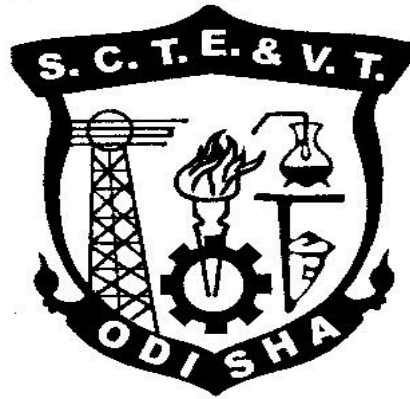| STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 3rd Semester Mechanical Engg.(wef 2019-20)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Production Technology	4		-	20	80	3	100
Th.2		Strength of Material	4		-	20	80	3	100
Th.3		Engineering. Material	4		-	20	80	3	100
Th.4		Thermal Engineering-I	4			20	80	3	100
Th.5		Environmental studies	4			20	80	3	100
		Total	20			100	400	-	500
		Practical							
Pr.1		Mechanical Engg. Drawing	-	-	6	25	50	3	75
Pr.2		Mechanical Engg. Lab-I	-	-	4	25	50	3	75
Pr.3		Workshop-II	-	-	6	50	50	4	100
		Student Centred Activities(SCA)		-	3	-	-	-	-
		Total	-	-	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 3RDSEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2019-20 Sessions)

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

TH-1   PRODUCTION TECHNOLOGY

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**

Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	I.A	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE :

Production Technology involves a working knowledge in the field of product design, product development and rapid part production. It deals with the production methodology and its management to make a complete analysis on the products.

B. COURSE OBJECTIVES

At the end of the course the students will be able to
1. Understand the different components and processes involved in press tool operation.
2. Understand how to minimize the job setting and tool setting times in mass production.
3. Understand the industrial requirements of fabrication systems.
4. Understand the manufacturing processes like casting and powder metallurgy.

C. CHAPTER WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Metal Forming Processes	07
02	Welding	16
03	Casting	16
04	Powder Metallurgy	07
05	Press Work	07
06	Jigs and fixtures	07
	Total Period:	60

D. COURSE CONTENTS

1.0   Metal Forming Processes
  1.1   Extrusion: Definition & Classification
  1.2   Explain direct, indirect and impact extrusion process.
  1.3   Define rolling. Classify it.
  1.4   Differentiate between cold rolling and hot rolling process.
  1.5   List the different types of rolling mills used in Rolling process.

2.0   Welding
  2.1   Define welding and classify various welding processes.
  2.2   Explain fluxes used in welding.
  2.3   Explain Oxy-acetylene welding process.
  2.4   Explain various types of flames used in Oxy-acetylene welding process.
  2.5   Explain Arc welding process.
  2.6   Specify arc welding electrodes.
  2.7   Define resistance welding and classify it.
  2.8   Describe various resistance welding processes such as butt welding, spot welding, flash welding, projection welding and seam welding.

2.9   Explain TIG and MIG welding process

2.10   State different welding defects with causes and remedies.

3.0   Casting

     3.1   Define Casting and Classify the various Casting processes.

     3.2   Explain the procedure of Sand mould casting.

     3.3   Explain different types of molding sands with their composition and properties.

     3.4   Classify different pattern and state various pattern allowances.

     3.5   Classify core.

     3.6   Describe construction and working of cupola and crucible furnace.

     3.7   Explain die casting method.

     3.8   Explain centrifugal casting such as true centrifugal casting, centrifuging with advantages, limitation and area of application.

     3.9   Explain various casting defects with their causes and remedies.

4.0   Powder Metallurgy

     4.1   Define powder metallurgy process.

     4.2   State advantages of powder metallurgy technology technique

     4.3   Describe the methods of producing components by powder metallurgy technique.

     4.4   Explain sintering.

     4.5   Economics of powder metallurgy.

5.0   Press Work

     5.1   Describe Press Works: blanking, piercing and trimming.

     5.2   List various types of die and punch   7

     5.3   Explain simple, Compound & Progressive dies

     5.4   Describe the various advantages & disadvantages of above dies

6.0   Jigs and fixtures

     6.1   Define jigs and fixtures

     6.2   State advantages of using jigs and fixtures

     6.3   State the principle of locations

     6.4   Describe the methods of location with respect to 3-2-1 point location of rectangular jig

     6.5   List various types of jig and fixtures.

Syllabus to be covered up to IA- Chapters 1, 2&3

LEARNING RESOURCES

Sl. No.	Author	Title of the book	Publisher
01	O.P. Khanna	Production Technology, Vol- I& II	Dhanpat Rai Publication
02	B.S Raghuwanshi	Workshop technology, Vol- I& II	Dhanpat Rai & Co
03	P.N. Rao	Manufacturing technology, Vol- I&II	TMH
04	P.C.Sharma	Manufacturing technology, Vol- I	S. Chand

TH-2   STRENGTH OF MATERIAL

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	I.A TEST	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE :

Strength of material deals with the internal behaviors of solid bodies under the action of external force. The subject focuses on mechanical properties of material analysis of stress, strain and deformations. Therefore it is an important basic subject of students for Mechanical and Automobile Engg.

B. COURSE OBJECTIVES:

Students will develop ability towards

- Determination of stress, strain under uniaxial loading (due to static or impact load and temperature) in simple and single core composite bars.
- Determination of stress, strain and change in geometrical parameters of cylindrical and spherical shells due to pressure
- Realization of shear stress besides normal stress and computation of resultant stress in two dimensional objects.
- Drawing bending moment and shear force diagram and locating points in a beam where the effect is maximum or minimum.
- Determination of bending stress and torsional shear stress in simple cases
- Understanding of critical load in slender columns thus realizing combined effect of axial and bending load.

C. CHAPTER WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Simple Stress & Strain	10
02	Thin cylindrical and spherical shell under internal pressure	08
03	Two dimensional stress systems	10
04	Bending moment& shear force	10
05	Theory of simple bending	10
06	Combined direct & Bending stresses	06
07	Torsion	06
	Total Period:	60

D. COURSE CONTENTS

1.0   Simple stress& strain

    1.1   Types of load, stresses & strains,(Axial and tangential) Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants,

    1.2   Principle of super position, stresses in composite section

    1.3   Temperature stress, determine the temperature stress in composite bar (single core)

    1.4   Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load

    1.5   Simple problems on above.

2.0   Thin cylinder and spherical shell under internal pressure

    2.1   Definition of hoop and longitudinal stress, strain

    2.2   Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain

    2.3   Computation of the change in length, diameter and volume

    2.4   Simple problems on above

3.0   Two dimensional stress systems

    3.1   Determination of normal stress, shear stress and resultant stress on oblique plane

    3.2   Location of principal plane and computation of principal stress

    3.3   Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle

4.0   Bending moment& shear force

    4.1   Types of beam and load

    4.2   Concepts of Shear force and bending moment

    4.3   Shear Force and Bending moment diagram and its salient features illustration in cantilever beam, simply supported beam and over hanging beam under point load and uniformly distributed load

5.0   Theory of simple bending

    5.1   Assumptions in the theory of bending,

    5.2   Bending equation, Moment of resistance, Section modulus& neutral axis.

    5.3   Solve simple problems.

6.0   Combined direct & bending stresses

    6.1   Define column

    6.2   Axial load, Eccentric load on column,

6.3	Direct stresses, Bending stresses, Maximum& Minimum stresses. Numerical problems on above.
6.4	Buckling load computation using Euler's formula (no derivation) in Columns with various end conditions

7.0   Torsion

7.0	Assumption of pure torsion
7.1	The torsion equation for solid and hollow circular shaft
7.2	Comparison between solid and hollow shaft subjected to pure torsion

Syllabus to be covered up to I.A   -   Chapters 1, 2, 3&4

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	S Ramamrutham	Strength of Materials	Dhanpat Rai
02	R K Rajput	Strength of Materials	S.Chand
03	R.S khurmi	Strength of Materials	S.Chand
04	G H Ryder	Strength of Materials	Mc millon and co. lmtd
05	S Timoshenko and D H Young	Strength of Materials	TMH

TH-3   ENGINEERING MATERIAL

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/week	IA	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Entire field of engineering deals with use of host of materials for making objects for human need. These materials include wide spectrum of element, metals, alloys and compounds with diverse properties. It is imperative that an engineer from any field should have a good knowledge of such materials and their properties.

B. COURSE OBJECTIVES:

After completion of the course students will have the ability of

- Realizing material requirements
- Realizing application area of ferrous, non ferrous and alloys
- Comprehending micro-structural changes during iron-carbon phase transformation process
- Comprehending effect of heat treatment and its effect towards change in material properties
- Comprehending continuity during evolution in engineering materials and development of modern engineering materials.

C. CHAPTER WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Engineering materials and their properties	05
02	Ferrous Materials and alloy	05
03	Iron – Carbon system	08
04	Crystal imperfections	10
05	Heat Treatment	10
06	Non-ferrous alloys	10
07	Bearing Material	03
08	Spring materials	03
09	Polymers	03
10	Composites and Ceramics	03
	Total Period:	60

D. COURSE CONTENT:

1.0 Engineering materials and their properties
    1.1   Material classification into ferrous and non ferrous category and alloys
    1.2   Properties of Materials: Physical , Chemical and Mechanical
    1.3   Performance requirements
    1.4   Material reliability and safety

2.0 Ferrous Materials and alloys
    2.1   Characteristics and application of ferrous materials
    2.2   Classification, composition and application of low carbon steel, medium carbon steel and High carbon steel
    2.3   Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel
    2.4   Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,

3.0 Iron – Carbon system
    3.1   Concept of phase diagram and cooling curves
    3.2   Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel

4.0 Crystal imperfections
    4.1   Crystal defines, classification of crystals, ideal crystal and crystal imperfections
    4.2   Classification of imperfection: Point defects, line defects, surface defects and volume defects
    4.3   Types and causes of point defects: Vacancies, Interstitials and impurities
    4.4   Types and causes of line defects: Edge dislocation and screw dislocation
    4.5   Effect of imperfection on material properties
    4.6   Deformation by slip and twinning
    4.7   Effect of deformation on material properties

5.0 Heat Treatment
    5.1   Purpose of Heat treatment
    5.2   Process of heat treatment: Annealing, normalizing, hardening, tampering, stress relieving measures
    5.3   Surface hardening: Carburizing and Nitriding
    5.4   Effect of heat treatment on properties of steel
    5.5   Hardenability of steel

6.0 Non-ferrous alloys
    6.1   Aluminum alloys: Composition, property and usage of Duralmin, y- alloy.
    6.2   Copper alloys: Composition, property and usage of Copper-Aluminum, Copper-Tin, Babbit , Phosperous bronze, brass, Copper- Nickel
    6.3   Predominating elements of lead alloys, Zinc alloys and Nickel alloys
    6.4   Low alloy materials like P-91, P-22 for power plants and other

high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.

7.0   Bearing Material

7.1   Classification, composition, properties and uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials

8.0   Spring materials

8.1   Classification, composition, properties and uses of Iron-base and Copper base spring material

9.0   Polymers

9.1   Properties and application of thermosetting and thermoplastic polymers
9.2   Properties of elastomers

10.0   Composites and Ceramics

10.1   Classification, composition, properties and uses of particulate based and fiber reinforced composites
10.2   Classification and uses of ceramics

Syllabus to be covered up to I.A -   Chapters 1, 2, 3, 4&5

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	O P Khanna	A Textbook of Material Science and Metallurgy	Dhantpat Rai
02	R K Rajput	Engineering materials and Metallurgy	S.Chand
03	S K Hazra choudhry	Material science & process	Imdian Book Distrubuting

TH - 4   THERMAL ENGINEERING-I

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches/E&M**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Thermal Engineering is the field of applied science which deals with energy possessed by heated gases and the laws which give the conversion of this energy into mechanical energy and vice versa

B. COURSE OBJECTIVES:

After the completion of the course the students will develop ability towards.

- Comprehending significance of thermodynamics properties in order to analyze a Thermodynamic system.
- Comprehending & applying first & second law of thermodynamics in closed & open system.
- Comprehending & applying gas laws applicable to perfect gas in order to determine Thermodynamic properties.
- Comprehending the concept of I.C engine and gas power cycle & computing work done & efficiency thereof.

C. CHAPTER WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Thermodynamic concept & Terminology	12
02	Laws of Thermodynamics	12
03	Properties Processes of perfect gas	10
04	Internal combustion engine	08
05	Air Standard Cycle	10
06	Fuels and Combustion	08
	Total Period:	60

D.   COURSE CONTENT:

1. Thermodynamic concept & Terminology

    1.1 Thermodynamic Systems (closed, open, isolated)
    1.2 Thermodynamic properties of a system (pressure, volume, temperature, entropy,
        enthalpy, Internal energy and units of measurement).
    1.3 Intensive and extensive properties
    1.4 Define thermodynamic processes, path, cycle , state, path function, point function.
    1.5 Thermodynamic Equilibrium.
    1.6 Quasi-static Process.
    1.7 Conceptual explanation of energy and its sources
    1.8 Work , heat and comparison between the two.
    1.9 Mechanical Equivalent of Heat.
    1.10Work transfer, Displacement work

2. Laws of Thermodynamics

    2.1 State & explain Zeroth law of thermodynamics.

2.2 State & explain First law of thermodynamics.

2.3 Limitations of First law of thermodynamics

2.4 Application of First law of Thermodynamics (steady flow energy equation and its application to turbine and compressor)

2.4 Second law of thermodynamics (Claucius & Kelvin Plank statements).

2.5 Application of second law in heat engine, heat pump, refrigerator & determination of efficiencies & C.O.P (solve simple numerical)

3. **Properties Processes of perfect gas**

   3.1 Laws of perfect gas:

   Boyle's law, Charle's law, Avogadro's law, Dalton's law of partial pressure, Guy lussac law, General gas equation, characteristic gas constant, Universal gas constant.

   3.2 Explain specific heat of gas (C_p and C_v)

   3.3 Relation between C_p & C_v.

   3.4 Enthalpy of a gas.

   3.5 Work done during a non- flow process.

   3.6 Application of first law of thermodynamics to various non flow process (Isothermal, Isobaric, Isentropic and polytrophic process)

   3.6 Solve simple problems on above.

   3.7 Free expansion & throttling process.

  4. Internal combustion engine

  4.1 Explain & classify I.C engine.

  4.2 Terminology of I.C Engine such as bore, dead centers, stroke volume, piston speed &RPM.

  4.3 Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine.

  4.4 Differentiate between 2-stroke & 4- stroke engine C.I & S.I engine.

5. **Gas Power Cycle**

   5.1 Carnot cycle

   5.2 Otto cycle.

   5.3 Diesel cycle.

   5.4 Dual cycle.

   5.5 Solve simple numerical.

6. **Fuels and Combustion**

   6.1 Define Fuel.

   6.2 Types of fuel.

   6.3 Application of different types of fuel.

   6.4 Heating values of fuel.

   6.5 Quality of I.C engine fuels Octane number, Cetane number.

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

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	R.S. Khurmi	Thermal Engineering	S.Chand
02	A.R.Basu	Thermal Engineering	Dhanpat Rai
03	A.S. Sarao	Thermal Engineering	Satya Prakash
04	P.K.Nag	Engineering Thermodynamics	TMH
05	Mahesh M Rathore	Thermal Engineering	TMH

TH.5 ENVIRONMENTAL STUDIES
(Common to All Branches)

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

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. OBJECTIVES:

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 CONTENT:

Unit 1: The Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness.

Unit 2: Natural Resources

Renewable and non renewable resources:

a) Natural resources and associated problems.
   - Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
   - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
   - Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
   - Food Resources: World food problems, changes caused by agriculture and overgrazing,effectsofmodernagriculture,fertilizers-pesticidesproblems, water logging, salinity,.
   - Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
   - 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 lifestyles.

Unit 3: Systems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers, decomposers.
- Energy flow in the ecosystems.
- Ecological succession.
- Food chains, food web sand ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:
- Forest ecosystem:
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and it's Conservation

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

Unit 5: Environmental Pollution.

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.

Solid waste Management: Causes, effects and control measures of urban and

industrial wastes.

Role of an individual in prevention of pollution.

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

Unit 6: Social issues and the Environment

From unsustainable to sustainable development.

- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Resettlement and rehabilitation of people; its problems and concern.
- Environmental ethics: issue and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Air (prevention and control of pollution) Act.
- Water (prevention and control of pollution) Act.
- Public awareness.

Unit 7: Human population and the environment

- Population growth and variation among nations.
- Population explosion-family welfare program.
- Environment and human health.
- Human rights.
- Value education
- Role of information technology in environment and human health.

Syllabus to be covered up to I.A   Units 1, 2, 3

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

MECHANICAL ENGINEERING DRAWING (PR-1)

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	90	Examination	3 hrs
Lab Periods:	6 P/week	Sessional:	25
Maximum marks:	75	End Semester Examination:	50

COURSE OBJECTIVES:-

Students will develop ability towards

- Recognizing significance of standardized representations
- Comprehending role of various fastening elements and offer engineering drawing thereof in manual mode
- Comprehending geometrical constraints and function of components in assemblies such as bearings and screw jack
- Comprehending functional requirement of major components and offer engineering drawing in manual mode thereof.

Chapter   **Contents**

1.0   Revision of Engineering Drawing of 1st Year

2.0   Draw plan, elevation and side view of different machine elements from
         their isometric view using AutoCAD & mini drafter (Minimum 5 Drawings).

3.0   Engineering drawing of fastening elements in first angle orthographic
         Projection
         3.1 Bolt, nut and threads

         3.2 Cotter joint

         3.3 Knuckle joint

4.0   Details to assembly
         4.1 Rigid pedestal bearing

         4.2 Foot step bearing

         4.3 Simple Screw jack

5.0   Assembly to details
         5.1 Connecting rod of IC Engine

         5.2 Boiler safety valve

         5.3 Spring loaded valve

         5.4 Hydraulic non return valve

         5.5 Flat belt pulley

Learning Resources:

Sl No.	Author Name	Name of the Book	Publisher Name
1	N D Bhatt	Machine Drawing	Charotar
2	T Jones	Machine Drawing	Kalyani
3	R K Dhawan	Machine Drawing	S.Chand
4	T. Jeypooven	Emgg. Graphics using Autocad	CBS

MECHANICAL ENGINEERING LABORATORY (PRACTICAL-2)

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Lab. periods:	4 P/week	Sessional	25
Maximum marks:	75	End Semester Examination:	50

COURSE OBJECTIVES

Students will develop ability towards

- Conducting experimentations to determine properties of a solid material subject to uniaxial loading and impact
- Conducting experimentations towards determining characteristics of a fuel
- Study of equipment employing using fuels.

1. **Strength of Materials and thermal Laboratory**

    1.1   Determine end reactions in a simply supported beam using parallel force apparatus.

    1.2   Determination of Young's modulus using Searle's apparatus

    1.3   Determination of torsional rigidity of the shaft using torsion testing machine

    1.4   Determination of salient points (Young's modulus, yield point, fracture point) from

    stress- strain curve using Universal Testing Machine

    1.5   Determination of hardness number by Rockwell/Vickers hardness testing machine

    1.6   Determination of toughness using Impact testing machine (Charpy/Izod)

    1.7   Determination of Flash point and fire point

    1.8   Joule's experiment

WORKSHOP PRACTICE-II (PRACTICAL-3)

Name of the Course: Diploma in **Mech/Auto/Aero & Other Mechanical Allied Branches**			
Course code:		Semester	3rd
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P/week	Sessional	50
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES:-

Students will develop ability towards

- Practicing fitting, carpentry, smithy and machining
- Understanding the tools and equipment used in the practices
- Realize the time and resource utilization in the practices

1.   Fitting practices
1.1 Preparation of caliper
1.2 Preparation of try square
1.3 Preparation of hammer, square , Hexagonal

2.   Smithy Practices
2.1 Preparation of door ring with hook
2.2 Preparation of hexagonal head bolt
2.3 Preparation of octagonal flat chisel

3   Carpentry Practices
3.1 Cutting of slot, botch, mortise and Tenon Joint
3.2 Preparation of single dove tail joint

4   Welding Practice
4.1 Lap & Butt Joint using Arc Welding
4.2 Lap Joint using Gas Welding
4.3 Joining Two non-ferrous parts through

LIST OF EQUIPMENTS OF MECHANICAL ENGG. LABORATORY

Sl No	NAME OF THE EQUIPMENT	Quantity
1	PARALLEL FORCE APPARATUS	2 Nos.
2	SEARLE'S APPARATUS	2 Nos.
3	TORSION TESTING MACHINE	1 Nos.
4	DIGITAL UNIVERSAL TESTING MACHINE	1 Nos.
5	HARDNESS TESTING MACHINE	1 Nos.
6	IMPACT TESTING MACHINE	1 Nos.
7	FLASH POINT AND FIRE POINT APPARATUS	1 Nos.
8	JOULES APPARATUS	1 Nos.

LIST OF EQUIPMENTS OF WORKSHOP PRACTICE

WELDING SHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	OXYGEN CYLINDER	01 No.
02	ACETYLENE CYLINDER	01 No.
03	PRESSURE GAUSES	02 Nos
04	PRESSURE REGULATOR	02 Nos.
05	WELDING TORCH	01 No.
06	GOGGLES	10 Nos.
07	HOSE PIPES	10 Meters
08	AC WELDING TRANSFORMER SET	01 No.
09	CHIPPING BRUSH	02 Nos.
10	WIRE BRUSH	02 Nos.
11	ARC SHIELD (EYE PROTECTOR)	05 Nos.
12	MIG / TIG WELDING MACHINE	01 Nos.

CARPENTRY SHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	STEEL RULE (SCALE) 1 Meter	10 Nos.
02	SCRIBER	10 Nos.
03	MARKING GAUGE	05 Nos.
04	MORTISE GAUGE	05 Nos.
05	TRY SQURE	10 Nos.
06	DIVIDERS	10 Nos.
07	RIP SAW	10 Nos.
08	COPING SAW	10 Nos.
09	FIRMAR CHIESEL	10 Nos.
10	GAUGE CHIESEL	02 Nos.
11	IRON JACK PLANE	02 Nos.
12	TRYING PLANE	05 Nos.
13	RASP	05 Nos.
14	HAND DRILL	05 Nos.
15	GIMLET DRILL	02 Nos.
16	CLAMPING VICE	10 Nos.
17	C-CLAMP	05 Nos.
18	CROSS PEAN HAMMER	05 Nos.
19	CLAW HAMMER	10 Nos.
20	MALLET	05 Nos.
21	WOOD WORKING LATHE	01 No.
22	CIRCULAR SAW	01 No.

FITTING SHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	BENCH VICE	20 Nos.
02	PIPE VICE	04 Nos.
03	TRY SQURE	10 Nos.
04	SCRIBER & SUEFACE GAUGE	10 Nos.
05	DOT PUNCH	10 Nos.
06	CENTRE PUNCH	10 Nos.
07	SURFACE PLATE	01 No.
08	ANGLE PLATE	01 No.
09	STEEL RULE	10 Nos.
10	VERNIER CALLIPERS	05 Nos.
11	MICROMETRE	05 Nos.
12	DIVIDERS	10 Nos.
13	OUTSIDE CALLIPERS	10 Nos.
14	INSIDE CALLIPERS	05 Nos.
15	FEELER GAUGE	01 No.
16	VERNIER HEIGHT GAUGE	01 No.
17	HACKSAW (FIXED FRAME)	10 Nos.
18	ROUND FILE	10 Nos.
19	SINGLE CUT FILE	10 Nos.
20	DOUBLE CUT FILE	10 Nos.
21	BALL PEAN HAMMER	05 Nos.
22	TAP WRENCH	01 No.
23	HAND DRILLING M/C	01 No.
24	PORTABLE GRINDER	01 o.

BLACKSMITHY SHOP

| SL. NO.	NAME OF ITEM	QUANTITY
01	FURNACE OF HEARTH (WITH CENTRE BLOWER)	05 Nos.
02	SHOWEL	05 Nos.
03	POKER	05 Nos.
04	ANVIL	05 Nos.
05	SCEDGE HAMMER	05 Nos.
06	PICK UP TONG	10 Nos.
07	CHIESEL TONG	05 Nos.
08	CLOSE FLAT TONG	05 Nos.
09	PINUR TONG	05 Nos.
10	HOT CHIESEL	05 Nos.
11	COLD CHIESEL	05 Nos.
12	DRIFT	02 Nos.
13	SWAGE BLOCK	01 No.
14	BALL PEAN HAMMER	05 Nos.
15	CROSS PEAN HAMMER	05 Nos.

TEACHING AND EVALUATION SCHEME FOR 4th Semester (Mechanical Engg.) (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		Theory of Machine	4		-	20	80	3	100
Th.2		Manufacturing Technology	4		-	20	80	3	100
Th.3		Fluid Mechanics	4		-	20	80	3	100
Th.4		Thermal Engg-II	4		-	20	80	3	100
		Total	*16*			*80*	*320*	*-*	*400*
		Practical							
Pr.1		Theory of Machine and Measurement lab	-	-	6	25	75	3	100
Pr.2		Mechanical Engg. Lab-II	-	-	6	25	75	3	100
Pr.3		Workshop-III	-	-	6	50	50	4	100
Pr.4		Technical Seminar			2	50			50
		Student Centered Activities(SCA)		-	3				
		Total	*-*	*-*	*23*	*150*	*200*	*-*	*350*
		Grand Total	**16**	**-**	**23**	**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.

1

CURRICULLUM OF 4th SEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2019-20 Sessions)
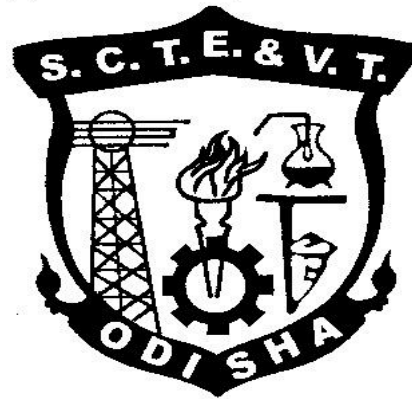
STATE   COUNCIL   FOR   TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

TH 1 - THEORY OF MACHINES

Name of the Course: Diploma in **Mech/Auto/ & Other Mechanical Allied Branches**			
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.RATIONAL:

Mechanical and Automobile engineering is involved with design, manufacturing and use of various types of machines. Each machine consists of a large number of static and moving parts called mechanisms. Theory of machines is study of such different kind of mechanisms.

B.COURSE OBJECTIVES:
Students will develop an ability towards

- Understanding machine system consisting of different link assemblies as components
- Comprehending Working principle of machine components such as clutch, brakes, bearings based on friction
- Comprehending working principles related to power transmission systems and predicting the work involved and efficiency.
- Comprehending working principle in speed and torque regulating devices such as governor and flywheels
- Determination of amount and position of masses required towards static and dynamic balancing
- Comprehending types and causes of vibration in machines and predicting remedial measures

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Simple Mechanism	08
02	Friction	12
03	Power Transmission	12
04	Governors and Flywheel	12
05	Balancing of Machine	08
06	Vibration of machine parts	08
	Total Period:	**60**

D. CONTENT

1.0   Simple mechanism
- 1.1   Link ,kinematic chain, mechanism, machine
- 1.2   Inversion, four bar link mechanism and its inversion
- 1.3   Lower pair and higher pair
- 1.4   Cam and followers

2.0   Friction
- 2.1   Friction between nut and screw for square thread, screw jack
- 2.2   Bearing and its classification, Description of roller, needle roller& ball bearings.
- 2.3   Torque transmission in flat pivot& conical pivot bearings.
- 2.4   Flat collar bearing of single and multiple types.
- 2.5   Torque transmission for single and multiple clutches
- 2.6   Working of simple frictional brakes.

2.7   Working of Absorption type of dynamometer

3.0   Power Transmission
 3.1   Concept of power transmission
 3.2   Type of drives, belt, gear and chain drive.
 3.3   Computation of velocity ratio, length of belts (open and cross)with and without slip.
 3.4   Ratio of belt tensions, centrifugal tension and initial tension.
 3.5   Power transmitted by the belt.
 3.6   Determine belt thickness and width for given permissible stress for open and crossed belt considering centrifugal tension.
 3.7   V-belts and V-belts pulleys.
 3.8   Concept of crowning of pulleys.
 3.9   Gear drives and its terminology.
 3.10 Gear trains, working principle of simple, compound, reverted and epicyclic gear trains.

4.0   Governors and Flywheel
 4.1   Function of governor
 4.2   Classification of governor
 4.3   Working of Watt, Porter, Proel and Hartnell governors.
 4.4   Conceptual explanation of sensitivity, stability and isochronisms.
 4.5   Function of flywheel.
 4.6   Comparison between flywheel &governor.
 4.7   Fluctuation of energy and coefficient of fluctuation of speed.
 4.8

5.0   Balancing of Machine
 5.1   Concept of static and dynamic balancing.
 5.2   Static balancing of rotating parts.
 5.3   Principles of balancing of reciprocating parts.
 5.4   Causes and effect of unbalance.
 5.5   Difference between static and dynamic balancing

6.0   Vibration of machine parts
 6.1   Introduction to Vibration and related terms (Amplitude, time period and frequency, cycle)
 6.2   Classification of vibration.
 6.3   Basic concept of natural, forced & damped vibration
 6.4 Torsional and Longitudinal vibration.
 6.5 Causes & remedies of vibration.

CHAPTERS COVERED UP TO IA- 1,2,3

Learning Resources:

Sl No.	Name of the Book	Author Name	Publisher
1.	Text Book of Theory of Machine	R.S Khurmi	S.Chand
2.	Text Book of Theory of Machine	R.K. Rajput	S.Chand
3.	Text Book of Theory of Machine	P.L.Ballany	Dhanpat Rai
4.	Text Book of Theory of Machine	Thomas Bevan	Pearsion

TH-2 MANUFACTURING TECHNOLOGY

Name of the Course: Diploma in **Mech/Auto/ & Other Mechanical Allied Branches**			
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. RATIONAL:

Engineering basically means production of goods and services for human consumption. The major function of mechanical engineering is to manufacture various products using machineries, production processes and production management techniques. Therefore this is one of the most important subjects to be learned by a mechanical and automobile engineer.

B. COURSE OBJECTIVES:

Students will develop an ability towards

- Comprehending required material properties for cutting tools
- Comprehending machining mechanism principle and factors affecting machining performance
- Comprehendingworkingprincipleandcomponentsinmachiningtoolsincludinglathe,milling,shaping,planning,slottingmachines
- Comprehendingrequirementofsurfacefinishandrealizeprinciplesinvolvedingrindingandsuperfinishingoperations

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Tool Materials	04
02	Cutting Tools	06
03	Lathe Machine	08
04	Shaper	06
05	Planning Machine	06
06	Milling Machine	08
07	Slotter	06
08	Grinding	06
09	Internal Machining operations	06
10	Surface finish, lapping	04
	Total Period:	**60**

D. CONTENT
1.0 Tool Materials
    1.1 Composition of various tool materials
    1.2 Physical properties& uses of such tool materials.

2.1 Cutting Tools
  2.1 Cutting action of various and tools such as Chisel, hacksaw blade, dies and reamer
  2.3 Turning tool geometry and purpose of tool angle
  2.5 Machining process parameters (Speed, feed and depth of cut)
  2.6 Coolants and lubricants in machining and purpose

3.0 Lathe Machine
  3.1 Construction and working of lathe and CNC lathe
  - Major components of a lathe and their function
  - Operations carried out in a lathe(Turning, thread cutting, taper turning, internal machining, parting off, facing, knurling)
  - Safety measures during machining
  3.2 Capstan lathe
  - Difference with respect to engine lathe
  - Major components and their function
  - Define multiple tool holders
  3.3 Turret Lathe
  - Difference with respect to capstan lathe
  - Major components and their function
  3.4 Draw the tooling layout for preparation of a hexagonal bolt &bush

4.0 Shaper
  4.1 Potential application areas of a shaper machine
  4.2 Major components and their function
  4.3 Explain the automatic able feed mechanism
  4.4 Explain the construction &working of tool head
  4.5 Explain the quick return mechanism through sketch
  4.6 State the specification of a shaping machine.

5.0 Planning Machine
  5.1 Application area of a planer and its difference with respect to shaper
  5.2 Major components and their functions
  5.3 The table drive mechanism
  5.4 Working of tool and tool support
  5.5 Clamping of work through sketch.

6.0 Milling Machine
  6.1 Types of milling machine and operations performed by them and also same for CNC milling machine

  6.2 Explain work holding attachment
  6.3 Construction & working of simple dividing head, universal dividing head
  6.4 Procedure of simple and compound indexing
  6.5 Illustration of different indexing methods

7.0 Slotter
  7.1 Major components and their function
  7.2 Construction and working of slotter machine
  7.3 Tools used in slotter

8.0 Grinding
  8.1 Significance of grinding operations
  8.2 Manufacturing of grinding wheels
  8.3 Criteria for selecting of grinding wheels
  8.4 Specification of grinding wheels with
      example Working of
  - Cylindrical Grinder
  - Surface Grinder
  - Centreless Grinder

9.0 Internal Machining operations
Classification of drilling machines

    9.1   Working of
- Bench drilling machine
- Pillar drilling machine
- Radial drilling machine

    9.2   Boring
- Basic Principle of Boring
- Different between Boring and drilling

    9.3   Broaching
- Types of Broaching(pull type, push type)
- Advantages of Broaching and applications

10 Surface finish, lapping
    10.1   Definition of Surface finish
    10.2   Description of lapping& explain their specific cutting.

CHAPTERS COVERED UP TO IA- 1, 2,3,4,5

LearningResources:

Sl No.	Name of the Book	Author Name	Publisher
1.	Text Book of Workshop Technology	Hazra Choudhury Vol-I & II	MPP Pvt. Ltd.
2.	Text Book of Workshop Technology	W.A.S Chapman Vol-I & II	
3.	Text Book of Manufacturing Process	P.N Rao	TMH

TH-3 FLUID MECHANICS

Name of the Course: Diploma in **Mech & Other Mechanical Allied Branches**			
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. RATIONAL:

Use of fluid in engineering field is of great importance. It is therefore necessary to study the physical properties and characteristics of fluids which have very important application in mechanical and automobile engineering.

B. COURSE OBJECTIVES:

Students will develop an ability towards

- Comprehending fluid properties and their measurements
- Realizing conditions for floatation
- Applying Bernoulli's theorem

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Properties of Fluid	08
02	Fluid Pressure and its measurements	08
03	Hydrostatics	08
04	Kinematics of Flow	08
05	orifices, notches & weirs	08
06	Flow through pipe	10
07	Impact of jets	10
	Total Period:	**60**

D.CONTENT

1.0 Properties of Fluid
1.1 Define fluid
1.2 Description of fluid properties like Density, Specific weight, specific gravity, specific volume and solve simple problems.
1.3 Definitions and Units of Dynamic viscosity, kinematic viscosity, surface tension Capillary phenomenon

2.0 Fluid Pressure and its measurements
2.1 Definitions and units of fluid pressure, pressure intensity and pressure head.
2.2 Statement of Pascal's Law.
2.3 Concept of atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure
2.4 Pressure measuring instruments
Manometers (Simple and Differential)
    2.4.1 Bourdon tube pressure gauge(Simple Numerical)
2.5 Solve simple problems on Manometer.

3.0   Hydrostatics
3.1   Definition of hydrostatic pressure
3.2   Total pressure and centre of pressure on
       immersed bodies(Horizontal and Vertical Bodies)
3.3   Solve Simple problems.
3.4   Archimedes 'principle, concept of buoyancy, meta center and meta centric height
        (Definition only)

3.5   Concept of floatation

4.0   Kinematics of 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 (Venturimeter, pitot tube)

4.4 Solve simple problems

5.0   Orifices, notches & weirs
5.1 Define orifice

5.2 Flow through orifice

5.3Orifices coefficient & the relation between the orifice coefficients

5.4 Classifications of notches & weirs

5.5 Discharge over a rectangular notch or weir

5.6 Discharge over a triangular notch or weir

5.7 Simple problems on above

6.0   Flow through pipe
6.1   Definition of pipe.
6.2   Loss of energy in pipes.
6.3   Head loss due to friction: Darcy's and Chezy's formula (Expression only)
6.4   Solve Problems using Darcy's and Chezy's formula.
6.5   Hydraulic gradient and total gradient line

7.0   Impact of jets
7.1   Impact of jet on fixed and moving vertical flat plates

7.2   Derivation of work done on series of vanes and condition for maximum
       efficiency.

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

CHAPTERS COVERED UP TO IA- 1, 2,3,4

Learning Resources:

Sl No.	Name of the Book	Author Name	Publisher
1.	Text Book of Fluid Mechanics	R.K.Bansal	Laxmi
2.	Text Book of Fluid Mechanics	R.S khurmi	S.Chand
3.	Text Book of Fluid Mechanics	R.K.Rajput	S.Chand
4.	Text Book of Fluid Mechanics	Modi & Seth	Rajson's pub. Pvt. lt

THEORY 4 -THERMAL ENGINEERING-II

Name of the Course: Diploma in **Mech/ & Other Mechanical Allied Branches**			
Course code:		Semester	4th
Total Period:	60	Examination	3 hr
Theory periods:	4 P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONAL:

Modern society needs lots of applications of thermodynamics, which deals with energy possessed by hot vapors, its production and its application in different fields.

B. COURSE OBJECTIVES:

Student will develop ability towards.

- Understanding the power developed in I.C engine and efficiency.
- Understanding the principle, performance and application of air compressor.
- Determining thermodynamic properties of steam using steam tables & mollier chart.
- Comprehending the working of various steam generators i.e. boilers.
- Comprehending the vapor power cycles and computing work done & efficiencies thereof.

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
01	Performance of I. C engine	08
02	Air Compressor	12
03	Properties of steam	12
04	Steam Generator	12
05	Vapor power cycle	08
06	Heat Transfer	08
Total Period:		**60**

D.CONTENT

1. Performance of I.C engine

1.1 Define mechanical efficiency, Indicated thermal efficiency,

Relative Efficiency, brake thermal efficiency overall efficiency

Mean effective pressure &specific fuel consumption.

1.2 Define air-fuel ratio & calorific value of fuel.

1.3 Work out problems to determine efficiencies & specific fuel consumption.

2. Air Compressor

2.1 Explain functions of compressor & industrial use of compressor air

2.2 Classify air compressor & principle of operation.

2.3 Describe the parts and working principle of reciprocating Air compressor.

2.4 Explain the terminology of reciprocating compressor such as bore, stroke, pressure ratio free air delivered &Volumetric efficiency.

2.5 Derive the work done of single stage & two stage compressor with and without clearance.

2.6 Solve simple problems (without clearance only)

3. Properties of Steam

3.1 Difference between gas & vapours.

3.2 Formation of steam.

3.3 Representation on P-V, T-S, H-S, & T-H diagram.

3.4 Definition & Properties of Steam.

3.5 Use of steam table & mollier chart for finding unknown properties.

3.6 Non flow & flow process of vapour.

3.7 P-V, T-S & H-S, diagram.

3.8 Determine the changes in properties & solve simple numerical.

4. Steam Generator

4.1 Classification & types of Boiler.

4.2 Important terms for Boiler.

4.3 Comparison between fire tube & Water tube Boiler.

4.4 Description & working of common boilers (Cochran, Lancashire, Babcock & Wilcox Boiler)

4.5 Boiler Draught (Forced, induced & balanced)

4.6 Boiler mountings & accessories.

5. Steam Power Cycles

5.1 Carnot cycle with vapour.

5.2 Derive work & efficiency of the cycle.

5.3 Rankine cycle.

       5.3.1 Representation in P-V, T-S & h-s diagram.

       5.3.2 Derive Work & Efficiency.

       5.3.3 Effect of Various end conditions in Rankine cycle.

       5.3.4 Reheat cycle & regenerative Cycle.

5.4 Solve simple numerical on Carnot vapour Cycle & Rankine Cycle.

6. Heat Transfer

6.1 Modes of Heat Transfer (Conduction, Convection, Radiation).

6.2 Fourier law of heat conduction and thermal conductivity (k).

6.3 Newton's laws of cooling.

6.4 Radiation heat transfer (Stefan, Boltzmann & Kirchhoff's law) only statement, no derivation & no numerical problem.

6.5 Black body Radiation, Definition of Emissivity, absorptivity, & transmissibility.

CHAPTERS COVERED UP TO IA- 1, 2,3.

Sl No.	Reference Book	Author Name	Publisher Name
1	Thermal Engineering	R.S. Khurmi	S.Chand
2	Thermal Engineering	A.R.Basu	Dhanpat Rai
3	Thermal Engineering	A.S. Sarao	Satya Prakash
4	Engineering Thermodynamics	P.k.Nag	TMH
5	Thermal Engineering	Mahesh M Rathore	TMH

PR-1 THEORY OF MACHINES AND MEASUREMENTS LAB

Name of the Course : Diploma in **Mech/ & Other Mechanical Allied Branches**

Course code:		Semester	4th
Total Period:	90	Examination	3 hrs
Lab. periods:	6 P/W	Term Work	25
Maximum marks:	100	End Semester Examination:	75

SL. No Content

1 Determination of centrifugal force of a governor (Hart Nell / Watt/Porter).

2 Study & demonstration of static balancing apparatus.

3 Study & demonstration of journal bearing apparatus.

4 Study of different types of Cam and followers.

5 Study & demonstration of epicyclic gear train.

6 Determination of the thickness of ground M.S flat to an accuracy of 0.02mm using Vernier Caliper.

7 Determination of diameter of a cylindrical component to an accuracy of 0.01mm using micrometer.

8. Determine the heights of gauge blocks or parallel bars to accuracy of 0.02mm using Vernier height gauge.

9. Determine the thickness of ground MS plates using slip gauges.

10. Determination of angel of Machined surfaces of components using sin bar with slip gauges.

PR- 2   MECHANICAL ENGG. LAB –II

Name of the Course: Diploma in **Mech/ & Other Mechanical Allied Branches**

Course code		Semester	4th
Total Period:	90	Examination	3 hrs
Lab. periods:	6 P/W	Term Work	25
Maximum marks:	100	End Sem Examination:	75

SL. No	Content
1	Study of 2-S, 4-S petrol & diesel engine models
2	Determine the brake thermal efficiency of single cylinder petrol engine.
3	Determine the brake thermal efficiency of single cylinder diesel engine.
4	Determine the B.H.P, I.H.P BSFC of a multi cylinder engine by Morse test.
5	Determine the mechanical efficiency of an air Compressor.
6	Study of pressure measuring devices (manometer, Bourdon tube pressure gauge)
7	Verification of Bernoulli's theorem
8	Determination of Cd from venturimeter
9	Determination of Cc, Cv, Cd from orifice meter
10	Determine of Darcy's coefficient from flow through pipe

PR-3 WORKSHOP   PRACTICE-III

Name of the Course: Diploma in **Mech/ & Other Mechanical Allied Branches**			
Course code:		Semester	4th
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P/W	Teamwork	50
Maximum marks:	100	End Semester Examination:	50

Course Objectives:
Students will develop an ability towards

- Preparing components and jobs using foundry, welding and machining
- Realizing process parameters involved and their effects

1   **Machining Practices**

    1.1   Job in evolving drilling, boring

    1.2   Internal/External threading on Turning jobs

    1.3   Job in evolving use of Capstan and turret lathe
             (Taper Turning & Chamfering)

    1.4   All gear lathe, CNC Lathe Trainer Practice
             Job involving all turning process on MS Rod &
             aluminum rod for jobs using CNC Lathe trainer.

2   **Metal Machining**

    2.1   Shaper
             Preparation of V Block on CI or MS Blocks

    2.2   Milling Machine
             Preparation of Spur gear on CI or MS round

Pr4. TECHNICAL SEMINAR

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	4th
Total Period:	30		
Lab. periods:	02/week	Term Work	50
Maximum marks:	50		

OBJECTIVES:

Each student has to select a recent topic of latest technology in the area of Mechanical Engineering and present a seminar in front of all students of the class. He/She has to prepare a PowerPoint presentation of the selected topic of minimum 10 slides are the total presentation will be approximately 10 minutes duration .There will be interactive session between the presenter and rest of the students including the faculty members of the dept at the end of presentation .A student has to present at least 2 nos.of seminar during a semester and to submit the report for evaluation.

List of Equipments of Theory of Machine and Measurement Lab

Sl. No.	Name of Apparatus	QUANTITY
01	GOVERNOR APPARATUS	01No
02	STATIC AND DYNAMIC APPARATUS	01No
03	JOURNAL BEARING APPARATUS	01 No
04	CAM ANALYSIS APPARATUS	01 No
05	EPICYCLIC GEAR TRAIN	01 No
06	VERNIER CALLIPER	04 Nos.
07	MICROMETER	04 Nos.
08	VERNIER HEIGHT GAUGE	02 Nos.
09	SLIP GAUGE	02 Nos.
10	SINE BAR	02 Nos.

List of Equipments of Workshop Practice-III

Sl. No.	Name of Apparatus	QUANTITY
01	RADIAL DRILL MACHINE	01 No
02	ALL GEAR LATHE	06 Nos.
03	CAPSTAN LATHE	01 Nos.
04	CNC LATHE TRAINER	01 Nos.

List of Equipments of MEL-II

SL. NO.	NAME OF ITEM	QUANTITY
01	MODEL OF 2 STROKE PETROL ENGINE	02 Nos
02	MODEL OF 4 STROKE PETROL ENGINE	02 Nos.
03	MODEL OF 2 STROKE DIESEL ENGINE	02 Nos.
04	MODEL OF 4 STROKE DIESEL ENGINE	02Nos.
05	SINGLE CYLINDER PETROL ENGINE TEST RIG	01 No.
06	SINGLE CYLINDER DIESEL ENGINE TEST RIG	01 No.
07	MORSE TEST APPARATUS	01 No.
08	2 STAGE AIR COMPRESSOR TEST RIG	01 No.
09	PRESSURE MEASURING DEVICES (BOURDON TUBE PRESSURE GAUGE, MANOMETER)	02 Nos. each
10	BERNOULLI'S APPARATUS	01 No.
11	VENTURIMETER APPARATUS	01 No.
12	ORIFICEMETER APPARATUS	01 No
13	FLOW THROUGH PIPE APPARATUS	01 No