20	80	3	100
Th.2		Basic Electricity	4	-	-	20	80	3	100
Th.3		Basic Electronics	4	-	-	20	80	3	100
Th.4		Applied Mathematics-II	4	-	-	20	80	3	100
		Total	*16*			*80*	*320*		*400*
		Practical							
Pr.1		Basic Electricity Lab	-	-	3	25	50	3	75
Pr.2		Basic Electronics Lab	-	-	3	25	50	3	75
		Student Centred Activities (SCA)	-	-	3	-	-	-	-
		Total			*09*	*50*	*100*		*150*
		On-Job-Training (OJT)							
		One more QP to be opted from the QPs mentioned in Level 3 1st semester	-	-	14	-	200	-	200
		Total			*14*		*200*		*200*
		Grand Total	**16**		**23**	**130**	**620**		**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

TH.1. GENERAL FOUNDATION COURSE – I

Theory	4 Periods per week	Internal Assessment	20 Marks
Total Periods	60 Periods	End Sem Exam	80 Marks
Examination	3hours	Total Marks	100Marks

RATIONALE:

Main objective of Mechanical Engineering is to produce goods and services for benefit to mankind. Such productions are done utilizing various resources like Men, Materials, machines and Money. Industrial engineering and quality control is the subject which allows optimized use of such resources and hence very important for a mechanical engineering.

COURSE OBJECTIVES:

After undergoing this course, the students will be able to:

- Identification of place for a new plant set up and systematic arrangement of machinery and shop for smooth production.
- Understanding of stock management and maintenance to reduce plant ideal time.

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Business Management and Entrepreneurship	20
2	Computational Skills	20
3	Environmental Education	20
4	Rural Development	20

DETAILED CONTENTS

1.0 Business Management and Entrepreneurship:

- Entrepreneurship Orientation
  - Importance and relevance in real life: Emphasis on self-employment.
- Entrepreneurship Values and Attitudes
  - Innovativeness, Independence, Risk Taking, Analytical ability.
- Entrepreneurial Motivation
  - Achievement Planning, personal efficacy, entrepreneurial goal setting.
- Launching of a Business Venture
  - Identification of project, steps in setting up a business, information about various institutions providing assistance, project formulation.

2.0 Computational Skills:

- Percentage, ratio & proportion, profit & loss, discount, simple and compound interest, population growth and depreciation of value of articles using logarithm.
- Area and volume: rectangle, parallelogram, circle, cube, cone, cylinder & sphere.

3.0 Environmental Education:

- Environment and the society, Environment properties risks in different economic enterprises, in use of raw materials, in processing / manufacturing and designing.
- Poverty and environment.

4.0 Rural Development:

- Agriculture, the back bone of Indian Economy.
- Rural development projects in India including Integrated rural development programme.
- Agro based rural industries, Community approach to rural development.

Syllabus to be covered before IA: Chapter 1,2,3

RECOMMENDED BOOKS

1. Environmental Studies, M.P. Poonia & S.C. Sharma, Khanna Publishing House
2. A Textbook of Environmental Sciences, Rimpi Mehani Ne' Chopra, Khanna Publishing House

TH.2. BASIC ELECTRICITY

Theory	4 Periods per week	Internal Assessment	20 Marks
Total Periods	60 Periods	End Sem Exam	80 Marks
Examination	3hours	Total Marks	100Marks

RATIONALE:

Automobiles are the principal mode of transport system. Their manufacture and maintenance gives a major scope for employment. Many entrepreneur pass outs go for servicing of automobiles or trading/ manufacturing of auto components. Thus automobile engineering is an important subject to be in the regular curriculum of the mechanical engineers.

COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand automobile chassis, transmission, breaking and fuel system etc.
- Understand the basics of electric vehicle kinematics.
- Understand the concepts of hybrid electric vehicles.

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Current Electricity	10
2	D.C. Circuits	10
3	Electric Cells	15
4	Lighting Effects of Current	10
5	Capacitors	10
6	Electromagnetic Effects	15
7	A.C Circuits	10

DETAILED CONTENTS

1.0 Current Electricity:

- Definition of Resistance, Voltage, Current, Power
- Energy and their units, Relation between electrical, mechanical and thermal units
- Temperature variation of resistance
- Difference between AC and DC voltage and current

2.0 D.C. Circuits:

- Ohm's Law, Series – parallel resistance circuits, calculation of equivalent resistance
- Kirchhoff's Laws and their applications.

3.0 Electric Cells:

- Primary cell, wet cell, dry cell, battery, Li-ion battery, series and parallel connections of cells, Secondary cells, Lead Acid Cell
- Discharging and recharging of cells, preparation of electrolyte, care and maintenance of secondary cells.

4.0 Lighting Effects of Current:

- Lighting effect of electric current, filaments used in lamps, and Tube-light, LED, their working and applications.

5.0 Capacitors:

- Capacitor and its capacity, Concept of charging and Discharging of capacitors
- Types of Capacitors and their use in circuits, Series and parallel connection of capacitors
- Energy stored in a capacitor

6.0 Electromagnetic Effects:

- Permanent magnets and Electromagnets, their construction and use, Polarities of an electromagnet and rules for finding them.
- Faraday's Laws of Electromagnetic Induction, Dynamically induced e.m.f., its magnitude and induction, inductance and its unit. Mutually induced e.m.f., its magnitude and direction, Energy stored in an inductance.
- Force acting on a current carrying conductor in magnetic field, its magnitude and direction, Principles and construction of dynamo.

7.0 A.C Circuits:

- Generation of A.C. voltage, its generation and wave shape
- Cycle, frequency, peak value R.M.S. value, form factor, crest factor, Phase difference, power and power factor
- A.C. Series Circuits with (i) resistance and inductance (ii) resistance and capacitance and (iii) resistance inductance and capacitance, Q factor of R.L.C. series circuits.

Syllabus covered up to I.A-Chapters 1,2 &3

RECOMMENDED BOOKS

1. Basic Electrical Engineering, Ritu Sahdev, Khanna Publishing House
2. Basic Electrical Engineering, Pradeep Kumar, Khanna Publishing House

TH.3. BASIC ELECTRONICS

Theory	4 Periods per week	Internal Assessment	20 Marks
Total Periods	60 Periods	End Sem Exam	80 Marks
Examination	3hours	Total Marks	100Marks

RATIONALE:

Bulk powers used in industries and for domestic purposes are generated in power plants. A large number of diverse and specialized equipment and system are used in a power plant should have this specialized elective course.

COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the generation of power by utilizing various energy sources.
- Understand the use of steam, its operation in steam power plants.
- Understand the nuclear energy sources and power developed in nuclear power plant.
- Understand the basics of gas turbine power plant, diesel engine power plant and hydroelectric power plant.

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Overview of Atom, Sub-Atomic Particles and CRO	15
2	Voltage and Current	12
3	Basics of Semiconductor	18
4	Bipolar Junction Transistor	15
5	Transistor Amplifier and Applications	20

DETAILED CONTENTS

1.0 Overview of Atom, Sub-Atomic Particles and CRO:

- Brief History of Electronics, Atom and its elements
- Electron, Force, Field intensity, Potential, Energy, current
- Electric field, Magnetic field, Motion of charged particles in electric and magnetic field.
- Overview of CRO, Electronic and Magnetic deflection in CRO, Applications.

2.0 Voltage and Current:

- Resistance, Ohm's law, V-I Characteristics, Resistors, Capacitors, Inductors.
- Voltage and Current sources, Symbols and Graphical representation
- Overview of AC, DC, Cells and Batteries, Energy and Power.

3.0 Basics of Semiconductor:

- Semiconductor materials, Metals and Semiconductors and Photo-electric emission.
- N-type and P-type semiconductor, Effects of temperature on Conductivity of semiconductor.
- PN junction diode, depletion layer, Forward & Reverse bias, V-I Characteristic, Effects of temperature, Zener diode, Photo diode, LED, Types and applications of diode.
- Diode as a rectifier, Half wave and full wave rectification, Zener diode Regulator.
- Introduction to Filters, Clippers, Clampers

4.0 Bipolar Junction Transistor:

- Operation of NPN and PNP transistors, Biasing of BJT.
- CB, CE and CC configuration
- Introduction to FET, JFET, MOSFET, CMOS and VMOS

5.0 Transistor Amplifier and Applications:

- Introduction, Single and Multi-stage amplifiers
- Introduction to Oscillators
- Introduction to Thyristors, PNPN diode, SCR, LASCR, DIAC, TRIAC

Syllabus covered up to I.A-Chapters 1,2 &3

RECOMMENDED BOOKS

1. Basic Electronics, S. Biswas, Khanna Publishing House
2. All in One Electronics Simplifies, A.K. Maini, Khanna Publishing House

TH.4. APPLIED MATHEMATICS – II

Theory	4 Periods per week	Internal Assessment	20 Marks
Total Periods	60 Periods	End Sem Exam	80 Marks
Examination	3hours	Total Marks	100Marks

RATIONALE:

Bulk powers used in industries and for domestic purposes are generated in power plants. A large number of diverse and specialized equipment and system are used in a power plant should have this specialized elective course.

COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the working principle of modern machining processes.
- Understand the Plastic Processing
- Understand the additive manufacturing process
- Understand the Special Purpose Machines
- Understand the Maintenance of Machine Tools

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Algebra-II	20
2	Relations and Functions	10
3	Calculus	15
4	Vectors and Three Dimensional Geometry	20
5	Linear Programming and Mathematical Reasoning	15

DETAILED CONTENTS

1.0 Algebra-II:

- Matrices
- Determinants
- Inverse of a Matrix and its Applications

2.0 Relations and Functions:

- Relations and Functions-II
- Inverse Trigonometric Functions

3.0 Calculus:

- Limits and Continuity
- Differentiation, Differentiation of Trigonometric functions, Differentiation of Exponential and Logarithmic functions, Application of Derivatives
- Integration
- Definite Integrals
- Differential Equations

4.0 Vectors and Three Dimensional Geometry:

- Introduction to Three Dimensional Geometry, Vectors, Plane, Straight Line

5.0 Linear Programming and Mathematical Reasoning:

- Types Linear Programming
- Mathematical Reasoning

Syllabus covered up to I.A-Chapters 1,2 &3

RECOMMENDED BOOKS

1. Applied Mathematics-II, J.K. Tyagi, Khanna Publishing House
2. Elements of Mathematical Analysis, R. Agor, Khanna Publishing House

Pr.1 BASIC ELECTRICITY LAB

Practical	4 Periods per week	Term Work	25Marks
Total Periods	60 Periods	End Sem Exam	50Marks
Examination	3hours	Total Marks	75Marks

COURSE OBJECTIVES

At the end of the course the students will be able to

1. Study the construction features of Domestic Refrigerator, water cooler, Window Air Conditioner, Split Air Conditioner
2. Determining the capacity, COP, of Refrigerator Test Rig, Window air Conditioner, Split Air Conditioner, Water cooler.
3. Evacuating the entire system
4. Locating the leakage in refrigerating system
5. Charging of the refrigerating system

List of Practical Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.
2. Verification of Ohm's Law.
3. Verification of temperature co-efficient of resistance:
   (i) Positive for Tungsten and Nichrome and
   (ii) Negative for carbon.
4. Study of series resistive circuits.
5. Study of parallel resistive circuits.
6. Study of series and parallel connection of cells in circuits.
7. Preparation of Electrolyte for lead acid battery and its charging and measurement of Specific gravity with the help of hydrometer.
8. To find heat efficiency of an electric kettle.
9. Charging and Discharging of a capacitor.
10. Verification of magnetic field of a Solenoid with:
    (i) Iron core and
    (ii) Air core.
11. Verification of Faraday's Laws of electromagnetic induction.
12. Verification of Torque development in a current carrying coil in magnetic field.
13. Study of R.L. series circuit and measurement of power and power factor.
14. Study of R.C. series circuit and measurement of power and power factor.
15. Study of R.L.C. series circuit and measurement of power and power factor.
16. Study of R.L.C. series circuit for calculation of inductive reactance, capacitive reactance, impedance and Q- Factor.

Pr 2. BASIC ELECTRONICS LAB

Practical	4 Periods per week	Term Work	25Marks
Total Periods	60 Periods	End Sem Exam	50Marks
Examination	3hours	Total Marks	75Marks

COURSE OBJECTIVES

At the end of the course the students will be able to

1.0 Conducting performance test on impulse and reaction turbine

2.0 Conducting performance test on centrifugal pump

3.0 Designing &operating pneumatic circuits

4.0 Designing &operating industrial fluid power circuits

List of Practicals

1. Study of current and voltage measurement using Ammeter and Voltmeter.
2. Study of current and voltage measurement using Galvanometer.
3. Study of current, voltage and resistance measurement using of Multi-meter
4. Study of Power and Energy measurement using Wattmeter and Energy meter.
5. Study of working principle of Signal Generator and measurement of amplitude, time period and frequency of signal using Oscilloscope.
6. Study of V-I Characteristic of Diode.
7. Study of V-I Characteristic of Zener Diode. And use of Zener Diode as voltage regulator.
8. Study of Half wave rectifier with and without filter circuit.
9. Study of Full wave rectifier with and without filter circuit.
10. Study CE configuration for NPN and PNP transistors and measurement of voltage and current gain.
11. Study CB configuration for NPN and PNP transistors and measurement of voltage and current gain.
12. Study CC configuration for NPN and PNP transistors and measurement of voltage and current gain.
13. Study of working of single layer PCB manufacturing
14. Study of working of double layer PCB manufacturing.
15. Design of 7 segment display using LED and bread board.

EQUIPMENT LIST

BASIC ELECTRICITY LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01		
02		
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BASIC ELECTRONICS LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
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