DIPLOMA IN MECHANICAL ENGINEERING

M-SCHEME (Full Time)

II and III year

2016 onwards
## ANNEXURE - I
### M SCHEME
Implemented from 2015 – 2016

### DIPLOMA IN MECHANICAL ENGINEERING (FULL TIME)

### CURRICULUM OUTLINE

#### THIRD SEMESTER

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# Scheme of Examination

## Mechanical Engineering

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M-Scheme
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-531
Semester : III
Subject Title : STRENGTH OF MATERIALS

TEACHING AND SCHEME OF EXAMINATIONS:
No. of Weeks per Semester: 15 Weeks

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RATIONALE:
Day by day, engineering and technology experience tremendous growth. Design plays a major role in developing engineering and technology. Strength of material is backbone for design. The strength of material deals generally with the behaviour of objects, when they are subject to actions of forces. Evaluations derived from these basic fields provide the tools for investigation of mechanical structure.

OBJECTIVES

- Define various Support reaction and equilibrium.
- Calculate the deformation of materials, which are subjected to axial load and shear.
- Determine the moment of Inertia of various sections used in industries.
- Estimate the stresses induced in thin shells.
- Draw the shear force and bending moment diagram of the beam for different loads.

I   STATIC OF PARTICLES:

External and internal forces - moment of a force - Varignon’s theorem - moment of a couple - equivalent couples - addition of couples - resolution of a force into a force and a couple - Free body diagram - Necessary and sufficient conditions for the equilibrium of rigid bodies in two dimension - Support reaction - types of support - removal of two dimensional supports - Simple problems only.

FRICITON:

II  DEFORMATION OF METALS

stress and shear strain - modulus of rigidity. Linear strain – Deformation due to tension and compressive force – Simple problems in tension, compression and shear force.


III GEOMETRICAL PROPERTIES OF SECTIONS AND THIN SHELLS
Properties of sections: Definition – center of gravity and centroid - position of centroids of plane geometrical figures such as rectangle, triangle, circle and trapezium-problems to determine the centroid of angle, channel, T and I sections only - Definition-centroidal axis-Axis of symmetry. Moment of Inertia – Statement of parallel axis theorem and perpendicular axis theorem. Moment of Inertia of lamina of rectangle, circle, triangle, I and channel sections- Definition-Polar moment of Inertia-radius of gyration – Problems computing moment of inertia and radius of gyration for angle, T, Channel and I sections.

Thin Shells: Definition – Thin and thick cylindrical shell – Failure of thin cylindrical shell subjected to internal pressure – Derivation of Hoop and longitudinal stress causes in a thin cylindrical shell subjected to internal pressure – simple problems – change in dimensions of a thin cylindrical shell subjected to internal pressure – problems – Derivation of tensile stress induced in a thin spherical shell subjected to internal pressure – simple problems – change in diameter and volume of a thin spherical shell due to internal pressure – problems.

IV SF AND BM DIAGRAMS OF BEAMS AND THEORY OF BENDING
Classification of beams – Definition – shear force and Bending moment – sign conventions for shear force and bending moment – types of loadings – Relationship between load, force and bending moment at a section – shear force diagram and bending moment diagram of cantilever and simply supported beam subjected to point load and uniformly distributed load (udl) – Determination of Maximum bending moment in cantilever beam and simply supported beam when they are subjected to point load and uniformly distributed load.

V THEORY OF TORSION AND SPRINGS

Theory of torsion – Assumptions – torsion equation \( \frac{T}{J} = \frac{f_s}{R} = \frac{C \theta}{l} \) – strength of solid and hollow shafts – power transmitted – Definition – Polar modulus – Torsional rigidity – strength and stiffness of shafts – comparison of hollow and solid shafts in weight and strength considerations – Advantages of hollow shafts over solid shafts – Problems.

Types of springs – Laminate and coiled springs and applications – Types of coiled springs – Difference between open and closely coiled helical springs – closely coiled helical spring subjected to an axial load – problems to determine shear stress, deflection, stiffness and resilience of closed coiled helical springs

Text Books:

Reference Books:
M-SCHHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code : 
Subject Code : M-532
Semester : III
Subject Title : MANUFACTURING PROCESSES

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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Topics and Allocation of Hours:

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<td>II</td>
<td>WELDING TECHNOLOGY</td>
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<td>III</td>
<td>FORMING TECHNOLOGY</td>
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<td>IV</td>
<td>THEORY OF METAL CUTTING &amp; LATHE</td>
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<td>DRILLING &amp; METROLOGY</td>
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RATIONALE:
Manufacturing, the major and the most important aspect in industries needs utmost care and attention. Knowledge about various processes and allied areas will be of great use to the
personnel involved in production. This will provide the students an opportunity to skill themselves for the industrial scenario.

**OBJECTIVES**

- Acquire Knowledge about types of pattern, casting, and moulding.
- Describe the various casting processes.
- Knowledge about various welding process and its working principle.
- Appreciate the safety practices used in welding.
- Acquire knowledge about various forming technologies.
- Knowledge about the lathe and its working parts.
- Describe the functioning of semi-automatic lathes.
- Study about the drilling process.
- Study about metrology and measuring instruments.

**MANUFACTURING PROCESSES**

**DETAILED SYLLABUS**

**Contents: Theory**

I Foundry Technology

**Patterns:** Definition—types of pattern—solid piece—split piece—loose piece—match plate—sweep—skeleton—segmental—shell—pattern materials—pattern allowances.

**Moulding:** Moulding sand—constituents—types—properties of moulding sand—moulding sand preparation—moulding tools—moulding boxes—types of moulds—green sand mould—dry sand mould—loam mould—methods of moulding—moulding machines—jolting—squeezing—sand slinger construction and working principle.

**Cores:** Essential qualities of core—materials—core sand preparation—core binders—core boxes—CO₂ process core making—types of core.

**Metallurgy:** Introduction—Iron-carbon diagram.

**Melting furnaces:** Blast furnace—Cupola furnace—crucible furnace—types—pit furnace—coke fired—oil fired—electric furnace—types—direct arc—indirect arc—induction furnace—working principles.

**Casting:** Shell mould casting—investment casting—pressure diecasting—hot chamber die casting—cold chamber die casting—gravity die casting—centrifugal casting—continuous casting—defects in casting—causes and remedies.
II  Welding Technology


Gas welding: Oxy-acetylene welding—advantages—limitations—gas welding equipment—Three types of flames—welding techniques—filler rods.—Flame cutting—soldering—brazing—difference between soldering and brazing.

Types of welded joints—merits and demerits of welded joints—inspection and testing of welded joints—destructive and non-destructive types of tests—magnetic particle test—radiographic and ultrasonic test—defects in welding—causes and remedies.

III  Forming Technology

Forging: Hot working, cold working—advantages of hot working and cold working—hot working operations—rolling, forging, smith forging, drop forging, upset forging, press forging—roll forging.


Powder Metallurgy: Methods of manufacturing metal powders—atomization, reduction and electrolysis deposition—compacting—sintering—sizing—infiltration—mechanical properties of parts made by powder metallurgy—design rules for the powder metallurgy process.

IV  Theory of metal cutting and Lathes:


Centre Lathe: Introduction—specifications—simple sketch—principal parts—head stock—back geared type—all geared type—feed mechanism—tumbler gear mechanism—quick change gear box—apron mechanism—work holding device—three jaw chuck—four jaw chuck—centres—faceplate—mandrel—steady rest—follower rest—machining operations done on lathe—straight turning—step turning—taper turning methods: form tool—tailstock set over method—compound rest method—taper turning attachment—knurling—Thread cutting—


V Drilling and Metrology


Text Books:
2. Introduction of basic manufacturing processes and workshop technology – Rajendersingh – New age International (P) Ltd. Publishers, 4835/24, Ansari Road, Daryaganj, New Delhi - 110002

Reference Books:

M SCHEME
TEACHING AND SCHEME OF EXAMINATIONS:

No. of weeks per semester: 15 Weeks

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<td>Hours / Semester</td>
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<tr>
<td>I</td>
<td>PROPERTIESOF FLUIDS AND PRESSUREMEASUREMENTS</td>
<td>14</td>
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<tr>
<td>II</td>
<td>FLOW OF FLUIDS AND FLOW THROUGH PIPES</td>
<td>14</td>
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<tr>
<td>III</td>
<td>IMPACT OF JETS, HYDRAULICTURBINES, CENTRIFUGAL AND RECIPROCATING PUMPS</td>
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<tr>
<td>IV</td>
<td>PNEUMATIC SYSTEMS</td>
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<td>V</td>
<td>HYDRAULIC SYSTEMS</td>
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RATIONALE:

The main objective of this subject Fluid mechanics and Fluid power is to study the behavior of fluids under the condition of rest and motion. This chapter deals with fluid pumps, turbines, hydraulic and pneumatic operation. The overall object is to impart knowledge of pumps, hydraulic and pneumatic operation of tools and equipments.
OBJECTIVES

- Define the properties of Fluids.
- Explain the working of pressure measuring devices
- Explain continuity equation and Bernoulli’s Theorem
- Assess the impact of frictional loss of head in flow through pipes
- Estimate the discharge through orifices
- Distinguish the working principles of pumps and turbines.
- Explain the working of centrifugal pumps and reciprocating pumps.
- Compare pneumatic system with hydraulic system
- Draw Pneumatic circuits for industrial application.
- State the properties of hydraulic Systems
- Develop hydraulic circuit for machine tools applications.

DETAILED SYLLABUS

UNIT I

PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS

Introduction - Definition of fluid - Classification of Fluids - ideal and real fluids -Properties of a fluid – definition and units - Pressure-units of Pressure - Pressure head-atmospheric, gauge and absolute pressure – problems - Pascal’s law- proof - applications of Pascal’s law - Hydraulic press - Hydraulic jack - Pressure measurement -

Piezometer tube - Simple U-tube manometer - Differential U-tube manometer - Inverted Differential manometer - Micro-manometer - Inclined tube micro-manometer - Mechanical Gauges -Bourdon’s Tube Pressure Gauge - Diaphragm pressure gauge - Dead weight pressure gauge.

UNIT II

FLOW OF FLUIDS AND FLOW THROUGH PIPES

and Chezy's formula – problems - minor losses (description only) - Power transmission through pipes - problems.

UNIT III  
IMPACT OF JETS, HYDRAULIC TURBINES, CENTRIFUGAL AND RECIPROCATING PUMPS
Impact of jet - on a stationary flat plate held normal to the jet and inclined to the direction of jet - Impact of jet on a flat plate moving in the direction of jet - Impact of jet on a series of moving plates or vanes - force exerted and work done by the jet - problems. Hydraulic turbines – classifications - Pelton wheel - components and working - speed regulation (theory only) - Francis and Kaplan turbines - components and working - draft tube - functions and types - surge tank - differences between impulse and reaction turbines.

Centrifugal Pumps – classifications - construction and working of single stage centrifugal pumps - components with types - theory only - multi stage pumps – advantages - priming – cavitation.

Reciprocating Pumps – classifications - construction and working of single acting and double acting reciprocating pumps - plunger and piston pumps- discharge of a reciprocating pump - theoretical power required - coefficient of discharge – slip – problems - negative slip - indicator diagram – separation - air vessel (functions and working) - Special pumps - Jet pump - Turbine pump - Submersible pump.

UNIT IV  
PNEUMATIC SYSTEMS

UNIT V  
HYDRAULIC SYSTEMS

Text Books:

Reference Books:
2. Hydraulics, Andrew Parr (A Technician’s and Engineer’s Guide)
M-Scheme
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code:
Subject Code: M-534
Semester: III
Subject Title: MACHINE DRAWING

TEACHING AND SCHEME OF EXAMINATIONS:

No. of weeks per semester: 15 Weeks

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<td>SECTIONAL VIEWS</td>
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<td>II</td>
<td>LIMITS, FITS AND TOLERANCES</td>
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<td>III</td>
<td>SURFACE TEXTURE</td>
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<td>IV</td>
<td>KEYS, SCREW THREADS AND THREADED FASTENERS</td>
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RATIONALE:
Manufacturing of various parts start from the basic drawing of components. The assembly of components is also carried out from the drawing. So drawing is an important subject to be studied by the students to carry and complete the production and assembly process successfully.
OBJCETIVES

- Appreciate the need for sectional view and types of sections.
- Draw sectional views using different types of sections.
- Explain the use of threaded fasteners and the types of threads.
- Compare hole basis system with shaft basis system.
- Select different types of fits and tolerance for various types of mating parts.
- Appreciate the importance of fits and tolerance.

DETAILED SYLLABUS

UNIT I
SECTIONAL VIEWS
Review of sectioning – Conventions showing the section – symbolic representation of cutting plane- types of section – full section, half section, offset section, revolved section, broken section, removed section – section lining.

UNIT II
LIMITS, FITS AND TOLERANCES
Tolerances – Allowances – Unilateral and Bilateral tolerances. Limits – Methods of tolerances – Indication of tolerances on linear dimension of drawings – Geometrical tolerances – application
Fits –
Classifications of fits – Selection of fits – examples

UNIT III
SURFACE TEXTURE
Surface texture – importance – controlled and uncontrolled surfaces – Roughness – Waviness – lay – Machining symbols

UNIT IV
KEYS, SCREW THREADS AND THREADED FASTENERS

UNIT V
MANUAL DRAWING PRACTICE
Detailed drawings of following machine parts are given to students to assemble and draw the Elevations / Sectional elevations / Plan / and Side views with dimensioning and bill of materials
- Sleeve & Cotter joint
- Knuckle joint
- Screw Jack
• Foot step bearing
• Plummer Block
• Universal Coupling
• Simple Eccentric
• Machine Vice
• Protected type flanged coupling
• Swivel bearing.

Reference Books:
3. Mechanical Draughtsmanship, G.L. Tamta, Dhanpat Rai & Sons, Delhi
5. Engineering Drawing, D.N. Ghose, Dhanpat Rai & Sons, Delhi

END EXAMINATIONS

Question Pattern

Time: 3 Hrs
Max Marks : 75
Note: All the questions will be answered in drawing sheet only

PART A
(7 x 5 = 35)

Theory questions : (1 TO 8)
Two questions from each unit (I to IV) will be asked.
Answer any seven questions from the given eight questions.

PART B
40 Marks (Either A or B.)

Answer any one question by selecting either A or B.
9. A. Assemble and Draw any two views and bill of materials.
   (OR)
B. Assemble and Draw any two views and bill of material
M-SHEME
(Implements from the Academic year 2015-2016 onwards)
Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-535
Semester : III
STRENGTH OF MATERIALS AND FLUID MECHANICS
Subject Title : PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES
- Acquire skills on different types of testing methods of metals.
- Conduct material testing on elasticity, hardness, shear strength.
- Determine modulus of rigidity of open spring and closed coil springs.
- Determine the co-efficient of discharge of venturimeter, orifice meter, mouth piece and orifice.
- Determine the co-efficient of friction in pipes.
- Conduct performance test on centrifugal and reciprocating pumps.
- Conduct performance test on impulse and reaction turbines.

Strength of Materials Laboratory Exercises
1. Test on Ductile Materials:
Finding Young’s Modulus of Elasticity, yield points, percentage elongation and percentage reduction in area, stress strain diagram plotting, tests on mild steel.

2. Hardness Test:
Determination of Rockwell’s Hardness Number for various materials like mild steel, high carbon steel, brass, copper and aluminium.

3. Torsion test:
Torsion test on mild steel – relation between torque and angle of twist-determination of shear modulus and shear stress.

4. Impact test:
Finding the resistance of materials to impact loads by Izod test and Charpy test.

5. Tests on springs of circular section:
Determination of modulus of rigidity, strain energy, shear stress and stiffness by load deflection method (Open / Closed coil spring)

6. Shear test:
Single or double shear test on M.S. bar to finding the resistance of material to shear load.

**Fluid Mechanics Laboratory Exercises**

1. Verify the Bernoulli’s Theorem.
2. Determination of co-efficient of discharge of a mouth piece / orifice by variable head method.
3. Determination of co-efficient of discharge of a venturimeter / orificemeter.
4. Determination of the friction factor in a pipe.
5. Performance test on reciprocating pump / centrifugal pump and to draw the characteristics curves.
6. Performance test on impulse turbine / reaction turbine and to find out the Efficiency
M-Scheme
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code:
Subject Code: M-536
Semester: III
Subject Title: FOUNDRY AND WELDING PRACTICAL

Teaching and Scheme of Examinations:

No. of weeks per semester: 15 Weeks

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Objectives
- Identify the tools used in foundry.
- Identify the tools and equipment used in welding.
- Prepare sand moulds for different patterns.
- Perform welding operation to make different types of joints.
- Identify the different welding defects.
- Appreciate the safety practices used in welding.
- Prepare a record of work for all the exercises

Foundry Section
1. Introduction of tools and equipment
2. Types of patterns
3. Types of sand
4. Preparation of sand moulds
5. Core sands, preparation of cores
Exercises:
Prepare the green sand mould using the following patterns.
1. Solid pattern
2. Stepped pulley

Split pattern
3. Bent Pipe with core print
4. T-pipes with core print
5. Tumbles

Loose Piece Pattern
6. Dovetail

Core preparation
7. Core preparation for Bent pipe / T-pipe

Welding Section
1. Introduction of Safety in welding shop
2. Introduction to hand tools and equipment
3. Arc and gas welding equipment
4. Types of joints

Exercises:
Make the following welding joint / cutting.
Arc welding (Raw Material: 25 mm x 6mm MS flat)
1. Lap joint
2. Butt joint
3. T- joint

Gas Welding (Raw Material: 25mm x 3mm Ms flat)
4. Lap joint

Gas cutting: (GI/MS Sheet - 3mm thickness)
5. Profile cutting – circular profile

Spot welding: (GI/MS Sheet)
6. Lap joint
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code: 
Subject Code: M-537
Semester: III
Subject Title: METROLOGY & METALLOGRAPHY PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES
- Familiarize about measuring techniques of Metrology instruments.
- Select the range of measuring tools.
- Obtain accurate measurements.
- Determine the least count of measuring instruments.
- Study the working principle of Microscope.
- Specimen preparation of ferrous and non-ferrous metals.
- Grinding, polishing and mounting of specimen.
- Non-destructive testing of metals for cracks.
- Crack detection – Visual inspection, Die penetration method
- Prepare the record of work for the exercises.

METROLOGY SECTION:
1. Introduction to linear measurement.
2. Introduction to angular measurement.
3. Introduction to geometric measurements.
4. Study of Least Count of measuring instruments.
5. Study of accuracy of instruments and calibration of instruments.
8. Study of Geometric measurement - Gear tooth Vernier, Thread Micrometer.

**Exercises:**
1. Measure the dimensions of ground MS flat / cylindrical bush using Vernier Caliper compare with Digital / Dial Vernier Caliper.
2. Measure the diameter of a wire using micrometer and compare the result with digital micrometer
3. Measure the thickness of ground MS plates using slip gauges
5. Measure the angle of the machined surface using sine bar with slip gauges.
6. Measure the geometrical dimensions of V-Thread using thread Vernier gauge.
7. Measure the geometrical dimensions of spur gear.

**METALLOGRAPHY SECTION:**
1. To study the micro structure of the metals using Metallurgical Microscope.
2. Determine the micro structure of the ferrous and nonferrous metals.
3. Prepare the specimen to study the microstructure.
4. Conduct the liquid penetration test to find the crack.
5. Conduct magnetic particle test to find cracks.

**Exercises:**
1. Find the grain structure of the given specimen using the Metallurgical Microscope.
2. Prepare a specimen to examine the micro structure of the Ferrous and Non-ferrous metal.
3. Detect the cracks in the specimen using Visual Inspection and ring test.
5. Detect the cracks in specimen using Magnetic particle test.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-541
Semester : III
Subject Title : HEAT POWER ENGINEERING

TEACHING AND SCHEME OF EXAMINATIONS:
No. of Weeks per Semester: 15 Weeks

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<td>BASICS OF THERMODYNAMICS AND THERMODYNAMIC PROCESSES OF PERFECT GASES</td>
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<td>II</td>
<td>THERMODYNAMIC AIR CYCLES AND FUELS &amp; COMBUSTION</td>
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<td>AIR COMPRESSORS AND GAS TURBINES</td>
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<td>FORMATION &amp; PROPERTIES OF STEAM AND STEAMCALORIMETERS</td>
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<td>STEAM BOILERS AND PERFORMANCE OF BOILERS</td>
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RATIONALE:
The knowledge on the concept of Thermodynamics, Thermodynamic Processes, Steady flow energy equation and steam properties and performance of Boilers are vital.
OBJECTIVES

- Explain a basics of systems, laws of thermodynamics and thermodynamic processes.
- Explain different types of Air Cycles.
- Explain the fuels and combustion.
- Explain a air compressors and gas turbines.
- Explain a formation and properties of steam and steam calorimeters.
- Explain a steam boilers and performance of boilers.

HEAT POWER ENGINEERING
DETAILED SYLLABUS

UNIT I
BASICS OF THERMODYNAMICS AND THERMODYNAMIC PROCESSES OF PERFECT GASES

Introduction:

Perfect gases: - laws of perfect gases – Boyle’s, Charle’s, Joule’s, Regnault’s and Avogadro’s laws – General Gas Equation - Characteristic gas equation – relation between specific heats and gas constant – Universal gas constant –Change in Internal Energy-enthalpy – change in enthalpy – entropy.

Thermodynamic processes:- Constant volume, Constant pressure, Constant temp.(isothermal) ,Isentropic ( reversible adiabatic ) and,Polytropic Processes – p-V and T-s diagrams, work done , changein internal energy , heat transfer , change in enthalpy, change inentropy for above processes – Simple problems – hyperbolic ,Freeexpansion and throttling processes(Description only).


UNIT II
THERMODYNAMIC AIR CYCLES AND FUELS & COMBUSTION


UNIT III
AIR COMPRESSORS AND GAS TURBINES


UNIT V

FORMATION & PROPERTIES OF STEAM AND STEAM


Steam Calorimeter: Determination of dryness fraction of steam – bucket calorimeter - combined separating and throttling calorimeters.

UNIT V

STEAM BOILERS AND PERFORMANCE OF BOILERS


Text Book:


Reference Books:

M-SCHMIE
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-542
Semester : IV
Subject Title : SPECIAL MACHINES

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

<table>
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Topics and Allocation of Hours:

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<td>I</td>
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<td>14</td>
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<tr>
<td>II</td>
<td>RECIPROCATING MACHINES AND BROACHING MACHINE</td>
<td>14</td>
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<td>III</td>
<td>MILLING MACHINES AND GEAR GENERATING PROCESSES</td>
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<td>IV</td>
<td>ABRASIVE PROCESS AND NON-CONVENTIONAL MACHINING PROCESSES</td>
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<td>V</td>
<td>CNC MACHINE AND ITS COMPONENTS</td>
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RATIONALE:
Manufacturing, the major and the most important aspect in industries needs utmost care and attention. Knowledge about various processes and allied areas will be of great use to the
personnel involved in production. This will provide the students an opportunity to skill themselves for the industrial scenario.

OBJCETIVES

- Acquire Knowledge about types of pattern, casting, and moulding.
- Describe the various casting processes.
- Knowledge about various welding process and its working principle.
- Appreciate the safety practices used in welding.
- Acquire knowledge about various forming technologies.
- Knowledge about the lathe and its working parts.
- Describe the functioning of semi-automatic lathes.
- Study about the drilling process.
- Study about metrology and measuring instruments.

SPECIAL MACHINES
DETAILED SYLLABUS

UNIT I
MANUFACTURING OF PLASTIC COMPONENTS


UNIT II
RECIPROCATING MACHINES

Planer: Introduction - description of double housing planer - specifications - principles of operation – drives - quick return mechanism - feed mechanism - work holding devices and special fixtures - types of tools - operations.


Broaching: Types of broaching machine - horizontal, vertical and continuous broaching - principles of operation - types of broaches – classification - broach tool nomenclature - broaching operations.
UNIT III
MILLING MACHINES AND GEAR GENERATING PROCESSES


Milling operations: straddle milling - gang milling - vertical milling attachment.


Generating Process: gear shaper - gear hobbing - principle of operation only.


UNIT IV
ABRASIVE PROCESS AND NON-CONVENTIONAL MACHINING PROCESSES


UNIT V
CNC MACHINE AND ITS COMPONENTS


Text Books:

Reference Books:


M-SCH EME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-543
Semester : IV
Subject Title : ELECTRICAL DRIVES AND CONTROL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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<td>DC CIRCUITS AND DC MACHINES</td>
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<td>II</td>
<td>AC CIRCUITS AND AC MACHINES</td>
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<tr>
<td>III</td>
<td>STEPPER AND SERVO MOTORS &amp; DRIVES</td>
<td>17</td>
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<td>IV</td>
<td>POWER SUPPLIES AND LOGIC GATES</td>
<td>16</td>
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<td>V</td>
<td>CONTROL ELEMENTS AND PLC</td>
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RATIONALE:
The automation is being the order of the day to improve the production with high quality consciousness. Such automation involves electrically operated switches, sensors controlled through electrically driven motors and actuators. The subject aims in introducing the basic electrical DC and AC circuits and motors
and also focuses on the various special control devices like stepper, servo drives and its controlling elements.

OBJECTIVES:

- Explore fundamental electric circuit laws.
- Explain the working principle of DC and AC Electrical machines.
- Identify the effective uses of drives of Electrical machines.
- Analyze the various power supply circuits.
- Select the field controlled elements.
- Explain the construction and working of Transformer.
- Compare the different types of Logic gates.
- Appreciate the safety practices followed in Electrical system.
- Compare the use of servo motors and stepper motors in electrical driving system
- Identify PLC Input outputs.
- Identify the use of Control elements.

ELECTRICAL DRIVES & CONTROL
DETAILED SYLLABUS

UNIT I

DC CIRCUITS AND DC MACHINES

Definition- Electric current, voltage and resistance - Ohm’s law and Kirchoff’s law. Resistance in series and parallel and series, parallel simple problems electromagnetism (definitions only) – magnetic flux, flux density magnetic field intensity, MMF, permeability, reluctance, Faraday’s law of electromagnetic induction, electrical and mechanical units DC generators – construction, principle of operation, types and application.

DC motors: - construction, principle of operation, types and application.

Necessity of starters: Three point, four point starters.

UNIT II

AC CIRCUITS AND AC MACHINES

Fundamentals of AC voltage, and current – peak, average, RMS value of sine wave, frequency, time period, amplitude, power and power factor (definition only) – star and delta connection relationship between phase, line voltage and current in star and delta connections.


UNIT III

STEPPER AND SERVO MOTORS & DRIVES:

PMDC, Stepper motor- construction and working principle and applications - Servo motor – types: brushless servo motor, permanent magnet servo motor construction and applications.
**Industrial drives:** types, group drive, individual drive, multi motor drive, block diagram of Variable frequency drive, stepper motor drive: single stepping and half stepping. Servo drives.

**Electrical safety:** importance of earthing - electric shock: first aid, precautions - causes of accident and their preventive measures. Energy conservation

**UNIT IV**

**POWER SUPPLIES AND LOGIC GATES**


Display devices – LED, 7 segment LED, LCD

Logic gates: Positive and negative logic, definition, symbol truth table, Boolean expression for OR, AND, NOT, NOR, NAND, EXOR AND EXNOR gates – Universal logic Gates: NAND, and NOR.

**UNIT V**

**CONTROL ELEMENTS AND PLC**

**Fuses:** selection of fuse – necessity of fuse - fuse switch units. Sensors: Photo electric sensor, Inductive proximity sensors, Temperature sensors.

**Switches:** Push button switch, selector switch, limit switch, pressure switch, temperature switch, float switch and reed switch. Relays – NO, NC – usage - bimetallic thermal overload relays. Contactors - usage – necessity of contactor- Solenoid type contactor Circuit breakers – Miniature case Circuit breaker (MCCB) and Miniature Circuit Breaker (MCB), Oil Circuit breakers (OCB), Earth leakage circuit breaker (ELCB)

**PLC:** Features of PLC - PLC Block diagram - PLC scan - Fixed and modular PLC Ladder logic - NO, NC contacts - Coils - AND, OR.

**Text Books:**


**Reference Books:**

2. Electronic Device and Circuits- An introduction – Allen Mottershed - Prentice Hall of India.
M-SCHME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-544
Semester : IV
Subject Title : COMPUTER APPLICATIONS AND CAD PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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<td>90</td>
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OBJECTIVES:
- On completion of the exercises, the students must be able to
- Use the different facilities available in the word processor
- Analyze the data sheet
- Create and manipulate the database
- Prepare PowerPoint presentation
- Practice on CADD commands in making 2D Drawings.
- Draw assembled drawings using CADD.
- Draw sectional views using different types of sections

PART – A: COMPUTER APPLICATIONS (30 Hrs)

WORD PROCESSING

Exercises
Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add ‘confidential’ as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page
should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

Create the following table using align, border, merging and other attributes.

<table>
<thead>
<tr>
<th>DIRECTORATE OF TECHNICAL EDUCATION - E-GOVERNANCE PARTICULARS</th>
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</table>

SPREADSHEET

Exercises
Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue colour and lowest donation with red colour. The table should have a heading.
Prepare line, bar and pie chart to illustrate the subject wise performance of the class for any one semester.

DATABASE

Exercises
Prepare a payroll for employee database of an organization with the following details: Employee Id, Employee name, Date of Birth, Department and Designation, Date of appointment, Basic pay, Dearness Allowance, House Rent Allowance and other deductions if any. Perform simple queries for different categories.
Design a pay slip for a particular employee from the above database.

PRESENTATION
Exercises
Make a presentation with at least 10 slides. Use different customized animation effects on pictures and clip art on any four of the ten slides.

PART – B: CAD (60 Hrs)

INTRODUCTION

DRAWING AIDS AND EDITING COMMANDS

BASIC DIMENSIONING, HATCHING, BLOCKS AND VIEWS

CAD EXERCISES
Detailed drawings of following machine parts are to be given to students. Draw the assembled views (two views only) and bill of materials. The elevation / sectional elevation / plan / sectional plan / side view with dimensioning.

- Sleeve & Cotter joint
- Screw jack
- Plummer Block
- Simple Eccentric
- Machine Vice
- Protected type flanged coupling

Reference Books:
1. Inside AutoCAD - D. Raker and H. Rice - BPB Publications, NewDelhi
3. AutoCAD with Applications - Sham Tickoo - Tata Mcgraw Hill.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-545
Semester : IV
Subject Title : SPECIAL MACHINES PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:

No. of weeks per semester: 15 Weeks

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<td>Hours / Semester 60</td>
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<td>Total Marks 100</td>
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OBJECTIVES
- Identify a milling machine and its parts
- Identify a cylindrical grinder, surface grinder and tool and cutter grinder
- Identify shaper, Slotter and its parts
- Identify the tools and instruments used in milling.
- Handle the different types of work holding devices
- Machine a component using different machine tools.
- Calculate the indexing for a work
- Machine a gear using milling machine.
- Machine a cutting tool using Tool and Cutter grinder.
- Machine a plug gauge using Cylindrical grinding machine.
- Machine components by shaping machine
- Machine components by slotting machine
- Prepare a record of work for all the exercises.
EXERCISES:  Raw Material: M.S. / C.I

1. Make ‘V’ Block using shaping machine

2. Make dovetail using shaping machine

3. Make groove cut using slotting machine
4. Make round to square in milling machine.


6. Make Helical Gear using milling machine
7. Make slot cut using milling machine.

8. Make Progressive type Plug gauge using Cylindrical Grinding machine

9. Make a turning tool using Tool and Cutter Grinder

10. Make plain surfaces (four surfaces) using surface Grinder
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code: 
Subject Code: M-546
Semester: IV
Subject Title: LATHE AND DRILLING PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES:

1. Identify the parts of a lathe.
2. Identify the work holding devices.
3. Set the tools for various operations.
4. Operate the lathe and machine a component using lathe.
5. Identify the parts of drilling machine.
6. Perform the various drilling operations.
7. Identify the various tools and its holding devices.
8. Identify the work holding devices.
9. Prepare the record of work for the exercises.

Lathe section:

1. Introduction of safety in operating machines.
2. Study of lathe and its parts.
3. Types of tools used in lathe work.
4. Study of work holding devices and tool holding devices.
5. Setting of work and tools.
7. Practice on a lathe.
8. Types of measuring instruments and their uses.
Exercises:

Make the following jobs in the lathe. Raw material - 32 mm M.S. Rod

1. Facing, Step turning & Chamfering

2. Step turning & Groove cutting

3. Step turning & Taper turning

4. Step turning & Knurling
5. Step turning & Thread cutting (L.H.)

6. Step turning & Thread cutting (R.H)

7. Bush: Turning & Drilling

8. Eccentric turning

Drilling section:
1. Introduction of safety in operating machines.
2. Study of drilling machines and its parts.
3. Study the types of tools used.
4. Study of work holding devices and tool holding devices.
5. Setting of work and tools.
6. Operation and practice.
7. Types of measuring instruments and their uses.

Exercises:

Make the following jobs in the drilling machine.
Raw material 50mm X 50mm X 20 mm thick M.S. Flat

1. Drilling & Tapping

2. Drilling & Counter boring

3. Drilling & Counter sinking
4. Drilling and Reaming – Radial drilling machine

BOARD EXAMINATION

Note: All the exercises in both sections have to be completed. Two exercises will be given for examination by selecting one exercise in each section. All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

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<td>Surface Finishing</td>
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<td><strong>Drilling</strong></td>
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LIST OF EQUIPMENT

**Lathe Section**

1. Lathe (Minimum 4 ½') - 13 Nos.
2. All geared lathe - 2 Nos.
3. 4 Jaw / 3 Jaw Chucks - Required Numbers
4. Chuck key - Required Numbers
5. Spanner - Sufficient quantity
6. Cutting Tools - Sufficient quantity
7. Pitch gauge - 5 Nos.
8. Thread gauge - 5 Nos.
10. Snap gauges - Sufficient quantity
11. Steel Rule (0-150) - Sufficient quantity
12. Calipers (Inside / Outside / Jenny) - Sufficient quantity
13. Dial Gauge with Magnetic Stand - Sufficient quantity
14. Marking Gauge - Sufficient quantity

**Drilling Section**

1. Upright drilling machine - 2 Nos.
2. Radial drilling machine - 1 No.
3. Drill bit & Tap set - Sufficient quantity
4. Reaming bit - Sufficient quantity
5. Counter sinking bit - Sufficient quantity
6. Counter boring bit - Sufficient quantity
7. Plug gauges - Sufficient quantity
8. Vernier Height Gauge - 1 No.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code : 
Subject Code : M-547
Semester : IV
Subject Title : ELECTRICAL DRIVES AND CONTROL PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES
1. Identify starters for different motors.
2. Study and prepare earthing
3. Test the characteristics of DC and AC machines.
4. Identify and select controlling elements.
5. Explore the performance of ELCB, MCB.
6. Design regulated power supplies.
7. Identify display devices - LED, 7 segment LED, LCD.
8. Identify the drive circuit for special motors.
9. Test the speed control circuit of the special motors

LIST OF EXPERIMENTS:
Part A:
1. Verification of Ohm’s Law
2. Testing of DC starters – 3 point and 4 point starter
3. Load test on DC shunt motor
4. Testing of AC starters - DOL, star - Delta starter
5. Load test on single phase induction motor
6. Load test on three phase squirrel cage motor
7. Testing of relays, contactors, push buttons and limit switch
8. Connection and Testing of MCB, ELCB

Part B
1. Construction and testing of Half wave and Full wave rectifier.
2. Construction and testing of IC voltage regulator using IC 7805.
3. Verification of truth tables for logic gates.
4. Verification of universal gates.
5. Identification and testing of display devices- LED, 7 segment LED, Laser diode.
6. Testing of Stepper motor drive.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-551
Semester : V
Subject Title : DESIGN OF MACHINE ELEMENTS

TEACHING AND SCHEME OF EXAMINATIONS:

No. of Weeks per Semester: 15 Weeks

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<td>DESIGN OF JOINTS AND FASTENERS</td>
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<td>II</td>
<td>DESIGN OF SHAFTS, COUPLINGS AND KEYS</td>
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<td>DESIGN OF FRICTION DRIVES (FLAT BELT AND V BELT)</td>
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<td>DESIGN OF BEARINGS</td>
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<td>V</td>
<td>DESIGN OF LEVERS AND SPUR GEARS</td>
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RATIONALE:
The main objective of Machine Design is to create new and better machine components to improve the existing one. A mechanical engineer should have thorough knowledge of design of machine elements to avoid the failure of machines or components.

OBJECTIVES
- Design riveted joints, welded joints, sleeve and cotter joint and knuckle joint.
- Design eye bolts, cylinder cover studs.
- Design shafts, keys and couplings required for power transmission.
- Compare the different types of couplings.
- Design flat and V-belt for power transmission.
- Study the various types of bearings and their applications.
- Design journal bearings.
- Design spur gear used for power transmission.
- Design hand lever, foot lever and cranked lever.

DESIGN OF MACHINE ELEMENTS
DETAILED SYLLABUS

UNIT I (17)
ENGINEERING MATERIALS, JOINTS AND FASTENERS
Creep strain and Creep Curve- Fatigue, S-N curve, Endurance Limit - Stress Concentration – Causes & Remedies
Theories of Elastic Failures – Principal normal stress theory, Maximum shear stress theory & maximum distortion energy theory.
Joints: Design of sleeve and cotter joint, knuckle joint and welded joint.
Fasteners: Design of bolted joints - eye bolts.

UNIT II (17)
DESIGN OF SHAFTS, KEYS AND COUPLINGS
Keys: Types of keys - design of sunk keys only - Effect of keyways on shaft-problems.
Couplings: Requirements of good couplings – types - design of – rigid protected type flange couplings - marine couplings – pin type flexible coupling (Description only).

UNIT III (17)
DESIGN OF FLAT BELTS AND V-BELTS
Flat Belts: Types of belts - materials for belt -- types of belt drives – Speed ratio – effect of slip - length of flat belts –Tension Ratio \( T'1/T2 = e^{\mu \theta} \) – centrifugal tension - power transmitted – condition for maximum power - transmission – Initial Tension - problems – design procedure of flat belts - design of flat belt based on manufacturer’s data only – problems.
V-Belts: V-belt drive - comparison with flat belt drive - designation of V-belts – length of belt - power transmitted – Design of V-belt using manufacturer’s data only – Problem.

UNIT IV
DESIGN OF BEARINGS
Design based on approved data books only.

UNIT V
DESIGN OF LEVERS AND SPUR GEARS
Levers: Types of levers – applications - mechanical advantage – leverage - displacement ratio - design of-hand lever-foot lever-cranked lever - problems.


Text Book:

Reference Books:

END EXAMINATIONS QUESTION PATTERN
Note: 1. Five questions will be asked, one question from each unit in either or pattern. All the five questions are to be answered.
2. Each question carries 15 marks. These questions may have sub-divisions also.
3. P.S.G. DESIGN DATA BOOK IS PERMITTED. (Required abstract pages of the P.S.G. Design Data Book Certified by the Chief Supdt. may be permitted.)
M-SCHEME

(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING

Course Code : 

Subject Code : M-552

Semester : V

Subject Title : THERMAL ENGINEERING

TEACHING AND SCHEME OF EXAMINATIONS:

No. of weeks per semester: 15 Weeks

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Topics and Allocation of Hours:

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<td>INTERNAL COMBUSTION ENGINES</td>
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<td>II</td>
<td>PERFORMANCE OF I.C ENGINES AND HEAT TRANSFER</td>
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<td>III</td>
<td>THERMAL POWER PLANT AND STEAM TURBINES AND CONDENSERS</td>
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<td>REFRIGERATION AND AIR CONDITIONING</td>
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<td>CONVENTIONAL SOURCES OF ENERGY AND NUCLEAR POWER PLANT</td>
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RATIONALE:
Study of thermal power plant, Nuclear power plant, turbines and condensers are required to know about the generation of electric power. The study about the Refrigeration and Air-
conditioning are required. The study about modes of heat transfer is required to analyse the heat transfer in various mechanical components.

OBJECTIVES:
- Explain the components of IC engines.
- Explain the performance tests on IC engines.
- Explain the fundamental of thermal power plant and steam turbines and condensers.
- Explain the refrigeration and air conditioning.
- Compare the modes of heat transfer and evaluate the heat transfer by various modes.
- Explain the Conventional Sources Of Energy And Nuclear Power Plant.

THERMAL ENGINEERING
DETAILED SYLLABUS

Unit-I
INTERNAL COMBUSTION ENGINES

Unit-II
PERFORMANCE OF I.C ENGINES AND HEAT TRANSFER

Unit-III
THERMAL POWER PLANT AND STEAM TURBINES AND CONDENSERS
Selection of site for thermal power plant - layout of thermal power plant - fuel and ash  circuit-water and steam circuit - air and flue gas circuit - cooling water  circuit -merits and demerits of thermal power plant - air pollution by thermal power plants-pollutants, effects and control - cyclone separator - wet scrubber-electrostatic precipitator - control of NO2 and SO. Fluidised bed combustion -thermal and noise pollution. Basic steam power cycles- Carnot, Rankine and modified Rankine cycles - classification of

Unit-IV
(13)
REFRIGERATION AND AIR CONDITIONING

Unit-V
(13)
CONVENTIONAL SOURCES OF ENERGY AND NUCLEAR POWER PLANT

Text Books:

Reference Books:
4. Refrigeration and Air Conditioning, Manohar Prasad.
M-SCHMNE  
(Implements from the Academic year 2015-2016 onwards)  

Course Name : DIPLOMA IN MECHANICAL ENGINEERING  
Course Code :  
Subject Code : M-553  
Semester : V  
Subject Title : PROCESS PLANNING AND COST ESTIMATION  

TEACHING AND SCHEME OF EXAMINATIONS:  
No. of weeks per semester: 15 Weeks  

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RATIONALE:  
In the product manufacturing the process selection and planning are important. In this subject the work study, cost estimation and machining time calculations are discussed.
OBJECTIVES:
- Understand the process planning.
- Study the process selection.
- Understand the work study and method study.
- Study the cost estimation.
- Study the machining time calculations.

PROCESS PLANNING AND COST ESTIMATION
DETAILED SYLLABUS

UNIT I
Process Planning

UNIT II
Process Selection

UNIT III
Work Study

UNIT IV
Cost Estimation
UNIT V

Machining Time Calculations
Elements of metal machining - cutting speed - feed - depth of cut - procedure for assigning cutting variables - calculation of machining time for different lathe operations like - turning - facing - chamfering - parting - knurling and forming - Calculation of machining time for operations on drilling machine - machining time for shaping, planing, slotting, broaching and sawing operations - Machining time for face milling and slab milling operations - timing for thread cutting - estimation of total unit time - Procedure for doing the above machining calculations with formulae used - simple problems.

TEXT BOOKS:
1. Industrial Engineering & Management - O.P Khanna
2. Industrial Engineering & Production Management - Martand Telsang

REFERENCE BOOKS:
2. Production and Costing - GBS Narang and V.Kumar
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Subject Code : M-5541
Semester : V
Subject Title : RENEWABLE ENERGY SOURCES AND ENERGY CONSERVATION

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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<td>II</td>
<td>SOLAR ENERGY, APPLICATION, STORAGE</td>
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<td>SOLAR PHOTOVOLTAIC SYSTEM AND DESIGN, OC EN, TIDAL, WAVE ENERGY</td>
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<td>ENERGY CONSERVATION TECHNIQUES AND ENERGY AUDIT</td>
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RATIONALE:
Electrical Energy requirement is the major crisis and hence any saving in Electrical energy is equivalent to production of Electrical Energy. Saving can be achieved by the utilization of Renewable Energy Sources.

OBJECTIVES:
- Study about the fundamentals of Energy.
- Study of construction and principle of Wind energy, Solar energy, Tidal energy and Bio energy.
- Understand the PV design and its components.
- Understand the energy management and auditing techniques.
- Study the energy conservation process.

RENEWABLE ENERGY SOURCES AND ENERGY CONSERVATION
DETAILED SYLLABUS

UNIT I
FUNDAMENTALS OF ENERGY
Introduction to Energy-Energy consumption and standard of living-classification of energy resources-consumption trend of primary energy resources-importance of renewable energy sources-energy for sustainable development.

WIND ENERGY

UNIT II
SOLAR ENERGY
Solar energy collectors- Classifications-Flat plate collectors -Concentrating collectors-performance parameter-tracking system-compound parabolic concentrator-parabolic trough concentrators-concentrator with point focus-heliostats-comparisons of various collectors-efficiency of collector-selection of collector for various applications.
Solar thermal energy storage: sensible storage-latent heat storage-thermo chemical storage.

UNIT III
Solar photovoltaic System and Design
Solar photovoltaic a brief history of PV, PV insilicon: basic principle, crystalline PV; reducing cost and raising efficiency, thin film PV, other innovative technologies, electrical characteristics of silicon PV cells and modules, grid connected PV system, cost of energy from PV, Environmental impact and safety. System design of solar photovoltaic system: Load analysis-solar array Design-Battery Design-Simple formulas. System design procedure. Case Studies: Designing solar home lighting system - Designing stand alone solar PV Power plant - Designing solar PV water pumping system - Only arriving load capacity - solar array sizing- Battery sizing - Inverter capacity and mountings.
Ocean energy, Tidal & Wave energy
Ocean energy resources – principle’s of ocean thermal energy conversion (OTEC) – Methods of Ocean thermal electric power generation – Energy utilization – basic principle of tidal power – components and operations of tidal power plant – Energy and Powerforms of waves – Wave energy conversion devices.

UNIT IV

BIO – ENERGY

UNIT V

(13)Energy Management and Audit, Conservation: Definition, Energy audit - need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments
Energy Conservation Techniques- Need and importance of energy conservation - Principles of energy conservation- Methods of energy conservation-Cogeneration and its application-Combined cycle system-Concept of energy management-Study of different energy management techniques like-Analysis of input-Reuse and recycling of waste.
Economic approach of Energy Conservation-Costing of utilities like steam, compressed air, electricity and water-Ways of improving boiler efficiency-Thermal insulation, Critical thickness of insulation-Waste heat recovery systems, their applications, criteria for installing unit-An introductory approach of energy conservation in compressed air, refrigeration, air conditioning, pumps and fans.

Text Books:
5. Industrial energy conservation- D. A. Ray- Pergaman Press
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code: 
Subject Code: M-5542
Semester: V
Subject Title: TOTAL QUALITY MANAGEMENT

TEACHING AND SCHEME OF EXAMINATIONS:

No. of weeks per semester: 15 Weeks

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<td>II</td>
<td>CONTINUOUS PROCESS IMPROVEMENT – Q-7 TOOLS</td>
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<td>III</td>
<td>STATISTICAL FUNDAMENTALS</td>
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RATIONALE:
Quality and customer satisfaction in every product and every activity is the order of the day. As there is a shift from quality control to quality management in all activities, the concept Total Quality Management and the pillars of TQM are to be given to Engineers, who are designing products and production systems.

**OBJECTIVES**

- Define quality and appreciate its signature.
- Explain the concept of TQM.
- Appreciate the use of principles of TQM to meet customer satisfaction.
- Solve problem using the Quality control tools.
- Apply Brainstorming and quality circle to solve problems.
- Use PDCA cycle for continuous improvement.
- Appreciate the benefits of implementing 5S concepts.
- Collect, classify and present the data.
- Determine the process capability of a manufacturing process.
- Practice on management planning tools.
- Use Bench Mark and JIT concepts.

**TOTAL QUALITY MANAGEMENT DETAILED SYLLABUS**

**UNIT I**

**BASIC CONCEPTS OF TOTAL QUALITY MANAGEMENT**


**UNIT II**

**CONTINUOUS PROCESS IMPROVEMENT – Q7 TOOLS**


Quality circle - concept of quality circle - Organisation of Quality circle and objectives of Quality circle.

**UNIT III**

**STATISTICAL FUNDAMENTALS**

UNIT IV

CONTROL CHARTS
Attributes – Control charts – P chart – np chart – c chart – u chart – Construction of above diagrams – Problems - Comparison between variable chart and Attribute chart.

UNIT V

MANAGEMENT PLANNING TOOLS & BENCH MARKING
Affinity diagram – Radar Diagram - Inter Relationship diagram (InterRelationship diagram) – Tree diagram - Prioritization matrix – Matrix diagram – Decision tree – Arrow diagram – Matrix data analysis diagram - Construction of above diagrams.

Bench marking – Objectives of bench marking – Types – Bench marking process - Benefits of Bench marking – Pit falls of Bench marking - Just In Time (JIT) concepts and its objectives - Total Productive Maintenance (TPM) - Introduction, Objectives of TPM - steps in implementing TPM.

Text Book:
1. Total Quality Management, Date H.Besterfiled, Pearson Education Asia.

Reference Book:
4. Quality Planning and Analysis, Jurian J.M and Frank M.Gryna Jr., TMH. India. 1982
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code:
Subject Code: M-5543
Semester: V
Subject Title: PRESS TOOLS

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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<td>II</td>
<td>PRESS &amp; PRESS TOOL ACCESSORIES AND CUTTING DIES</td>
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<td>III</td>
<td>BENDING AND FORMING DIES</td>
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<td>DRAWING DIES AND DIES FOR SECONDARY OPERATIONS</td>
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RATIONALE:
Press working plays a vital role in the metal forming process. The study about the operations in the press work is important method of manufacturing.

**OBJECTIVE**
- Explain the fundamentals of press working, to be familiar with the various press working operations and machines.
- Appreciate the safety practices in press working operations.
- Explain with the various press and press tool accessories
- Compare the different types of Die construction.
- Explain the various bending, forming and other miscellaneous press working operations.
- Demonstrate about the construction and operation of the different bending dies.
- Define the various drawing and other related processes
- Explain the construction and operating principle of drawing and combination dies.
- Explain the basic concepts and the advantages of fine blanking process
- Demonstrate the construction and working principle of various fine blanking dies.
- Appreciate the concepts of SMED and quick die changes and its advantages in bringing down the press set up time.
- Troubleshoot in various press tools.

**PRESS TOOLS**
**DETAILED SYLLABUS**

**UNIT I** (14)
**PRESS WORKING FUNDAMENTALS, OPERATIONS, AND MACHINERY**


**UNIT II** (14)
**PRESS & PRESS TOOL ACCESSORIES AND CUTTING DIES**

Parts and functions of a press tool - Punches, Dies, Stoppers, Trigger stops, Strippers – Fixed and Travelling, Gauges, Pilots-Methods of piloting, shanks -Strip layout, Economy factor.
Cutting Dies - Construction and working of Blanking tool, Piercing tool, Progressive tool, Compound tool. Commercially available die components – Die sets, die set attachment devices, punches, die buttons, retainers, springs, fluid springs, die cushion and its types.

UNIT III

BENDING AND FORMING DIES:
Bending of sheet metal – Bending theory, neutral axis, metal movement, spring back, methods of overcoming spring back. Bending Operations – Bending, flanging, hemming, curling, seaming, and corrugating. Types of Bending dies (construction and working principle) – V bending and its types, edge bending, U bending.

UNIT IV

DRAWING DIES AND DIES FOR SECONDARY OPERATIONS
Dies for secondary operations - Construction and working principle of Semi piercing dies, shear form dies, dies for formed contours, notching die, shaving die, side piercing die.

UNIT V

FINE BLANKING TOOL AND SPECIALISED PRESS TOOL APPLICATIONS

Text Books:

Reference Books:
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-555
Semester : V
Subject Title : PROCESS AUTOMATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES
- Design and operate pneumatic circuits.
- Design and operate fluid power circuits
- Use PLC system and its elements for process control
- Familiarize the working of function blocks in PLC
- Use ON-Delay timer to control a motor
- Use OFF-Delay timer to control a motor
- Use counter function block (Up counter and Down counter)
- Control the automatic operation of pneumatic cylinder using PLC
- Record of work to be prepared.

Exercises

Pneumatics Lab
1. Direct operation of single and double acting cylinder.
2. Operation of double acting cylinder with quick exhaust valve.

**Hydraulics Lab**
6. Direct operation of double acting cylinder.
7. Direct operation of hydraulic motor.
8. Speed control of double acting cylinder metering-in and metering-out control.

**PLC Lab**
16. Sequential operation of double acting cylinder and a motor.
M-SHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-556
Semester : V
Subject Title : THERMAL ENGINEERING PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES:
- Determine the flash and fire point and viscosity of oil.
- Draw the valve timing diagram of petrol and diesel engines.
- Draw the port timing diagram of petrol and diesel engines.
- Conduct performance test on petrol and diesel engines.
- Prepare heat balance sheet for an IC engine.
- Identify the parts of a high pressure boiler and their applications.
- Identify the boiler mountings and accessories and their functions.
- Determine the C.O.P of Refrigerators.

Study Exercise:
1. Study of high pressure boiler. (With model)
2. Study of boiler mountings and Accessories. (With model)

LIST OF EXPERIMENTS
PART – A
1. Determine flash and fire point of the given oil using open cup apparatus.
2. Determine flash and fire point of the given oil using closed cup apparatus.
3. Determine the absolute viscosity of the given lubricating oil using Redwood viscometer.
4. Determine the absolute viscosity of the given lubricating oil using Say bolt viscometer.
5. Port timing diagram of two stroke petrol engine.
6. Valve timing diagram for four stroke petrol engine.
7. Valve timing diagram for four stroke diesel engine.

**PART – B**
1. Load test (Performance test) on Four Stroke Petrol Engine.
2. Load test (Performance test) on Four Stroke Diesel Engine.
3. Morse test on Multi-cylinder petrol engine.
5. Heat balance test on four stroke diesel engine.
6. Volumetric efficiency of Air Compressor.
7. Thermal Conductivity measurement using guarded plate apparatus.
M-Scheme
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code:
Subject Code: M-557
Semester: V
Subject Title: LIFE AND EMPLOYABILITY SKILLS PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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<tbody>
<tr>
<td>LIFE AND EMPLOYABILITY SKILLS PRACTICAL</td>
<td>Hours / Week</td>
<td>Hours / Semester</td>
</tr>
<tr>
<td></td>
<td>4</td>
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Allocation of marks

<table>
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<th>Sl. No.</th>
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<tbody>
<tr>
<td>1</td>
<td>Part – A Communication</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Part – B Entrepreneurship, Project Preparation Productivity, Occupational Safety, Health, Hazard, Quality Tools &amp; Labour Welfare</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Part – C Environment, Global Warming, Pollution</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
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</tbody>
</table>

RATIONALE:
Against the backdrop of the needs of the Industries, as well as based on fulfilling the expectations of the Industries, the Diploma Level students have to be trained directly and indirectly in toning up their competency levels. Proficiency in Communication only, equips them with confidence and capacity to
cope with the employment. Hence, there is a necessity to focus on these in the curriculum. At the end of the Course, the student is better equipped to express himself in oral and written communication effectively.

**SPECIFIC INSTRUCTIONAL OBJECTIVES**

- Emphasize and Enhance Speaking Skills
- Increase Ability to Express Views & Opinions
- Develop and Enhance Employability Skills
- Induce Entrepreneurship and Plan for the Future
- Expose & Induce Life Skills for Effective Managerial Ability

**M 447 - LIFE AND EMPLOYABILITY SKILLS LAB**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topics</th>
<th>Activities</th>
<th>Hours</th>
</tr>
</thead>
</table>
| I    | Communication, Listening, Training, Facing Interviews, Behavioural Skills | -- instant sentence making  
-- say expressions/phrases  
-- self- introduction / another higher official in company | 30 |
| II   | Entrepreneurship, Project Preparation, Marketing Analysis, Support & Procurement | -- prepare an outline of a project to obtain loan from bank in becoming an entrepreneur  
-- prepare a resume | 10 |
| III  | Productivity – comparison with developed countries, Quality Tools, Circles, Consciousness, Management, House Keeping | -- search in the website  
-- prepare a presentation  
-- discuss & interact | 05 |
-- prepare a presentation  
-- discuss & interact | 05 |
| V    | Environment, Global Warming, Pollution | -- taking down notes / hints  
-- answering questions  
-- fill in blanks the exact words heard | 10 |

**LEARNING STRUCTURE**

-- Focus more on Speaking & Listening Skills  
-- Attention less on Reading & Writing Skills  
-- Apply the skills in fulfilling the Objectives on Focused Topics

**a)** Listening  
1. Deductive Reasoning Skills (taking down notes/hints)  
2. Cognitive Skills (answering questions)  
3. Retention Skills (filling in blanks with exact words heard)
b) Speaking Extempore/ Prepared
1. Personality/Psychological Skills (instant sentence making) 05
2. Pleasing & Amiable Skills (say in phrases/expressions) 05
3. Assertive Skills (introducing oneself/others) 05
4. Expressive Skills (describe/explain things) 05
5. Fluency/Compatibility Skills (dialogue) 05
6. Leadership/Team Spirit Skills (group discussion) 05

c) Writing & Reading
1. Creative & Reasoning Skills (frame questions on patterns) 05
2. Creative & Composing Skills (make sentences on patterns) 05
3. Attitude & Aim Skills (prepare resume) 05
4. Entrepreneurship Skills (prepare outline of a project) 05

d) Continuous Assessment (Internal Marks)
(search, read, write down, speak, listen, interact & discuss)
1. Cognitive Skills (Google search on focused topics) 10
2. Presentation Skills & Interactive Skills (after listening, discuss) 05

Note down and present in the Record Note on any 5 topics 10 Marks
Other activities recorded in the Record note 10 Marks
Attendance 05 Marks

INTERNAL MARKS
25 Marks

EXTERNAL MARKS AT END EXAMINATION
75 Marks

MODEL QUESTION
Time: 3 Hours
Max. Marks: 75

A. LISTENING
25 Marks
1. Listen to the content and take down notes/hints 10
2. Listen to the content and answer the following questions. 10
3. Listen to the content and fill in the blanks the exact words heard. 05

B. SPEAKING
30 Marks
1. Say in a sentence instantly on hearing the word (5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your department. Introduce him to your subordinates. 05
4. Explain/describe the product you are about to launch in the market. 05
5. Speak with your immediate boss about the progress you have made. 05
6. Discuss within the group on the topic of focus in the syllabus. 05

C. WRITING & READING
20 Marks
1. Frame new questions from the pattern given by changing sets of words with your own. 05
2. Make sentences from the pattern given by changing sets of words with your own. 05

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>When</td>
<td>Do</td>
<td>you return?</td>
</tr>
<tr>
<td>b.</td>
<td>How</td>
<td>Is</td>
<td>his performance?</td>
</tr>
<tr>
<td>c.</td>
<td>Where</td>
<td>Has</td>
<td>the manager gone?</td>
</tr>
<tr>
<td>d.</td>
<td>What</td>
<td>Is</td>
<td>the progress today?</td>
</tr>
<tr>
<td>e.</td>
<td>Why</td>
<td>Are</td>
<td>the machines not functioning?</td>
</tr>
</tbody>
</table>

3. Prepare a resume for the post of Department Manager. 05
4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

Guidelines for setting the question paper

A. LISTENING:
ONLY TOPICS related to POLLUTION / ENVIRONMENT / GLOBAL WARMING are to be taken. These topics are common for all the three types of evaluation.

B. SPEAKING:
✓ WORDS of common usage
✓ Fragments – expression of politeness, courtesy, cordiality
✓ Introduce yourself as an engineer with designation or Introduce the official visiting your company/department
✓ Describe/Explain the product/machine/department
✓ Dialogue must be with someone in the place of work.
✓ Group of six/eight
✓ Discuss the focused topic prescribed in syllabus

C. WRITING & READING:
- Provide five different structures.
- Students are to substitute at least one with some other word/words
- Provide five different structures.
- Students are to substitute at least one with some other word/words
- Provide some post related to industries.
- Outline of the project (skeleton/structure)
- Only the various headings and subheadings
- Content is not needed
Guidelines for recording the material on the Focused Topics in the Record note.

Write in the record note, on any five topics, from the list of topics given below. 10 Marks
(5 topics x 10 marks = 50 marks. Thus, the Average of 5 topics is 10 Marks)

1. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid
7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights
9. Entrepreneurship
10. Marketing Analysis, Support and Procurement

LABORATORY REQUIREMENT:
1. An echo-free room
2. Necessary furniture and comfortable chairs
3. A minimum of two Computers with internet access
4. A minimum of two different English dailies
5. A minimum of Three Mikes with and without cords
6. Colour Television (minimum size – 29”)
7. DVD/VCD Player with Home Theatre speakers
8. Smart board
9. Projector

Suggested Reading:
1. Production and Operations Management by S.N. Chary, TMH
2. Essentials of Management by Koontz &Weirich, TMH
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan
8. Business Correspondence & Report Writing by R.C. Sharma and K.Mohan, TMH
9. How to prepare for Group Discussion & Interview (With Audio Cassette) by Prasad, TMH
10. Spoken English – A self-learning guide to conversation practice (with Cassette)
11. Introduction to Environmental Engineering by Mackenzie, L. Davis and A. David, Cornwell, McgrawHill, 3rd Ed.
12. Environmental Engineering by Peary, Rowe and Tchobanoglos, McgrawHill
13. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose
15. Industrial Engineering Management by O.P. Khanna
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code: 
Subject Code: M-561
Semester: VI
Subject Title: INDUSTRIAL ENGINEERING AND MANAGEMENT

TEACHING AND SCHEME OF EXAMINATIONS:

<table>
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<th>Instructions</th>
<th>Examination</th>
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<tr>
<td></td>
<td>Hours / Week</td>
<td>Hours / Semester</td>
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<tr>
<td>INDUSTRIAL ENGINEERING AND MANAGEMENT</td>
<td>6</td>
<td>90</td>
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<td>Board Examination</td>
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Duration: 3 Hrs

Topics and Allocation of Hours:

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<th>Unit No</th>
<th>Topics</th>
<th>Hours</th>
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<tbody>
<tr>
<td>I</td>
<td>PLANT ENGINEERING AND PLANT SAFETY</td>
<td>17</td>
</tr>
<tr>
<td>II</td>
<td>WORK STUDY, METHOD STUDY AND WORKMEASUREMENT</td>
<td>17</td>
</tr>
<tr>
<td>III</td>
<td>PRODUCTION PLANNING AND QUALITY CONTROL</td>
<td>17</td>
</tr>
<tr>
<td>IV</td>
<td>PRINCIPLES, PERSONNEL MANAGEMENT AND ORGANIZATIONAL BEHAVIOR</td>
<td>16</td>
</tr>
<tr>
<td>V</td>
<td>FINANCIAL AND MATERIAL MANAGEMENT</td>
<td>16</td>
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<tr>
<td></td>
<td>TEST AND REVISION</td>
<td>7</td>
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<td>Total</td>
<td></td>
<td>90</td>
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</table>
RATIONALE:
In the Indian Economy, Industries and Enterprises always find prominent place. After globalization, the students should be trained not only in manufacturing processes but also in managing activities of industries. The knowledge about plant, safety, work study techniques, personnel management and financial management will definitely mould the students as managers to suit the industries.

OBJECTIVES:
- To study the different types of layout.
- To study the safety aspects and its impacts on an organization.
- To study different work measurement techniques.
- To study production planning and control and its functions.
- To study basic and modern management techniques.
- To study the staff selection procedure and training of them.
- To study capital and resources of capital.
- To study inventory control system.
- To study about organization and it’s behavior.

INDUSTRIAL ENGINEERING AND MANAGEMENT
DETAILED SYLLABUS

UNIT I
PLANT ENGINEERING AND PLANT SAFETY


UNIT II
WORK STUDY, METHOD STUDY AND WORK MEASUREMENT


UNIT III
PRODUCTION PLANNING AND QUALITY CONTROL
Production Planning and Control: Introduction – Major functions of production planning and control – Pre planning – Methods of forecasting – Routing and scheduling – Dispatching and controlling Concept
of Critical Path Method (CPM)-Description only. Production – types-Mass production, batch production and job order production- Characteristics – Economic Batch Quantity (EBQ) – Principles of product and process planning – make or buy decision.


**UNIT IV**

**PRINCIPLES, PERSONNEL MANAGEMENT AND ORGANIZATIONAL BEHAVIOR**


**Organizational behavior:** Definition – organization--Types of Organization – Line, Staff,Taylor’s Pure functional types – Line and staff and committee type – Organizational Approaches, individual behavior—causes—Environmental effect—Behavior and Performance, Perception- organizational implications.

**UNIT V**

**FINANCIAL AND MATERIAL MANAGEMENT**


**Text Books :**

Reference Books:
M-Scheme
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Subject Code: M-562
Semester: VI
Subject Title: COMPUTER AIDED DESIGN AND MANUFACTURING

Teaching and Scheme of Examinations:
No. of weeks per semester: 15 Weeks

<table>
<thead>
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<th>Subject</th>
<th>Instructions</th>
<th>Examination</th>
<th>Duration</th>
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<tr>
<td>COMPUTE AIDED DESIGN AND MANUFACTURING</td>
<td>5 weeks / 75 weeks</td>
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<td>3 Hrs</td>
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<td></td>
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Topics and Allocation of Hours:

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<th>Topics</th>
<th>Hours</th>
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<tbody>
<tr>
<td>I</td>
<td>COMPUTER AIDED DESIGN</td>
<td>14</td>
</tr>
<tr>
<td>II</td>
<td>COMPUTER AIDED MANUFACTURING</td>
<td>14</td>
</tr>
<tr>
<td>III</td>
<td>CNC PROGRAMMING, RAPID PROTOTYPING</td>
<td>14</td>
</tr>
<tr>
<td>IV</td>
<td>COMPUTER INTEGRATED MANUFACTURING, FLEXIBLE MANUFACTURING SYSTEMS, AUTOMATIC GUIDED VEHICLE, ROBOT</td>
<td>13</td>
</tr>
<tr>
<td>V</td>
<td>CONCURRENT ENGINEERING, QUALITY FUNCTIONAL DEPLOYMENT, PRODUCT DEVELOPMENT CYCLE, AUGMENTED REALITY</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>TEST AND REVISION</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>75</td>
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</table>

Rationale:
As per the latest requirements in the Industries this enables to learn the assistance of computer in the field of design and manufacturing areas. It’s able to learn the latest manufacturing concepts of in the
shop floors and manufacturing methods like RPT. They are able to know about the CNC programming techniques are included.

OBJECTIVES:
- Understand the concept and requirement of the integration of the design and manufacturing.
- Acquire knowledge about the computer assistance in the design process and analysis.
- Understand the concepts of manufacturing with computer assistance in the shop floor.
- Understand the principle of latest manufacturing machines like RPT.
- Acquire the knowledge in the material handling equipment and robot.
- Understand the Computer Integrated Manufacturing and FMS.
- Study of Concurrent Engineering and its tools and Augmented Reality.

**COMPUTER AIDED DESIGN AND MANUFACTURING**
**DETAILED SYLLABUS**

**UNIT I**

**COMPUTER AIDED DESIGN**


**UNIT II**

**COMPUTER AIDED MANUFACTURING**


Group technology: Part families - Parts classification and coding - coding structure – Optiz system, MICLASS system and CODESystem.


Production Planning and Control (PPC): Definition – objectives - Computer Integrated Production management system – Master Production Schedule (MPS) – Capacity Planning – Materials Requirement Planning (MRP) – Manufacturing Resources Planning (MRP-II) – Shop Floor Control system (SFC) - Just In Timemanufacturing philosophy (JIT) - Introduction to Enterprise Resources Planning (ERP).

**UNIT III**

**CNC PROGRAMMING, RAPID PROTOTYPING**

Rapid prototyping: Classification – subtractive – additive–advantages and applications - materials. Types - Stereo lithography (STL) – Fused deposition model (FDM) – Selective laser sintering (SLS) - three dimensional printing (3D) – Rapid tooling.

UNIT IV


UNIT V
CONCURRENT ENGINEERING, QUALITY FUNCTION DEPLOYMENT, PRODUCT DEVELOPMENT CYCLE, AUGMENTED REALITY

Concurrent Engineering: Definition – Sequential Vs Concurrent engineering – need of CE – benefits of CE.


Text Books:
1. CAD/CAM/CIM, R. Radhakrishnan, S. Subramanian, New Age International Pvt. Ltd.
2. CAD/CAM, Mikell P. Groover, Emory Zimmers, Jr. Prentice Hall of India Pvt., Ltd.

Reference Books:
**M-Scheme**
(Implements from the Academic year 2015-2016 onwards)

**Course Name**: DIPLOMA IN MECHANICAL ENGINEERING  
**Course Code**:  
**Subject Code**: M-5631  
**Semester**: VI  
**Subject Title**: AUTOMOBILE ENGINEERING

**Teaching and Scheme of Examinations:**
No. of weeks per semester: 15 Weeks

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<th>Subject</th>
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<th>Examination</th>
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<tr>
<td></td>
<td>Hours / Week</td>
<td>Hours / Semester</td>
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<tr>
<td>AUTOMOBILE ENGINEERING</td>
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<td>75</td>
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<td>Internal Assessment</td>
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**Topics and Allocation of Hours:**

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<thead>
<tr>
<th>Unit No</th>
<th>Topics</th>
<th>Hours</th>
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<tbody>
<tr>
<td>I</td>
<td>AUTOMOBILE ENGINES</td>
<td>14</td>
</tr>
<tr>
<td>II</td>
<td>FUEL AND FUEL FEED SYSTEMS</td>
<td>14</td>
</tr>
<tr>
<td>III</td>
<td>TRANSMISSION AND POWER TRAINS</td>
<td>14</td>
</tr>
<tr>
<td>IV</td>
<td>AUTOMOBILE CHASSIS</td>
<td>13</td>
</tr>
<tr>
<td>V</td>
<td>AUTOMOBILE ELECTRICAL EQUIPMENT &amp; POLLUTION CONTROL</td>
<td>13</td>
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<tr>
<td></td>
<td>TEST AND REVISION</td>
<td>7</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>75</td>
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</tbody>
</table>

**Rationale:**
Automobile is one of the key areas of development in India facilitated by Multinational Companies. As Automobile is the Major sources of employing man power a thorough knowledge on Automobile Engine construction and its functioning is required with due consideration on pollution control.
OBJECTIVES:
- Explain the automobile engines and its components.
- Explain the cooling system and lubrication system of the IC engines.
- Explain the fuel and fuel feed system.
- Explain the transmission systems and power trains of automobile.
- Study about the Brake systems and electrical components.
- Study the pollution and its standards.

AUTOMOBILE ENGINEERING
DETAILED SYLLABUS

UNIT - I
(14)
AUTOMOBILE ENGINES

UNIT-II
(14)
FUEL AND FUEL FEED SYSTEMS

UNIT-III
(14)
TRANSMISSION AND POWER TRAINS

UNIT-IV

AUTOMOBILE CHASSIS


UNIT-V

AUTOMOBILE ELECTRICAL EQUIPMENT & POLLUTION CONTROL


Text Books:


Reference Books:


M-SCHME

(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code : 
Subject Code : M-5632
Semester : VI
Subject Title : ROBOTICS

TEACHING AND SCHEME OF EXAMINATIONS:

No. of weeks per semester: 15 Weeks

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<td>Hours / Week</td>
<td>Hours / Semester</td>
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<tr>
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Topics and Allocation of Hours:

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<tr>
<th>Unit No</th>
<th>Topics</th>
<th>Hours</th>
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<tbody>
<tr>
<td>I</td>
<td>FUNDAMENTALS OF ROBOT TECHNOLOGY</td>
<td>14</td>
</tr>
<tr>
<td>II</td>
<td>ROBOT CONTROLLER, DRIVE SYSTEMS AND END EFFECTERS</td>
<td>14</td>
</tr>
<tr>
<td>III</td>
<td>SENSORS AND MACHINE VISION</td>
<td>14</td>
</tr>
<tr>
<td>IV</td>
<td>ROBOT KINEMATICS AND ROBOT PROGRAMMING</td>
<td>13</td>
</tr>
<tr>
<td>V</td>
<td>ROBOT APPLICATIONS IN MANUFACTURING</td>
<td>13</td>
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<tr>
<td></td>
<td>TEST AND REVISION</td>
<td>7</td>
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<td>TOTAL</td>
<td>75</td>
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</table>

RATIONALE

Rapid industrialization and globalization needs industries to be more competitive and deliver cost effective quality products. This needs industries to implement flexible manufacturing systems where Robotic technology plays major role. Hence study of robotic technology is very essential.
OBJECTIVES:

- Understand fundamentals of robotics
- Acquire knowledge structure and elements of robot
- Gain knowledge on controller and various drives used in robotics
- Develop knowledge on role of sensors and vision system
- Acquire skill to program and control robot
- Understand to adopt robot to various industrial applications.

ROBOTICS
DETAILED SYLLABUS

UNIT I
FUNDAMENTALS OF ROBOT TECHNOLOGY

UNIT II
ROBOT CONTROLLER, DRIVE SYSTEMS AND END EFFECTERS

UNIT III
SENSORS AND MACHINE VISION

UNIT IV
ROBOT KINEMATICS AND ROBOT PROGRAMMING
Forward kinematics, Inverse kinematics and differences – Forwardkinematics and Reverse kinematics of manipulators with Two and Three degrees of freedom – Deviations. – Robot dynamics – Static Lead
through programming – Robot programming languages – VALProgramming – Motion commands, Sensor commands, Endeffector commands and Simple programs.

UNIT V

ROBOT APPLICATIONS IN MANUFACTURING


Text Books:

Reference Books:
### M-Scheme
(Implements from the Academic year 2015-2016 onwards)

**Course Name**: DIPLOMA IN MECHANICAL ENGINEERING  
**Course Code**:  
**Subject Code**: M-5633  
**Semester**: VI  
**Subject Title**: REFRIGERATION AND AIR-CONDITIONING

#### Teaching and Scheme of Examinations:

No. of weeks per semester: 15 Weeks

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<th>Subject</th>
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<th>Examination</th>
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<td>Hours / Week</td>
<td>Hours / Semester</td>
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<tr>
<td>REFRIGERATION AND AIR-CONDITIONING</td>
<td>5</td>
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<table>
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<th></th>
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#### Topics and Allocation of Hours:

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<tr>
<th>Unit No</th>
<th>Topics</th>
<th>Hours</th>
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<tbody>
<tr>
<td>I</td>
<td>REFRIGERATION SYSTEM AND REFRIGERATION EQUIPMENTS</td>
<td>14</td>
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<tr>
<td>II</td>
<td>VAPOUR COMPRESSION &amp; ABSORPTION REFRIGERATION SYSTEM AND CRYOGENIC REFRIGERATION SYSTEMS</td>
<td>14</td>
</tr>
<tr>
<td>III</td>
<td>REFRIGERATION FLOW CONTROLS, REFRIGERANTS AND LUBRICANTS AND APPLICATIONS OF REFRIGERATION</td>
<td>14</td>
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<tr>
<td>IV</td>
<td>PSYCHOMETRICS AND COMFORT AIR CONDITIONING SYSTEMS</td>
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<tr>
<td>V</td>
<td>COOLING LOAD CALCULATIONS AND DUCT DESIGN, ENERGY CONSERVATION TECHNIQUES</td>
<td>13</td>
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<tr>
<td></td>
<td>TEST AND REVISION</td>
<td>7</td>
</tr>
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</table>
RATIONALE:
Hence the study of refrigeration principles, system and its effectiveness are essential. Comfort is the basic requirement of customers and machines through air-conditioning and hence learning the concept of air-conditioning and methods of air-conditioning facilitates quality design of air conditioners.

OBJECTIVES:
- Explain the working of open and closed air system of refrigeration.
- Describe the working and construction of compressors used for air conditioning.
- Explain vapour compression refrigeration system.
- Explain vapour absorption refrigeration system.
- Compare the properties and applications of various refrigerants.
- Define the parameters used in psychrometry.
- Use Psychrometry chart
- Describe the equipment used for air conditioning.
- Estimate the cooling load for the given requirement.
- Explain the industrial application of refrigeration.

REFRIGERATION AND AIR-CONDITIONING
DETAILED SYLLABUS

UNIT I
(14)
REFRIGERATION SYSTEM AND REFRIGERATION EQUIPMENTS

UNIT II
(14)
VAPOUR COMPRESSION REFRIGERATION SYSTEM, VAPOUR ABSORPTION REFRIGERATION SYSTEM AND CRYOGENIC REFRIGERATION SYSTEMS

Simple absorption system – Electrolux system - solar absorption refrigeration system- absorption system comparison with mechanical refrigeration system.

Refrigerators for above 2 K- Philips Refrigerator–GifferedMcMohan refrigerator- refrigerators for below 2 K - Magnetic refrigeration systems.
UNIT III
(14)
REFRIGERATION FLOW CONTROLS, REFRIGERANTS AND LUBRICANTS AND APPLICATIONS OF REFRIGERATION

Capillary tube-automatic expansion valve-thermostatic expansion valve-electronic expansion valve solenoid valve-evaporator pressure regulator—suction pressure regulator-classification of refrigerants-selection of a refrigerant-properties and applications of following refrigerants SO2, CH4, F22, and NH3—CFCs refrigerants- equivalent of CFCs refrigerants (R-123a, R-143a, R-69S)- blends of refrigerants (R400 and R500 Series) - lubricants used in refrigeration and their applications.

Slow freezing—quick freezing- cold storage-frozen storage-freeze drying—dairy refrigeration—ice cream cabinets-ice making—water cooler, milk cooler, bottle cooler-frost free refrigeration.

UNIT IV (13)
PSYCHOMETRIC S AND COMFORT AIR CONDITIONING SYSTEMS


UNIT V (13)
COOLING LOAD CALCULATIONS AND DUCT DESIGN, ENERGY CONSERVATION TECHNIQUES


Text books:
2. Refrigeration and air conditioning, V.K. Jain,
3. Industrial Refrigeration Hand Book, Wilbert F. Steocker

Reference Books:
1. A course in refrigeration and air conditioning, Domkundwar,
2. Principles of refrigeration, Dossat
4. Refrigeration and air conditioning, C.P Arora
5. Cryogenic systems RandellFd Barron.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-564
Semester : VI
Subject Title : COMPUTER AIDED DESIGN AND MANUFACTURING PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES

- Study of parametric modeling.
- Understand the part modeling and assembly of parts.
- Create the views of the solid model and parts list.
- Study the working principle of CNC machines.
- Study the datum points and offsets.
- Differentiate incremental System with absolute system.
- Study the simulation software package.
- Write program and simulate in the Lathe software and Milling software.
- Prepare a part program, edit and execute in CNC Turning centre.
- Prepare a part program, edit and execute in CNC Machining centre.
- Produce components in the CNC Turning centre and CNC Machining centre.
PART A: Solid Modeling (30 Hrs.)

Introduction

Exercises

- 3D Drawing
- Geneva Wheel
- Bearing Block
- Bushed bearing
- Gib and Cotter joint
- Screw Jack
- Connecting Rod

Note: Print the orthographic view and sectional view from the above assembled 3D drawing.

PART B: CNC Programming and Machining (45 Hrs.)

Introduction:
- Study of CNC lathe, milling.
- Study of international standard codes: G-Codes and M-Codes
- Format – Dimensioning methods.
- Editing the program in the CNC machines.
- Execute the program in the CNC machines.

Exercises
Note: Print the part program from the simulation software and make the component in the CNC machine.
CNC Turning Machine     Material: M.S / Aluminum / Acrylic fibre / Plastic

1. Using Linear and Circular interpolation - Create a part program and produce component in the Machine.
2. Using Stock removal cycle – Create a part program for multiple turning operations and produce component in the Machine.

![Diagram](image1.png)

3. Using canned cycle - Create a part program for thread cutting, grooving and produce component in the Machine.

CNC Milling Machine    Material: M.S / Aluminum / acrylic fibre / plastic

![Diagram](image2.png)

4. Using Linear interpolation and Circular interpolation – Create a part program for grooving and produce component in the Machine.

![Diagram](image3.png)
5. Using canned cycle - Create a part program for drilling, tapping, counter sinking and produce component in the Machine.

6. Using subprogram - Create a part program and produce component in the Machine

References:
M-SCHME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-565
Semester : VI
Subject Title : MACHINE TOOL TESTING AND MAINTENANCE PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES:
- Study of Indian Standard Test charts.
- Set up instrument for machine tool testing.
- Observe the machine tool alignment and results.
- Observe the manufacturing accuracy of machine tools.
- Study the maintenance of the machine components.
- Study the trouble shooting procedures and methods.
- Prepare the record of work for all the exercises.

MACHINE TOOL TESTING
- Conduct geometrical test on machines with permissible deviations.
- Study the testing instruments and calibration to the standards.
- Prepare a test chart for the various tests and mention the errors.

Part A: Machine Tool Alignment EXERCISES

1. Conduct the following test for the lathe machine and prepare a test chart. Check the level of slideways.
   - Check the straightness of carriage movement.
   - Check the parallelism of tailstock movement to carriage movements.
• Check the run-out of the spindle.
• Check the parallelism of the axis of the outside of tailstock sleeve to carriage movement.

2. Conduct the following test for the shaping machine and prepare a test chart. Check the flatness of table top face.
   • Check the parallelism of table top face to its transverse movement.
   • Check the parallelism of table top face to the ram movement.
   • Check the parallelism of T-slot of top face to the ram movement.
   • Check the squareness of table side face to its transverse movement.

3. Conduct the following test for the drilling machine and prepare a test chart. Check the level of the machine.
   • Check the flatness of the table surface.
   • Check the run-out of the internal taper of the spindle.
   • Check the straightness of the pillar and squareness of the spindle axis.
   • Check the squareness of the table surface to the vertical movement of the spindle housing.

4. Conduct the following test for the surface grinding machine and prepare a test chart.
   • Verify the levelling of slideways.
   • Verify the straightness of slideways in a horizontal plane. Verify the flatness of the table surface.
   • Verify the parallelism of the table surface. Check the run-out of the wheel spindle nose.

5. Conduct the following test for the milling machine and prepare a test chart.
   • Check the straightness of the vertical movement of the knee.
   • Check the squareness of the table surface to the column ways for knee.
   • Check the flatness of the table surface.
   • Check the parallelism of the table surface to its movement.
   • Check the run-out of the internal taper of the spindle.

6. Conduct the following test for the slotting machine and prepare a test chart.
   • Check the flatness of the table top face.
   • Check the run-out of the central locating bore.
   • Check the parallelism of table surface to its movement in longitudinal direction.
   • Check the squareness of the longitudinal and transverse movements of table.
   • Check the squareness of ram movement to the table surface in the transverse direction.

**Part B: Maintenance**

Dismantle, inspect and assemble the following machine components.
1. Lead screw and nut
2. Tailstock
3. Bench vice
4. Three jaw chuck
5. Four jaw chuck
6. Drill chuck

**BOARD EXAMINATION**

*Note: Examinations will be conducted in both Part A and Part B. Students should be given exercises by selecting one exercise from each part by lot.*

All the exercises should be given in the question paper and students are allowed to select by a lot.

Machine Tool Alignment 45
Procedure / Drawing 15
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**LIST OF EQUIPMENTS**

**Machine**
1. Lathe machine - 1 No.
2. Shaping machine - 1 No.
3. Drilling machine - 1 No.
4. Surface grinding machine - 1 No.
5. Milling machine - 1 No.

**Tools**
7. Dial gauge - 5 Nos.
8. Magnetic stand - 5 Nos.
9. Surface gauges - 5 Nos.
10. Spirit level - 5 Nos.
11. Spanners (DE/Ring/Box) - Sufficient quantity
12. Screw drivers - Sufficient quantity
13. Allen screw sets - Sufficient quantity
14. Hammer - Sufficient quantity
15. Test mandrels - Sufficient quantity
16. Squares / Blocks - Sufficient quantity

**Machine components**
17. Lead screw and nut - 1 No.
18. Tailstock - 1 No.
20. Three jaw chuck - 1 No.
21. Four jaw chuck - 1 No.
22. Drill chuck - 1 No.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-5661
Semester : VI
Subject Title : AUTOMOBILE ENGINEERING PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:

No. of weeks per semester: 15 Weeks

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OBJECTIVES:

- Identify the various tools and their applications used in Automobile.
- Dismantle and assemble parts of petrol engine.
- Dismantle and assemble parts of diesel engine.
- Service AC fuel pump, oil pump and water pump.
- Service carburetors
- Dismantle and assemble fuel injection pump & fuel injectors.
- Dismantle and assemble of power transmission and differential unit.
- Dismantle and assemble steering gear box.
- Testing and charging of batteries.
- Overhauling of starter motor, alternator & dynamo.
- Troubleshoot the electrical circuits in automobiles.

LIST OF EXPERIMENTS
PART – A

1. Identification and application of mechanic’s tools.
2. Dismantling and assembling of four stroke petrol engine and diesel engine and identification of parts.
3. Cleaning, inspecting and measuring cylinder bore using cylinder bore dial gauge and suggesting the next over size.
4. Removing decarburizing, inspecting and replacing connecting rods and adjusting the bearings.
5. Removing camshaft, replacing timing gears, removing valves, lapping and adjusting valve clearance.
6. Removing, servicing and replacing of fuel pump, oil pump & water pump.
7. Removing, servicing and replacing of SOLEX carburetor/MPFI system.
8. Dismantling and assembling of inline fuel injection pump/ CRDI system.
9. Dismantling, assembling & testing of injectors.

**PART – B**
1. Removing and replacing of pressure plate and clutch plate, fingers adjustment.
2. Dismantling, inspecting and assembling of gear box and find out the gear ratios.
3. Dismantling, inspecting and assembling of final drive and differential units. Adjusting of backlash and correct tooth contact of crown and pinion of differential unit.
4. Dismantling, assembling and adjusting of steering gear box and find gear ratio.
5. Test a battery with specific gravity test and charge the battery with constant amperage/voltage method.
6. Dismantling, overhauling and assembling of starter motor.
7. Dismantling, overhauling and assembling of alternator/dynamo
8. Trace the automobile electrical system with respect to battery coil ignition system.
9. Trace the automobile electrical system with respect to (i) horn relay circuit, (ii)Wiper circuit & explain with neat circuit diagram.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name : DIPLOMA IN MECHANICAL ENGINEERING
Course Code :
Subject Code : M-5662
Semester : VI
Subject Title : ROBOTICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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Objectives
- Study of Robot / Study of robot simulation software
- To study the components required.
- To study the techniques of programming
- Study of machine vision system
- Prepare a record of work done.

Exercises
1. Position recording using Cartesian co-ordinate system - (No. of positions to be specified - 9)
2. Position recording using Polar co-ordinate system - (No. of positions to be specified- 9)
3. Pick and place the objects - No. of objects to be specified- 6)
4. Pick and stack the objects - (No. of objects to be specified- 6)
5. Spray painting practice - (Area to be specified - 300mm x 300mm)
6. Spot welding practice - (No. of spots to be specified - 9)
7. Arc welding practice – (Length of weld to be specified)
8. Assembling practice - (Simple assembling)
9. Profile cutting practice - (Complicated profile – combination of lines and arcs)
10. Machine loading and unloading practice with time delay - (No. of times to be specified- 9)
M-Scheme
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code:
Subject Code: M-5663
Semester: VI
Subject Title: REFRIGERATION AND AIR-CONDITIONING PRACTICAL

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES:
- Identify the various tools used in R & AC
- Demonstrate the construction and working of window air conditioner
- Demonstrate the construction and working of split type air conditioner
- Set parameters for comfortable operation of an air conditioner.
- Determine the C.O.P of air conditioner.
- Determine the capacity of window air conditioner.
- Describe the wiring of refrigerator and coolers.
- Perform servicing on air conditioner.

PART- A

1. BASIC REFRIGERATION WORKSHOP OPERATION
   (a) Copper and steel tubing
      - To study the various sizes of copper and steel tubing. To study the various tools used for operations.
      - To become familiar with various operations on copper and steel tubing—Flaring, Swaging.
(b) Soldering methods used in R & A.C

2. TO STUDY THE CONSTRUCTION FEATURES OF THE FOLLOWING:
   (a) Domestic refrigerators       (b) Water coolers      (c) Window Air Conditioner
   (d) Split Type Air-Conditioner

3. PROPER METHODS OF SETTING AND ADJUSTING OF
   (a) Thermostats
   (b) Low pressure and high pressure cut-outs
   (c) Thermostatic expansion valve
   (d) Automatic Expansion Valve

   PART-B

TEST PROCEDURES
1. To determine the refrigerating effect, C.O.P and the compressor capacity of a open type system with Thermostatic expansion valve, Capillary tube, Automatic Expansion Valve
2. To determine the C.O.P of sealed system by using electrical measurements
To determine the capacity of a window air conditioner.
To determine the efficiency of a cooling tower.
Wiring of refrigerator, water cooler, desert cooler, room air conditioner – packaged air conditioner, panel board etc.

SERVICE PROCEDURES
   1. To change refrigerant into service cylinder from storage cylinder.
   2. To evaluate the entire system
   3. To Pump down the system
   4. To Purge air from the system
   5. To locate the leaks in a system.
   6. To charge the system
   7. To check the oil level in the compressor.
   8. Tracing the common faults in R & A.C units and their remedies.
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN MECHANICAL ENGINEERING
Course Code:
Subject Code: M-567
Semester: VI
Subject Title: PROJECT WORK

TEACHING AND SCHEME OF EXAMINATIONS:
No. of weeks per semester: 15 Weeks

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OBJECTIVES:
- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment.
- Get exposure on industrial environment and its work ethics. Understand what entrepreneurship is and how to become an entrepreneur.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.
- Understand the facts and importance of environmental management. Understand and gain knowledge about disaster management.

PROJECT WORK
ENVIRONMENTAL & DISASTER MANAGEMENT
1. ENVIRONMENTAL MANAGEMENT
Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.
Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..


LIST OF QUESTIONS

A. ENVIRONMENTAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?

2. Define Environmental Ethic.

3. How Industries play their role in polluting the environment?

4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?

5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.

6. What is meant by Hazardous waste?

7. Define Industrial waste management.

8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.

9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.

10. What are the objectives of treatments of solid wastes before disposal?

11. What are the different methods of disposal of solid wastes?

B. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamil Nadu lie:
    (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones