

**DRAFT SYLLABUS OF DIPLOMA ENGINEERING
(3rd Semester to 6th Semester)**

BRANCH : MECHANICAL ENGINEERING

Under

**TRIPURA UNIVERSITY
(A Central University)
Suryamaninagar**

DIPLOMA MECHANICAL ENGINEERING **SEMESTER III**

Sl. No	Theoretical Paper					Sessional / practical paper			
	1 st half (50mark)	2 nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / practical	Mark	CPW	Credit
i	Basics Of Electrical Engg. DEE-304		100	4	4	Programming in C lab DCS-304S	100	4	2
ii	Heat Power –I DME-301		100	4	4	Mechanical Engineering Lab –I DME-304S	100	4	2
iii	Machine Tool –I DME-302		100	3+1T	3	Mechanical Engineering Drawing DME-305S	100	4	2
iv	Strength Of Material DME-303		100	3	3	Mechanical Engineering Workshop –I DME-306S	100	4	2
v						Electrical Engg. Lab DEE-304S	100	4	2
vi						Strength of Material Lab DME-307S	100	4	2
			400	15	14		600	24	12

SEMESTER IV

Sl. No	Theoretical Paper					Sessional / practical paper			
	1 st half (50mark)	2 nd half (50 mark)	Mark	CPW L+T	Credit	Name of Sessional / Lab	Mark	CPW	Credit
i	Fluid Mechanics DME-401		100	4	4	Communication skills(job) Lab DHU- 400S	100	4	2
ii	Heat Power-II DME-402		100	3	3	Mechanical Engineering Lab-II DME-405S	100	4	2
iii	Machine Tool –II DME-403		100	4	4	Mechanical Engineering Workshop-II DME-406S	100	4	2
iv	Mechanical Engineering Drawing DME-404		100	3	3	Mechanical Engineering Drawing DME-407S	100	5	2
v						Advance Mechanical Engineering Drawing-I DME-408S	100	4	2
Vi						Fluid Mechanics Lab DME-409S	100	4	2
			400	14	14		600	25	12

CPW = Contact lecture Per Week

Total marks : 2000 @ 1000 per semester , Number of Contact periods : 39 per week , Total Credit : 52 @ 26 per semester

SEMESTER V

Sl. No	Theoretical Paper					Sessional / practical paper			
	1 st half (50mark)	2 nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / Lab	Mark	CPW	Credit
i	Industrial Management & Entrepreneurship Development DHU-501		100	4	4	Advance Mechanical Engineering Drawing-II DME-504S	100	5	2
ii	Non Conventional Energy Source DME-501	Advance M/c Tools & General Maintenance DME-501	100	4	4	Mechanical Engineering Workshop-III DME=505S	100	4	2
iii.	Metallurgy & Metrology DME-502		100	3+1T	3	Mechanical Engineering Lab –III DME-506S	100	4	2
iv	Manufacturing Process DME-503		100	3+1T	3	Project –I DME-507S	100	5	2
v						Non Conventional Energy Source Lab DME-508S	100	4	2
vi.						Industrial Training DIT-500S	100	-	2
			400	16	14		600	22	12

SEMESTER VI

Sl. No	Theoretical Paper					Sessional / practical paper			
	1 st half (50mark)	2 nd half (50 mark)	Mark	CPW	Credit	Name of Sessional / practical	Mark	CPW	Credit
i	Professional ethics & Values DHU601	Optimization Techniques DHU601	100	4	4	Project-II DME-604S	200	10	2
ii	Machine Design, Estimating & Costing DME-601		100	4	4	Mechanical Engineering Workshop-IV DME-605S	100	4	2
iii	Theory Of Machine DME-602		100	3	3	Mechanical Engineering Lab –IV DME-606S	100	4	4
iv	Elective Paper: DME-603 a. CAD/ CAM b. Automobile Engg. c. Power plant Engineering d. Refrigeration & Air-Conditioning		100	3	3	Elective lab DME-607S	100	4	2
v						Generic Skill HU –DME-610S	50	2	1
vi						Final Viva	50	-	1
	Total			14	14			24	12

Total marks : 2000 @ 1000 per semester , Number of Contact periods : 38 per week , Total Credit : 52 @ 26 per semester
Student should under go Industrial training for at least 3-4 week duration, corresponding grade for 2 credit (as received from industry) will be reflected on 5th semester grade card.

3rd Semester Diploma Mechanical Engg.

H E A T P O W E R - I

SUBJECT CODE- DME-301

Total Marks : 100 , CPW : 4, Credit : 4

DETAIL COURSE CONTENT

GROUP-A

(1ST HALF)

DEFINITIONS & BASIC CONCEPTS

Thermal equilibrium – Statement of Zeroth law of thermodynamics, thermodynamic equilibrium. System, boundaries and surroundings. Properties of a system-Intrinsic (intensive) Properties and Extrinsic (Extensive) properties Pressure-Units, absolute pressure gauge, pressure & atmospheric pressure Temperature - Units of measurements, specific volume, density, units. Energy- Stored energy and transitional energy-unit of energy.Heat and work- Definitions and units, power-unit State of a system, process, cycle, flow process, non-flow process, P-V diagram. First Law of thermodynamics-Statement and explanation, Mechanical equivalent of heat, Energy equation for flow & non-flow processes, internal energy, enthalpy. (Simple Problem) Limitation of 1st. Law, 2nd law of thermodynamics, statement (Clausius & Kelvin-Planck), Perpetual motion m/c of 2nd.kind,its absurdity in the light of 2nd. Law of thermodynamics.Entropy-Analogy of heat energy with work, concept of T-S plane from analogy with P-V plane, units of entropy.

PROPERTIES OF GASES

Perfect and real gases – difference between gas and vapour – critical point Characteristic gas equation – characteristic and universal gas constant. Specific heat (C_p & C_v), ratio of specific heat, relation between C_p , C_v & R , change of internal energy and enthalpy in terms of specific heats and temperature difference. P-V & T-S diagram, relation between pressure, temperature, volume, work done, change of internal energy, heat absorbed, change of entropy for the following processes (deduction & numerical problems):

- (a) Constant volume process
- (b) Constant pressure process
- (c) Isothermal process
- (d) Adiabatic process
- (e) Polytropic process

GROUP-B

(2ND HALF)

STEAM

Formation of steam, change of state, T-S diagram

BASIC TERMS AND PROPERTIES OF STEAM: Saturation temperature, saturation pressure, dry, wet and superheated steam, dryness fraction, degree of superheat, sensible heat or liquid enthalpy, enthalpy of evaporation or latent heat of evaporation, enthalpy of dry saturated, wet, superheated steam, specific volume, entropy of water, evaporation and steam (dry, wet & superheated)

Throttling of steam (concept only)

Steam table – its use, problems using steam tables

Enthalpy- Entropy chart (Mollier – chart) – its use

Steam calorimeters, types, principle for calculation of dryness fraction in:

- (a) throttling calorimeter
- (b) separating and combined calorimeter

BOILERS (STEAM GENERATOR)

Classification

Fire tube & water tube boiler, working principle, difference, applications

Basic requirements for running a boiler, draught types, calculation of chimney heights, problems

Important boiler mountings and accessories – name, functions

Feed pump, super heater, economizer, air pre-heater, functions Feed water treatment

MACHINE TOOL - I

SUBJECT CODE- DME-302

Total Marks : 100 , CPW : 3+1T, Credit : 3

DETAIL COURSE CONTENT

GROUP- A (1ST HALF)

GENERAL INTRODUCTION

Metal cutting machine tools – definitions, classifications, elements, purpose and accuracy

Machine tool drives – elements, classifications, individual vs group drive

METAL CUTTING

Cutting tools materials – Properties and uses – Cutting tool life – Equation for cutting tool life – Factors for cutting tool life.

Cutting tool classifications, nomenclature of a single point cutting tool, tool angles and its influence

Forces acting on a single point cutting tool, orthogonal and oblique cutting

Concept of chip formation, types of chips

Coolant used in metal cutting

LATHE AND LATHE WORKS

LATHE- working principle, types, specifications

Centre lathe – principal parts and their functions

Lathe drives – cone pulley, back gear, all geared drive

Lathe attachment and accessories

Different mechanisms – apron mechanism, feed mechanism

Different operation on lathe

Taper turning methods, working principle and calculations, simple problems

Thread cutting – gear calculation, tool setting, measurement of thread sections, arrangement in cutting, problems

Cutting speed, feed, depth of cut – definitions, machining time calculation, depending factors, simple problems.

Group- B (2nd half)

CAPSTAN AND TURRET LATHE

Comparison between capstan and turret lathe

Specifications of capstan and turret lathe

Capstan lathe parts – turret with indexing mechanism, turret slide & base only

Job holding devices – chucks, collets, bar feeding mechanism

Tool holding devices – roller steady box, knee tool holder & self-opening die.

DRILLING MACHINE

Specifications and types

Constructions – pillar drill and radial drill only

Different operation in drilling machine

Drill – nomenclature of twist drill, types

Reamers – types, nomenclature

Tap drill size, calculation only

Cutting speed, feed, depth of cut, drilling time, calculations

Work holding devices – drill jig, vice, v-block, direct clamping on table

BORING MACHINE

Principle, types, constructional features, accuracy achieved & uses
Boring machines – operations, tool required
Tool holding and job holding devices

STRENGTH OF MATERIAL**SUBJECT CODE- DME-303**

Total Marks : 100 , CPW : 3, Credit : 3

DETAIL COURSE CONTENT**GROUP-A****(1ST HALF)****STRESS AND STRAIN**

Lateral strain, Poisson's ratio, volumetric strain, bulk modulus
Shear stress- shear strain, modulus of rigidity
Elastic constants and their relationship
Problem connecting lateral and linear deformation

THIN CYLINDER AND SPHERICAL SHELLS

Definition of thin & thick shells, failure of thin cylinder shells subjected to internal pressure, failure of spherical shell subjected to internal pressure
Derivation of hoop stress and longitudinal stress
Problem considering efficiency of longitudinal and circumferential joints of the shell.

Deflections of beams

Deduction of maximum deflection and slope for cantilevers with: —point load at free ends,
point load at any position, uniformly distributed load throughout the length.
Deduction of maximum deflection and slope of simply supported beam with: —
point load at mid span,
uniformly distributed load throughout the length,
combination of (a) & (b) using standard formula and principle of superposition (no deduction of formula).

COLUMNS AND STRUTS

Problems using Euler's formula for long column (no deduction)
Problems using Rankine – Gordon's formula (no deduction).

GROUP-B**(2ND HALF)****TORSION OF SOLIDS AND HOLLOW CIRCULAR SHAFTS**

Introduction – theory of torsion and assumptions, derivation of torsion formula, polar modulus, torsional rigidity
Power transmission
Strength and stiffness of shafts
Comparison of hollow and solid shafts – advantage of using a hollow shaft
Problems

SPRINGS

Types of springs, uses
Closely coiled helical spring subjected to axial load, shear stress, deflection, stiffness, strain energy stored for closely coiled helical spring
Simple problem.

Riveted joints

Types of rivets and riveted joints
Strength of rivet & plate, strength of riveted joints, efficiency of riveted joints (lap and butt joints)
Failure of riveted joints
Simple problems

Basics of Electrical Engineering

DEE-304

Total Marks :100, Credit : 3 , CPW:3

DETAIL COURSE CONTENT

IST HALF

GENERAL INTRODUCTION OF ROTATING MACHINE

Faraday's laws of e.m.f. inductions and basic constructional features of generators and motors. Hetero-polar and homopolar configuration.
Space distribution of flux density and time-variation of voltage. Magnetisation curve.

D.C Machines:

D.C. Generator: basic principles, brief description of different parts and working, different types, e.m.f equation, building up of e.m.f in self-excited generator – applications of D.C. generator – problems on e.m.f. equation.

D.C. Motors: basic principles, significance of back e.m.f., speed and torque equation, speed-current, torque-current, speed-torque characteristics, Types – applications.
Diff. Methods of speed control of motors, starters, industrial applications – problems.

TRANSFORMERS:

Constructional details: selection of core material & winding materials considering different types of losses, insulating materials, core & coil construction, Transformer oil, Accessories: tank & radiator, breather, conservator, bucholz relay, bushings, pressure relief valve {PRV} & explosion vent (protection from explosion).

1-phase Transformers:

E.m.f. equation, derivation of core losses, no-load operation, phasor diagram under no-load and load conditions, equiv-resistance and reactance, approx, equivalent circuit, dependence of circuit parameters' on V and f., impedance voltage, Regulation, Losses and efficiency (including all-day eff) – Problems .Cause of noise & vibration in transformers – Rating of transformer.

S.C. and O.C. tests – separation of eddy current and hysteresis losses – Problems.

SECOND HALF

Alternator:

Introduction:

Construction – brief description and functions of diff. Parts, viz.

Armature – (i) stationary armature – merits
(ii) Rotating armature demerits

Stator – Core, frame, slots

Rotor – (i) Cylindrical
(ii) Salient type

- Salient features, merits and applications.

Excitation system – (i) Brushless excitation system with circuit diagram

(ii) Static excitation system with diagram.

E.M.F. equation: Coil span factor and distribution factor (significance and mathematical expressions only – no deduction) - Problems.

No-load characteristics and Load Characteristics at various p.f.

Synchronous reactance (both for cylindrical & Salient pole m/c), Synchronous impedance, O.C. Test and S.C. Test.

Synchronous Motor:

Principle of steady state constant speed operation, Construction (in brief).

Methods of starting (brief discussion), hunting & damper winding.

Applications

3-Phase Induction Motor

Introduction & production of rotating magnetic field.

Types of motors with their construction (in brief)

Principle of operation, syn. Speed, rotor speed, slip, rotor current frequency – related problems.

Induction motor as transformer – similarities & dissimilarities, equivalent circuit, torque equ. Starting torque, running torque, max torque, slip torque characteristics.

Industrial applications.

Fractional H.P. Motors:

Construction, principle of operation and applications of 1-ph Induction motor – split phase motors

1-phase Synchronous motors – Reluctance Motors

AC – series motor: Universal motors.

REFERENCE BOOKS

1. Electrical Machines by S. K. Bhattacharya – Tata McGraw Hill Publications
 2. Electrical machines by M. V. Deshpande – Wheeler Publication.
 3. Theory & Performance of Electrical Machine by J. B. Gupta
 4. D. C. Machines and Transformers by K. Mungnesh Kumar – Vikas Publication
 5. A Text Book of Electrical Technology by B. L. Thereja – S. Chand publication
 6. Electrical Machine by Dr. P. K. Mukherjee & S. Chakraborty
 7. AC Machines by M. G. Say
 8. The performance and design of D. C. machines by A. E. Clayton.
 9. Fundamentals of Electric Machine by B. R. Gupta and V. Singhal
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Sessional / Practical subjects for 3rd Semester

PROGRAMMING IN C LAB (ALL DISCIPLINE)

DCS-304S

Total Marks :100 CPW : 5 (2 L + 3P) , Credit : 2

DETAIL COURSE CONTENT

Basic of C Programming

Introduction of C language , Merit & Demerits of C , Working steps of C Compiler

- 1.1 To execute a sample C program to study the basic structure of C program.
- 1.2 To be familiar with keywords and identifiers through some program.
- 1.3 To apply constant, variables and different types of data types.

Operators & Expressions

- 2.1 To write program using Arithmetic, Relational, Logical and Assignment operators.
- 2.2 To write program to implement increment & decrement operators and to find the greatest between two numbers using conditional operator.
- 2.3 **To evaluate an expression to study operator precedence and associativity and to write a program using casting a value.**

Decision Making

- 3.1 To use formatted scanf() and printf() functions for different types of data.
- 3.2 To find the roots of a quadratic equation. Find the greatest of three numbers using IF –ELSE and IF - ELSE IF statements.
- 3.3 To test whether the given character is vowel or not, using nested if –else statement and Switch-case statement.
- 3.4 To find sum of first n natural number using 'GOTO' statement
- 3.5 To find the sum of all Fibonacci numbers in between 1 to n using 'for' loop.
- 3.6 To find G.C.D and L.C.M of two numbers using 'WHILE' loop.
- 3.7 To find the sum of the digits of an integer using DO –WHILE loop structure.
- 3.8 To solve other problems for the implementation of different loop structure.

Arrays

- 4.1 **To write a program to accept 10 numbers, store them in a single dimensional array and to make the average of the numbers.**
- 4.2 To make an array of n elements and sort them and to write a program to check whether an input number is palindrome or not.
- 4.3 To write a program to accept a string and to count the no of vowels present in this string.
- 4.4 To write programs on matrix operation (addition, subtraction & multiplication).
- 4.5 To write some programs to utilize different string handling functions and to create an array to store the names of 10 students arranging them alphabetically.

User Defined Functions

- 5.1 To write a program to find the sum of the digits of a given number using function.
- 5.2 To write program using functions: —
 - (a) with no argument and no return value;
 - (b) with argument and no return value;
 - (c) with argument and return value.
- 5.3 To find out the factorial of a given number using recursive function.
- 5.4 To write a program that uses a function to sort an array of integers.
- 5.5 To write programs to illustrate auto variable, external variable, static variable and register variable.

Pointers

- 6.1 To write a program to access variables using pointer.
- 6.2 To write a program to assign the address of an integer array to a pointer variable 'p' and add all the array elements through 'p'.
- 6.3 To write programs to explain parameter passing 'by reference' and 'by value'.

Structure

- 7.1 To write a program to define and assign values to structure members
 - 7.2 To write program to explain structure with arrays.
 - 7.3 To define and assign values to 'Union' members.
 - 8.1
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Mechanical Engineering Lab –I

DME-304S

As per Heat Power- I (DME-301)

MECHANICAL ENGINEERING DRAWING

SUBJECT CODE- DME-305S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

PLATE NO. 1

- SECTIONAL VIEWS: To draw different (Front view, Side view & Top view) Orthographic & sectional views from given isometric views of casting & machine parts (At least 6 problems).
- INTERPRETATION OF VIEWS: To draw different view including sectional views from given orthographic views (at least 4 problems)

PLATE NO. 2

- Development of surface like hopper, funnel, tray, oblique pyramid, oblique cone & oblique cylinder.

PLATE NO. 3

- To draw free hand sketch of a screw thread showing various parts and conventional representation, the method of designating and dimensioning of metric screw threads.
- To draw free hand sketch mentioning proportion and use of following thread profile
I.S.O metric screw thread – internal and external ii) B.S.W iii) B.S.P iv) B.A v) Square vi) ACME vii) Knuckle viii) Buttress
- To draw three views of a hexagonal bolt of given diameter fitted with washer and nut
- To draw free hand sketch of the following bolts (any one)
i) Square headed bolt with square neck; ii) Cheese headed bolt; iii) Tee headed Hook; iv) Lifting eye; v) Stud; vi) Foundation.
- To show by means of neat sketch & sectional views of: i) the drilled hole ii) tapped hole
- To draw free hand sketch of the following nuts: i) lock; ii) castle; iii) wing; iv) flange; v) dome.

PLATE NO: 4

- To draw free hand sketch of different types of key such as: i) shunk taper; ii) saddle; iii) gib head; iv) pin; v) wood ruff; vi) spline shaft and spindle hole.
- Isometric view of the followings to be provided. Draw three views with bill of materials i) knuckle joints; ii) socket and spigot joint.

PLATE No. 5

- To draw: i) sectional front view, and, ii) side view of a protected type rigid shaft coupling having given diameter " D" (prepare a bill of material)
- To draw: i) half sectional front view, and, ii) side view of a C.I pulley from given dimension (shaft diameter, hub diameter, length of the hub, outside diameter of pulley, dimensions of arms etc. are given)

MECHANICAL ENGINEERING WORKSHOP-I

SUBJECT CODE- DME-306S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

BASIC MACHINE SHOP:**LATHE WORK**

Every student must be familiar with the operation, safety, general maintenance of a lathe machine. Students to be familiarized with lathe parts, accessories and attachments used on lathe. Students to be familiarized with the measuring instruments and measurement transferring devices. Students to be familiarized with the personal safety while working on lathe machine. Familiarization with lathe tools and their mountings and speed and feed to be adopted.

Find out the centre of a round job with hermaphrodite caliper, and mount the job in Between centers.

Straight turning with a tough turning tool.

Holding a round job in a 4-jaw chuck, making concentric with the lathe axis, facing the free face and then centering with a centre drill.

Reverse the job, do the same operation on other face also.

EXERCISE:

A job having facing, centering and step turning as per drawn exercise.

A job having step turning, chamfering, grooving, shouldering, recessing etc as per drawnsketch.

A job with external taper turning and internal taper turning with matching.

Thread cutting practice – both external and internal having different dimensions.

DRILLING MACHINE:

Study of a pillar and radial drill, including accessories, attachments and holding devices.

Study of different drills available in the workshop.

Exercise on drilling concentrically on a flat surface, round surface

Preparation for a reamed hole, tapped hole and their sizes.

SHAPER M/C

Study of shaper m/c including tool holding devices & job holding devices.

Making surfaces like horizontal, vertical & angular (external & internal).

V-block making.

BENCH WORK AND FITTING SHOP

Purpose of Bench Work & Fitting Shop:

Study of different types of hand tools & their uses with specifications, care & maintenance of different hand tools e.g. files, chisels, hammers, hacksaw with frames, vice, divider, try square.

Study of different measuring instruments e.g. micrometer, vernier calipers, height gauge, etc.

Basic fitting shop practice

Chipping & chiseling practice

Filing practice

Marking & measuring practice

a) Drilling & tapping practice

b) Joining practice (male & female joints with internal & external)

1. Practice job:

a) Preparation/manufacturing of jobs – at least two covering the above mentioned processes are to be prepared such as square joint, triangular joint, etc.

STRENGTH OF MATERIAL LABORATORY

SUBJECT CODE- DME-307S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

Determination of Co-efficient of friction between rough surfaces.

Simple Screw-Jack : M.A., V.R. & efficiency.

Tension test on M.S. Specimen.

Determination of Strength and Stiffness of Springs.

Determination of hardness of metal by Brinell and Rockwell Testing Machines.

Determination of Modulus of elasticity of a given material.

Determination of impact strength of C.I. and M.S. Specimens by impact testing machine.

Electrical Engg. Lab DEE-304S

As per Basics of Electrical Engineering DEE-304

4TH Semester

FLUID MECHANICS

SUBJECT CODE- DME-401

Total Marks : 100 , CPW : 3+1T, Credit : 3

DETAIL COURSE CONTENT

Group-A (1st half)

INTRODUCTION

Introduction of fluid mechanics
Solids, liquids and gases
Ideal & real fluids
Significance of fluid mechanics
Units & dimensions

PHYSICAL PROPERTIES OF FLUIDS

Specific weight, mass density, specific gravity, compressibility
Viscosity, Newton's law of viscosity, kinematic viscosity, dimensional formula and units of viscosity
Surface tension, cohesion & adhesion
Newtonian & Non Newtonian fluid problems

FLUID STATICS

Pressure(atmospheric, absolute & gauge)
Transmission of pressure (Pascal's law & its application)
Hydrostatic law (Pressure, specific weight & height relationship)
Force & centre of pressure on a horizontal , vertical , inclined & curved submerged surface with deduction
Archimedis principle, stability of immersed & floating bodies, metacentre & determination of metacentric height

Group-B (2nd half)

FLUID KINEMATICS

Classifications of fluid flow (laminar & turbulent), steady & unsteady, uniform & non uniform, compressible & non compressible, rotational & irrotational
Flow rate & continuity equation
Energy in terms of head of flowing fluid (potential, kinetic & pressure)
Bernoulli's equation
Hydraulic & energy gradient

FLUID MEASUREMENTS

Piezometer
Description & working principle of simple U-Tube manometer, differential manometer, inverted type manometer
Definition & relation of coefficient of contraction, coefficient of velocity & coefficient of discharge
Working principle, deduction & use – Venturimeter, Orificemeter & Pitot tube
Working principle, deduction & use – Rectangular & Vee notches
Working principle & use – Weirs with end contractions

LAMINAR & TURBULANT FLOWS

Determination of Reynolds number, critical velocity
Flow losses in pipes (at entrance ,exit, contraction, expansion & bending) only empirical formula
Laws of fluid friction
Darcys equation for head loss due to pipe friction

OPEN CHANNEL FLOW

Chezys & Mannings formula (No deductions & problems only)

SUBJECT CODE- DME-402

Total Marks : 100 , CPW : 3, Credit : 3

DETAIL COURSE CONTENT

GROUP-A (1ST HALF)

STEAM POWER CYCLES

Reversible Cycle – Carnot Cycle (with gas and vapour) – Representation on P-V, T-S planes, Thermal Efficiency – impracticability of Carnot Cycle in active cases – (Problems on Carnot Cycle with steam). Rankin Cycle – with & without feed pump work. P-V, T-S diagram, Thermal Efficiency, Work Ratio, Specific Steam Consumption, (Problems), Elements of a Steam Power Plant, Modified Rankine Cycle – P-V, T-S diagram, (Simple line diagram & Names – No details) (No Problems), Simple Reheat Cycle – Regenerative Cycle (No Problem)

STEAM ENGINE

Classification and use

Working Principle

Theoretical Indicator Diagram (a) without clearance (b) with clearance. Theoretical mean effective pressure from indicator diagram – Actual indicator diagram, reason for variation from theoretical indicator diagram, diagram factor, Actual mean effective pressure, Indicator Power.

Brake Power- Rope Brake Dynamometer to measure Brake Power, Mechanical Efficiency, Brake Mean effective Pressure, Indicated and Brake Specific Steam Consumption (Problems). Meaning of Thermal Efficiency, Overall Efficiency, Standard Efficiency, Relative Efficiency or Efficiency Ratio – Definition only (No Problem)

STEAM TURBINE

Comparison between Steam Engine & Steam Turbine.

Classification of Steam Turbine (No Details)

Simple Impulse Turbine – Working Principle, Velocity Diagram – Problems (Graphical Method)

Parts of Steam Turbine (Location & Function)

Compounding of Turbine

Working Principle of Reaction Turbine

Governing of Turbine (Throttle Control & Nozzle Control)

GROUP-B (2ND HALF)

STEAM CONDENSER

Purpose of using condenser – Classification – Surface Condenser & Jet condenser, Sketch & Description of 2 – Pass Surface Condenser. Comparison between Surface & Jet condensers.

Vacuum, vacuum efficiency, Condenser efficiency, Dalton's Law Of Partial Pressure as applicable to condenser – Calculation of air leakage into condenser – Cooling water circulation – (Simple Problems)

Source of air in Condenser – Check of leakage of air.

HEAT TRANSFER

Three Basic Modes of Heat Transfer: —

CONDUCTION: Fourier's Law of heat conduction – Thermal Conductivity.

Heat transfer through plane homogeneous wall, Heat transfer through composite wall, Heat transfer through hollow cylinder – (Simple Problem)

CONVECTION: Explanation of Convective heat transfer, Principle of heat exchanger (No Deduction & Problem)

RADIATION: Explanation of heat transfer by radiation, definition of absorptivity reflectivity, transmissivity, Black Body. Stephen-Boltzman Law – Statement and Explanation of terms with unit (No Problem)

MACHINE TOOLS - II

SUBJECT CODE- DME-403

Total Marks : 100 , CPW : 4, Credit : 4

DETAIL COURSE CONTENT

GROUP-A (1ST HALF)

SHAPER & PLANNER

Specifications & types of Shaper

Construction of a Shaper & brief functions of its part.

Crank slotted link mechanism (adjustment of length of stroke), Quick return mechanism & feed mechanism.

Hydraulic shaper -Working principle & quick return mechanism.

Different operation performed on a shaper –Flat surface, Angular surface, Slot, Formed surface.

Cutting speed, feed, depth of cut machining time calculation.

Cutting tool - types only.

Job holdings devices – Fixture, Vice, Directly over table.

Planning m/c- Specifications & types. Quick return mechanism a) Open & Cross belt b) Variable speed.

Difference between Planner & Shaper.

MILLING MACHINE

Types specification.

Difference between plain milling & universal milling.

Milling m/c parts & their functions.

Cutter holding device – Arbors, fixing of arbor with machine spindle. Arbor assembly accessories & attachments.

Milling processes- Peripheral milling, Up & Down milling, difference, Face milling, End milling, Straddle milling, Plain milling, Side milling, Angular milling, Gang milling, End milling etc.

Milling operations with cutter & job set up & the directions of movements.

Milling cutters- Types, elements, negative rake cutter (purpose).

Cutting speed, feed, depth of cut & machining calculations.

Indexing- Purpose, types, description with working principle of differential indexing head, cutting spur gear with different index head, calculation & problem, difference index plate & cutter nos.

Generating method of cutting gears – working principle of gear shaper, hob cutting.

GROUP-B (2ND HALF)

GRINDING MACHINE

Abrasives – Types & Uses.

Effect of bond, Grit, Grade & Structure in manufacturing a grinding wheel.

Specification of a grinding wheel.

Grinding Machine – Types, Operations performed (specially Surface Grinding & Cylindrical Grinding) emphasis on Centreless Grinding (Outside & Inside)

Factors selecting a grinding wheel, Balancing & Mounting a grinding wheel, Glazing & Loading of wheels. Care & Maintenance of grinding wheel.

Honning & Lapping – Principle & Use only.

BROACHING MACHINE

Advantage & disadvantage of using a Broaching machine.

Broaching Machine – Types, Operations performed, Accuracy achieved.

Broach tool – Elements, free hand sketch of a Broach tool.

PRESS WORK

Types and size of a press machine.

Operations performed like Blanking, Piercing, Drawing, Bending, Embossing, Coining, etc.

Press tools (Die & Punch), Die accessories, elements of Die & Punch.

MECHANICAL ENGINEERING DRAWING

SUBJECT CODE- DME-404

Total Marks : 100 , CPW : 3, Credit : 3

DETAIL COURSE CONTENT

GROUP-A (1ST HALF)

PLATE NO. 1

- SECTIONAL VIEWS: To draw different (Front view, Side view & Top view) Orthographic & sectional views from given isometric views of casting & machine parts (At least 6 problems).
- INTERPRETATION OF VIEWS: To draw different view including sectional views from given orthographic views (at least 4 problems)

PLATE NO. 2 Development of surface like hopper, funnel, tray, oblique pyramid, oblique cone & oblique cylinder.

PLATE NO. 3 THREADS NUTS AND BOLTS

- To draw free hand sketch of a screw thread showing various parts and conventional representation, the method of designating and dimensioning of metric screw threads.
- To draw free hand sketch mentioning proportion and use of following thread profile
I.S.O metric screw thread – internal and external ii) B.S.W iii) B.S.P iv) B.A v) Square vi) ACME vii) Knuckle viii) Buttress
- To draw three views of a hexagonal bolt of given diameter fitted with washer and nut
- To draw free hand sketch of the following bolts (any one)
i) Square headed bolt with square neck; ii) Cheese headed bolt; iii) Tee headed Hook; iv) Lifting eye; v) Stud; vi) Foundation.
- To show by means of neat sketch & sectional views of: i) the drilled hole ii) tapped hole
- To draw free hand sketch of the following nuts: i) lock; ii) castle; iii) wing; iv) flange; v) dome.

PLATE NO: 4 To draw free hand sketch of different types of key such as: i) shank taper; ii) saddle; iii) gib head; iv) pin; v) wood ruff; vi) spline shaft and spindle hole.

- Isometric view of the followings to be provided. Draw three views with bill of materials i) knuckle joints; ii) socket and spigot joint.

GROUP-B (2ND HALF)

PLATE No. 5

- To draw: i) sectional front view, and, ii) side view of a protected type rigid shaft coupling having given diameter “ D” (prepare a bill of material)
- To draw: i) half sectional front view, and, ii) side view of a C.I pulley from given dimension (shaft diameter, hub diameter, length of the hub, outside diameter of pulley, dimensions of arms etc. are given)

PLATE No 6

- To draw a spur gear and a pinion in contact showing a few teeth profile having given pressure angle module and number of teeth.

PLATE No 7 Isometric view of plummer block is given . To draw two orthographic views of following parts of the plummer block: i) body ii) cap iii) brasses.

- Draw i) sectional front view, ii) top view, and, (iii) side view of the plummer block after proper assembly and prepare bill of materials.

PLATE No. 8

- Draw details parts of an assembled mechanical screw jack and prepare a bill of materials.

COMMUNICATION SKILLS (JOB) LAB

SUBJECT CODE- DHU-400S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

OBJECTIVE

On satisfactory completion of the course, the students should be in a position to: —

- (i) look for suitable jobs by skimming through job advertisement;
- (ii) scan advertisements for specific information about particular jobs;
- (iii) develop aural-oral skills, recognition and interpretation of linguistic and non-linguistic forms which relate to job interviews;
- (iv) prepare for an interview;
- (v) respond appropriately and politely at an interview;
- (vi) take part in group discussions;
- (vii) learn all kinds of communication needed at the workplace, including telephone calls.

DETAIL COURSE CONTENT

LOOKING FOR A JOB

Identifying Sources — Skimming Newspapers for Information

JOB INTERVIEWS *

Preparing for an interview — Responding Appropriately — Group Discussions — Using Language Effectively for Interaction

* Mock interviews are to be arranged and to be conducted by any suitable person

AT THE WORKPLACE

Communicating using the telephone

- (a) L R U C Room to be used for the classes;
- (b) English newspapers be made available on a regular basis to the students;
- (c) samples of different Application Forms be made available to the students.

TEXT BOOK

ENGLISH SKILLS for Technical Students – TEACHERS' HANDBOOK / West Bengal State Council of Technical Education in collaboration with THE BRITISH COUNCIL / Orient Longman

Mechanical Engineering Lab –II

DME-405S

As per Heat Power –II (DME-402)

MECHANICAL ENGINEERING WORKSHOP-II

SUBJECT CODE- DME-406S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

ADVANCE WELDING SHOP:

Welding (by arc welding) of plates in:

- a) Flat position
- b) Vertical position
- c) Overhead position

Filler welding

Preparation of different joints : (including pipe joints – Straight & right angles)

Gas welding of non-ferrous metals.

Gas cutting practice

Mig welding practice on atleast 12 mm thick plates.

SHEET METAL SHOP:

Purpose of the shop, application.

Development of paper templates of rectangular container without lid & with lid, circular drum, funnel, rectangular tray, hopper (any three).

Cutting the sheet as per development previously done in sl. no. 2 above.

Cutting, bending, rolling, shearing, etc. as related to the job.

Soldering or clipping.

Checking the manufactured item as per dimension.

MECHANICAL ENGINEERING DRAWING

SUBJECT CODE- DME-407S

Total Marks : 100 , CPW : 5, Credit : 2

DETAIL COURSE CONTENT

PLATE No1

- To draw a spur gear and a pinion in contact showing a few teeth profile having given pressure angle module and number of teeth.

PLATE No2

- Isometric view of plummer block is given . To draw two orthographic views of following parts of the plummer block: i) body ii) cap iii) brasses.
- Draw i) sectional front view, ii) top view, and, (iii) side view of the plummer block after proper assembly and prepare bill of materials.

PLATE No. 3

- Draw details parts of an assembled mechanical screw jack and prepare a bill of materials.

PLATE No. 4

- Detail parts of a simple eccentric are given. Draw after proper assembly: i) sectional front view, ii) top view, iii) side view of the eccentric and prepare a bill of materials.
- Details of a stuffing box are given i) sectional front view, ii) top view, iii) side view with all parts after proper assembly.

ADVANCE MECHANICAL ENGINEERING DRAWING-I

SUBJECT CODE- DME-408S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

(TWO SHEETS.)

Awareness of command :- Limit, Zoom, pan, line, circle, polyline, multiline, polygon, arc, text, dtext, ddedit, dimension, hatch, layer, offset, trim, extend, erase, scale, dist, area, fillet, chamfer, array etc.

Sheet 1-- Drawing of line, poly line, polygon, circle arc, text, dimension, hatch etc,

Sheet 2-- Drawing of simple figure using different edit/Modify option like
(sample figure to be provided by the subject teacher)

(One Sheet --)

Sheet 1-- Drawing of gasket, hook, wrench, turn buckle, nuts & bolts

Sheet 2-- Drawing Plan and half sectional elevation of a rigid type protective **flange coupling** (given in sample in any drawing book)

Sheet 3-- Assembly drawing a **pulley** (full sectional elevation)) on a support beam

Fluid Mechanics Lab

DME-409S

Sessional will be conducted as per the Syllabus of DME-401 (theory)

5th Semester

INDUSTRIAL MANAGEMENT

(DHU 501), 1st half Full Marks: 50, Credit : 2, CPW:2

DETAIL COURSE CONTENT

Introduction to Management Science

Principles & functions of management — Contributions of F.W. Taylor, Henry Fayol, Max Weber in development of the theories of management science.

Organisational Behaviour

Objectives — Brief introduction to: Motivation– Perception – Leadership & Leadership Styles – Communication – Team Building – Work Culture.

Human Resources Management

Scope & Functions – Human Resources Planning – Selection & Recruitment – Training & Development – Performance Appraisal .

Production & material Management

Production Planning: Routing – Loading – Scheduling — Production Control: Expediting – Dispatching — Materials Handling Inventory Management Inventory Management —Productivity — Quality Management: Tools & Techniques – Quality Management System.:

Financial Management

Financial Ratios — Elements of Costing — Auditing

Marketing & Sales Management

Marketing of products & Services — Advertising & Sales Promotion — Consumer Behaviour

REFERENCE BOOKS

Essentials of Management / Kontz / McGraw-Hill of India

Organization & Behaviour / M. Banerjee / Allied Publishers

Human Behaviour at Work: Organizational Behaviour / Keith Davis & Newstrom / McGraw-Hill of India

Human Resources Management / Mirza Saiyatin / Tata McGraw-Hill
Production Management & Control / Nikhil Bharat / U.N. Dhar & Co.
Production Management / Keith Lockyer / ELBS
Marketing Management / Philip Kolter / Prentice Hall of India
Lectures on Management Accounting / Dr. B.K. Basu / Basusri Bookstall, Kolkata
An Insight into Auditing: A Multi-dimensional Approach / Dr. B.K. Basu / Basusri Bookstall, Kolkata
Business Strategies, Financial Management & Management Accounting / S.K. Poddar / The Association of Engineers (India)

Entrepreneurship Development

(DHU 501), 2ND half Full Marks: 50, Credit : 2, CPW:2

Definition of entrepreneurship, Characteristics of entrepreneurship, Factors influencing entrepreneurship, Types and Functions of Entrepreneurs.

Need for promotion of entrepreneurship, Entrepreneurial Environment, Govt. policies for setting-up new small enterprises.

Planning a SSI

What is planning, Types of planning, Importance of planning, Steps in planning.,Steps for starting a small enterprise. ,Commercial Banks and Financial Institutions.

Problems of Small Industries

Power shortages, Project planning, Finance.,Raw materials, Production constraints, Marketing. ,Personal constraints, Regulation., Entrepreneurial Motivation Training, Motivating factors of Entrepreneurs, Achievement Motivation, Institutions assisting entrepreneurs.

REFERENCE BOOKS

Starting your own business, A step-by-step Blue print for the first-time Entrepreneur – Stephen C. Harper, McGraw-Hill

Harward Business Review on Entrepreneurship – Harward Business School Press.

Entrepreneurship Development in small scale – proceedings of National Seminar, DCSSI, New Delhi – Patel, V.G.

Entrepreneurship: Strategies & Resources – Abrams Grant Pass. Oregon: Oasis press.

The Business Planning Guide – David H Bangs, Upstart Publishing Company in Chicago.

Entrepreneurship Development in India – Dr. C.B. Gupta, Dr. N.P. Srinivasan, Sultan Chand & Sons.

Entrepreneurship – Madhurima Lall and Shikha Sahai, Excel Books.

NON CONVENTIONAL ENERGY SOURCES

SUBJECT CODE- DME-501 (1st half)

Total Marks : 50 , CPW : 2, Credit : 2

DETAIL COURSE CONTENT

SOLAR POWER PLANTS

Solar energy – Advantages & limitations

Solar radiation – Extraterrestrial radiation, solar constant, atmospheric attenuation of solar radiation, beam, diffuse & total radiation

Solar thermal collectors – Flat plate collector, its construction & operational features, advantages & limitations, concentrating collector, its principle of operation, advantages & disadvantages over FPC, solar pond, its construction & operational features, advantages & limitations

Solar thermal power systems – Layout & description of low temperature system using FPC or solar pond, medium & high temperature systems using concentrating collectors, central receiver systems

Photo voltaic power generation system – Layout, description & function of different elements, advantages & disadvantages

WIND POWER PLANTS

Wind energy – Planetary wind & local wind, wind power density, power coefficient, advantages & disadvantages of wind energy

Wind power systems – Horizontal axis wind energy generator , its layout & schematic diagrams showing basic components & their functions, vertical axis wind mills, savonius & darrieus wind mills, their relative advantages & disadvantages

Application of wind energy

GEOHERMAL POWER PLANTS

Nature of geothermal fields

Geothermal sources – Names of different sources, brief descriptions of various hydro thermal systems

Geothermal power systems – Description with layout diagram of vapour dominated system, liquid dominated flashed system & binary systems, geothermal preheat hybrid system

Advantages & disadvantages of geothermal energy

Application of geothermal energy

ADVANCE MACHINE TOOLS & GENERAL MAINTENANCE

SUBJECT CODE- DME-501 (2nd half)

Total Marks : 50 , CPW : 2, Credit : 2

DETAIL COURSE CONTENT

JIGS & FIXTURE

Definition

Purpose of using it

Difference between Jigs & Fixture

Location (Six point principle),locating elements, types

Clamping elements, types of clamp

Type of Jigs

Design point consideration

NON TRADITIONAL MACHINING (NTM)

Need of it

Difference between traditional & non traditional machining

NTM Process :- a)EDM b) USM c) ECM d) LBM (Description & application of the processes)

. GENERAL MAINTENANCE

Introduction of it, objective , classification (Routine , shut down ,preventive running, emergency etc.)

Maintenance planning , planning activities ,routine card, critical path scheduling , planned maintenance cycle, spare part planning, standard time for maintenance work ,safety & precaution
Tools & equipments required for maintenance , hand hammer ,punch, files, chisels, hand taps, hand tools, pulleys, jacks, hoists, cranes, tapextractor ,bearing pulley etc.
Installation – Location, steps in foundation work, foundation planning design & work, grouting, curing, isolation of foundation, isolating material, foundation bolts

METALLURGY & METROLOGY

SUBJECT CODE- DME-502

Total Marks : 100 , CPW : 3+1T, Credit : 3 **DETAIL COURSE CONTENT**

Group-A (1st half)

CLASSIFICATION OF STEEL

- a) Carbon steel – Dead steel, mild steel, medium carbon steel, high carbon steel, percentage of carbon & application of each . Influence of manganese, silicon, sulphur, & phosphorous in plain carbon steel.
- a) Alloy steel – Purpose of using alloy steel ,effects of alloying elements like nickel, chromium, cobalt, manganese, silicon, molybdenum, tungsten , vanadium , Classification of alloy steel according to the principle alloying elements , names & uses , Classification of alloy steel according to purpose & application- structural steel , tool steel – composition & application

IRON CARBON EQUILIBRIUM DIAGRAM & HEAT TREATMENT OF STEEL

Iron carbon diagram – Name of the phases & temperature of transformation to be specified (without going into detail of any structure)

Concept of heat treatment of steel & purpose of heat treatment

Annealing , normalising , hardening , tempering of steel , principle of the process (heating temp. ,soaking , cooling) , purposes & uses of each process ,hardenability , definition & tests

Case hardening process – a)Curburising b) Nitrading c) cyaniding – principle , purpose & uses

Surface hardening – a) Flame hardening b) Induction hardening – principle & purposes

POWDER METALLURGY

Definition – Stages of powder metallurgy process- primary processes

Production of metal powders – (Reduction process, electrolysis, mechanical pulverisation) –

Characteristics of metal powder ii) Blending iii) Briqutting or compacts iv) Pre-sintering v) Sintering .

Secondary process – sizing, coining, machining, infiltration, impregnation, plating, heat treatment

Advantages & disadvantages of powder metallurgy

PLASTICS & THEIR PROCESSES

Classification of plastics – common thermosetting plastics & their names & uses

Useful common properties of plastics

Plastic processing methods :- i) Compression moulding ii) Transfer moulding iii) Injection moulding iv)

Extrusion v) Casting vi) Slush moulding vii) Calendering (principle & field of application)

Plastic fabrication methods i) Blow moulding ii) Forming methods

a) Drape forming b) Vacuum forming c) Pressure forming (principle & field of application)

Laminating of plastics – principles & field of application

Group-B (2nd half)

METROLOGY

Introduction – Meaning of metrology, objective of metrology

Linear measurement :- a) Line standard & end standard b) Vernier instruments – Vernier calliper, vernier height gauge- parts & sketches, principle of measurement

b) Micrometer – Outside & inside, construction, sketches, principle of measurement

c) Vernier micrometer – construction, sketches & principle of measurement

d) Dial indicator – construction, sketches & principle

e) Slip gauge – construction, sketches & principle

Angle measurement – By bevel protector, Sine bar

Limits, Fits & Tolerance & Application of gauges

a) Concept of interchangeability – advantages & application in mass production, Elements of interchangeable system – nominal size, basic size, actual size, limits, tolerance, deviation, allowance, clearance

b) Types of fit – clearance, transition, interference, selective assembly- definition & function,

Hole basis system, shaft basis system, definition & use

c) Go – NoGo gauges – plug gauge, snap gauge,

d) Difference between measuring instruments & gauges

Gear measurement – measurement of tooth thickness, gear tooth vernier caliper

Measurement of straightness, flatness, concept of geometrical tolerance

Nondestructive testing- Types, fields of application, principle, advantages, limitations

MANUFACTURING PROCESS

SUBJECT CODE- DME-503

Total Marks : 100 , CPW : 4, Credit : 4

DETAIL COURSE CONTENT

GROUP-A (1ST HALF)

INTRODUCTION

Classification of manufacturing process

Primary Shaping Process – Joining Process – Process affecting change in properties.

WELDING & ALLIED PROCESS

Concepts of welding - Workability

GAS WELDING: Principle, Equipments, Types of flames, Application, Safety — ARC WELDING: Principle, Application, equipment, safety.

RESISTANCE WELDING: Types (Names Only) — SPOT WELDING: Principle, simple sketch of setup, application — SEAM WELDING: Principle, simple sketch of setup, application.

THERMIT WELDING: Principle of operation, application

SPECIAL WELDING TECHNIQUES: TIG, MIG, Electron Beam Welding – Principle & Application

Defects in welding, Remedies

Soldering, Brazing – Principle and application.

MECHANICAL WORKING OF METAL

Classification of mechanical working of metals – Hot working and Cold working – examples.

Forging – Types (Hand forging, Power hammer forging, Drop forging, Press forging) – Principle of operation – Characteristics, Advantages and Defects of forged parts – Application.

Extrusion – Definition, Principle of operation, Hot and Cold extrusion, Application

Rolling - Principle of Hot and Cold rolling – Field of application

Wire drawing – Principle of operation, Field of application.

METAL CLEANING & PROTECTIVE SURFACE TREATMENT

Mechanical and chemical cleaning of metals (Names & Principles)

Surface Treatment – Electroplating, Hot Dipping, Metal Sprays, Anodising, Enamelling, Galvanising (Principle and field of application)

GROUP- B (2ND HALF)

FOUNDRY

PATTERN MAKING

Definition of pattern used in casting – Pattern Material names (Wood, Metals, Plaster of paris, Wax, Plastic)

Advantages of wood as pattern material – Limitation of Wood as pattern material – Advantages and Disadvantages of Metal patterns.

Pattern Allowances – Shrinkage Allowance, Machining Allowance, Draft Allowance, Rapping and Shaking Allowance, Distortion or Camber Allowance, Reason for and Factors controlling the allowances.

Types of patterns – Solid pattern, Split pattern, Metallic plate pattern, Loose piece pattern, Cope and Drag pattern, Sweep pattern – Sketch and Field of Application.

MOULDING

Classification of Moulding Process (Names)

Preparation and desired Properties of Moulding Sand.

Green Sand Moulding using Solid Pattern and Cope and Drag pattern; Grates, Runners, Risers; Moulding Tools required.

Cores – purpose of using cores – Preparation. Method of supporting cores – Core print, Chaplets.

CASTING

Names of furnaces for melting of metal (details not required)

Casting process – Names (Sand casting, Die casting, Centrifugal casting, Malleable casting, Investment or Lost wax casting) – Processes in brief, Field of Application

Fettling and cleaning of casting (removal of Gates, Sizers, Corers, Fins etc.)

Defects in Casting and Remedies. _____

ADVANCE MECHANICAL ENGINEERING DRAWING-II

SUBJECT CODE- DME-504S

Total Marks : 100 , CPW : 5, Credit : 2

DETAIL COURSE CONTENT

PLATE / SHEET—1

Details of foot step Bearing : Assembly views to be given . draw the Detail Drawing of the same through different sectional views (Front View, Side View & Top View)

PLATE / SHEET—2

Assembly &Details of Petrol Engine connecting rod : Assembly views to be given . draw the Detail Drawing of the same through different sectional views (Front View, Side View & Top View)

PLATE / SHEET—3

Assembly &Details of feed check : Assembly views to be given . draw the Detail Drawing of the same through different sectional views (Front View, Side View & Top View)

PLATE / SHEET—4

Assembly &Details of Square tool post : Assembly views to be given . draw the Detail Drawing of the same through different sectional views (Front View, Side View & Top View)

PLATE / SHEET—5 —ASSEMBLY &DETAILS OF PISTON : ASSEMBLY VIEWS TO BE GIVEN . DRAW THE DETAIL DRAWING OF THE SAME THROUGH DIFFERENT SECTIONAL VIEWS (FRONT VIEW, SIDE VIEW & TOP VIEW)

PLATE / SHEET—6

Assembly &Details of Revolving Centre : Assembly views to be given . draw the Detail Drawing of the same through different sectional views (Front View, Side View & Top View)

PLATE / SHEET—7

Assembly &Details of Box type drill jig : Assembly views to be given . draw the Detail Drawing of the same through different sectional views (Front View, Side View & Top View)

MODULE D

Sheet 1-- Drawing of simple three figures cylinder, cone, wedge, cube ,sphere , hemi sphere, pyramid etc

Sheet 2-- Drawing simple 3D Drawing by using different solid editing option (Union , Subtraction)

Sheet 3 ,4-- Drawing of simple machine parts as given in sample

ME WORKSHOP – III

SUBJECT CODE- DME-505S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

MACHINE SHOP

- 1) Introduction – Different types of measuring instrument used in the shop & their care & maintenance, safety also.
- 2) Lathe work - a) Production of an eccentric turning with suitable dimension (Two Link Crank)
b) Working demonstration of a capstan lathe , turret lathe & other types of production lathe.
- 3) Shaper – Making surfaces like horizontal, vertical & angular (external & internal), V- block making
- 4) Milling m/c – a) Cut flat surfaces (horizontal & vertical) on m.s plate
b) Making a slot (rectangular)
c) Production of spur gear by indexing method (Complete or partially)
- 5) Working demonstration of surface grinder, planing m/c, radial drilling m/c, tool & cutter grinder (including non conventional m/c if available in the shop)

PATTERN SHOP

- 1) Introduction – Name, uses & specification. Care & maintenance of different tools & measuring instruments used in the shop
- 2) Operations of wood working machine. Simple exercises involving cylindrical, taper & form turning, boring, facing & filleting
- 3) Simple pattern making (at least two, one should be solid & one should be split, preferably making with core print & core box)
- 4) Safety precautions of the shop.

ME LABORATORY – III

SUBJECT CODE- DME-506S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

A. HEAT POWER LAB.

1. STUDY OF I.C ENGINES

- 1.1 a) Petrol engine – Study of parts, functions, locations, material
- b) Diesel engine - Study of parts, functions, locations, material

1.2 Determination of I.P,B.P& Mechanical efficiency of an I.C engine through Mech. Dynamometer

1.3 Study of valve setting diagram of Petrol engine/Diesel engine

1.4 Study of air compressor, Gas Turbine

1.5 Study of Refrigeration plant & Air Conditioning Unit

N.B:- Study of air compressor, gas turbine, refrigeration plant & air conditioning plant may be conducted by Model , Charts & OHP/AUDIO facilities if the actual testing is not possible.

B. METROLOGY LAB – 1

- 1) Study of micrometer, measurement by micrometer
- 2) Study of vernier caliper (outside & inside), measurement by inside & outside caliper
- 3) Study of vernier height gauge, measurement
- 4) Study of slip gauge, bore dial gauge, dial indicator
- 5) Angular measurement by a) bevel protector b) sine bar

PROJECT -I

SUBJECT CODE- DME-507S

Total Marks : 100 , CPW : 5, Credit : 2

DETAIL COURSE CONTENT

OBJECTIVE

Project Work is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, it should provide a taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different *Panchayet* bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using Word and CADD software wherever necessary.

Seminar on Project Work is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, aural and visual communication aids which they learnt through different courses in the Parts – I & II of the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

GENERAL GUIDELINE

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a lecturer of their core discipline who will work as a Project Guide. It is expected that most of the lecturers of the core discipline will act as project guide and each should supervise the work of at least two groups. Number of students per group will vary with the number of lecturers acting as Project Guide and student strength of that particular class.

COURSE & EXAMINATION SCHEDULE

THE PROJECT

Each group has to undertake the complete design and manufacture of at least any one of the following articles:—

- a) Screw jack (small conventional type or leaf type)
- b) Jigs or Fixture (small)
- c) Small vice
- d) Wall bracket
- e) Turn buckle
- f) Surface gauge
- g) Manufacturing of grills
- h) Coupling.

The above are suggestions and a student group need not to restrict their selection of Project Tropic from within them. Any suitable items may also be taken depending upon the available workshop facilities (i.e materials & infrastructure). The project work should involve some of the following aspects:—

1. Prepare complete work study & also calculate the cost of item,
2. Visit to industry as a part of project work is compulsory.

The Project Report should contain among others:

- (a) Design, drawing, complete work study of the manufactured items, and,
 - (b) Brief report of industrial visit.
-

NON - CONVENTIONAL ENERGY SOURCE LABORATORY

SUBJECT CODE- DME-508S

Total Marks : 100 , CPW : 4, Credit : 2

DETAIL COURSE CONTENT

1. Study of different types of wind mills & their application
2. Study of wind speed measuring instruments like anemometer (vanetype, cuptype)
3. Study of various solar radiation measuring instruments like pyranometer, sunshine recorder etc.
4. Study & applications of various solar energy devices like solar cooker, solar water heater, solar still, solar dryer etc.
5. Study of different types of bio gas plants
6. Sessional reports based on site visit like in hotels, hospital etc

INDUSTRIAL TRAINING

DIT-500S, Total Marks : 100, credit : 2

All the students must undergo at least 2 weeks Industrial training to local / outside company /organisation after completion of 4th semester examination .

A feedback form will be taken from the respective industry which will indicate the students performance during the training and same will be reflected on the grade card of 5th semester.

6th Semester

PROFESSIONAL ETHICS & VALUES (DHU-601) 1st half

Total Marks: 50, Credit: 2 , CPW : 2

DETAIL COURSE CONTENT

Effects of Technological Growth:

Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits to growth; sustainable development. Energy Crisis; Renewable Energy Resources.

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics. Appropriate Technology Movement of Schumacher: later developments. Technology and developing nations. Problems of Technology transfer. Technology assessment/ impact analysis; Industrial hazards and safety, safety regulations safety engineering. Politics and technology, authorization versus democratic control of technology; Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centered Technology

Ethics of Profession:

Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies.

Profession and Human Values :

Value Crisis in contemporary society. Nature of values: Value Spectrum of a 'good' life

Psychological values: Integrated personality; mental health. Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution. Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity
Moral and ethical values: Nature of moral judgments; canons of ethics; Ethics of virtue; ethics of duty; ethics of responsibility. Work ethics, professional ethics.

REFERENCE BOOKS:

1. Blending the best of the East & West, Dr. Subir Chowdhury, EXCEL
2. Ethics & Mgmt. & Indian Ethos, Ghosh, VIKAS
3. Business Ethics, Pherwani, EPH
4. Ethics, Indian Ethos & Mgmt., Balachandran, Raja, Nair, Shroff Publishers
5. Business Ethics: concept and cases, Velasquez, Pearson

OPTIMIZATION TECHNIQUE

(DHU 601) 2nd half, Total Marks: 50, Credit: 2 , CPW : 2

Introduction to Operation Research & Optimization technique

Linear Programming :

Introduction to linear programming, Formulation, LPP in the standard form, LPP in canonical form, conversion of LPP in standard form to canonical form, procedure of solving LPP by graphical method.

Introduction to Simplex method, Simplex algorithm.

Shortest path **DJKstra** method.

Project Scheduling :

Project scheduling by PERT/ CPM, Decisions and game theory,

Classical optimization theory, unconstrained External problem.

MACHINE DESIGN, ESTIMATING & COSTING

SUBJECT CODE- DME-601

Total Marks : 100 , CPW : 4, Credit : 4

Group-a (1st half)

Introduction : Concepts of machine design, Machine & machine elements – basic requirements. Factors to be considered during machine design. Types of load, types of stresses, factors of safety under different load conditions, stress concentration. Commercial design material available and their properties such as C.I., W.

I. , M.S. , alloy steel, Copper alloy, Tin, G.M., Aluminium, Zinc, Non metal such as plastic, composite metal, designation of steel, Indian standard (I.S. – 1570, 1970), selection of material, use of design data book, General procedure in design.

Design of riveted joint. : Rivet material, types of heads, types of riveted joints, types of failure of riveted joint, Relation between a) Plate thickness, b) Rivet hole diameter and c) Rivet diameter. Effy of the joints (Caulking and fullering , simple problem).

Design of welded joints.

Application of welded joint. Advantages and disadvantages of welded joint over riveted joint, materials used in welded joint,type of welded joint – Name and symbol as per I.S.

Design of V Butt welded joint – transverse and parallelfillet welded joints only, Circular fillet welded joint (subjected to torsion and bending only) (Simple problem)

Design all parts of –

- a) Knuckle joints
- b) Cotter joints.

Design of –

- a) C.I. pulley for flat belt.
- b) Rigid shaft coupling.

For transmission of given power. Design of all parts including shaft (pure torsion only) and keys)
Group- B (2nd half)

Cam

Introduction, classification Cam, Classification of followers, definition, Motion of followers (Uniform velocity, uniform acceleration, retardation and simple harmonic motion)

Cam profile construction (Knife edge and roller follower)
ESTIMATING AND COSTING

Definition of estimating and costing, elements of costing, overhead (classification, allocation), depreciation, scrap, wastage & spoilage – grouping of costing – simple problems.

Determination of weight of various parts such as i) crandles ii) stuffing box gland iii) simple bush bearing iv) Flanged pipe.

Estimation of simple forged parts such as i) Rivets ii) Bolts & Nuts, iii) Chain, iv) Simple spanner, v) Simple crank & connecting Rod.

Estimation of selling price of cost part such as i) C.I. pulley, ii) Coupling, iii) Piston, iv) V – belt pulley.

Estimation of selling price of wood work such as i) table, ii) Chair, iii) Tool, iv) Pattern (Flanged pipe, stuffing box gland).

THEORY OF MACHINES

SUBJECT CODE- DME-602

Total Marks : 100 , CPW : 3, Credit : 3

DETAIL COURSE CONTENT

Group-A (1st half)

1) POWER TRANSMISSION BY BELT AND PULLYS

Open & cross belt drive, velocity ratio, length of belt, tension on tight side & slack side, initial tension, relation between tight side & slack side tension, centrifugal tension, power transmission, problems on flat belt drive, idea of v-belt drive, rope drive, compound drive(no problem)

2) **POWER TRANSMISSION BY GEAR**

Types of gear- important terms and definition related to spur gear (pitch, pitch circle, addendum, dedendum, module etc.),velocity ratio, simple gear train, compound gear train, power transmitted by gears, problems on spur gear train, epicyclic gear train, problems

3) **BALANCING OF ROTATING PARTS**

Balancing of single rotating mass by another single mass rotating in the same plane, balancing of several rotating masses by a single mass rotating in the same plane (graphical method),balancing of several masses rotating in different planes, problems

Group –b (2nd half)

4) **FLYWHEELS & GOVERNERS**

Crank effort diagram, function of flywheel, co-efficient of fluctuation of speed, determination of weight of flywheel for a given crank effort diagram, governors, functions, types, simple watt, porter & hartnel governor, simple problems in relation to simple watt & porter governor

5) **LINK MOTION**

Definition of kinematic link, kinematic pair, kinematic chain mechanism & machines, relative motion, instantaneous centre,4 bar linkage, crank & connecting rod mechanism to determine velocity by relative velocity diagram & instantaneous center methods

AUTOMOBILE ENGINEERING (ELECTIVE) DME-603/1

Total Marks : 100 , CPW : 3, Credit : 3

DETAIL COURSE CONTENT

GROUP-A (1st half)

1) **INTRODUCTION**

History of I.C engine, external engine
Classification of I.C engine
Automobile, components of automobile

2) **CONSTRUCTIONAL FEATURES**

Construction, materials & functions
Cylinder block, cylinder liners (wet & dry liners),cylinder head, crankcase, oil pan & gasket
Piston. piston clearance, advantages & disadvantages of al-alloy piston to cast iron piston
Piston rings, compression rings, oil control rings, blow by
Piston pin, types, connecting rod, crankshaft
Flywheel, vibration damper
Valve gear ,types of valve actuating mechanism, over head valve actuating mechanism ,working principle, components, tappet clearance
Timing gears, camshaft

3) **FUEL SUPPLY SYSTEM**

Fuel feed system in S.I engine, types, gravity & pump feed system, layout of S.I engine fuel pump system, function of each components
Fuel mixing & circuit control system, carburetor, types, working principle of simple carburetor, requirement of air- fuel ratio, defects of carburetor & its remedy
Circuits of carburetor, float, starting, idling, low speed, high speed & accelerating circuit

Petrol injection system, types, layout & working principle of multi point fuel injection system, advantages & disadvantages

Fuel supply system in C.I engine, layout, components ,function, types, working & line diagram of common rail, individual pump system, fuel injectors, single orifice, multiple orifice

4) **COOLING SYSTEM**

Purpose of cooling, types of cooling system, air cooling, water cooling, working principle with line diagram

Water cooling components, radiator, (tubular & cellular),thermostat, pressure cap, pr. Cooling system, anti freeze solutions

5) **LUBRICATION SYSTEM**

Purpose, properties of good lubricant, grading of lubricant, parts of automobile to be lubricated

Different methods, gravity, wet sump, dry sump, layout & working principle, components, oil filter, strainer, dip stick, relief valve (Function only),crankcase ventilation

6) **INTAKE & EXHAUST SYSTEM**

Intake manifold, air cleaner, types, working principle of wet air cleaner

Exhaust manifold, muffler, function

Supercharging, purpose, advantages & disadvantages, turbocharger

Group- B (2nd half)

7) **FUELS**

Types, heating value of fuel, H.H.V & L.L.V

Properties of S.I & C.I engine fuel, volatility, sulphur content, gum content, antiknock quality, ignition quality, viscosity, flash point, pour point, octane no., cetane no., alternative fuels used in automobile

8) **COMBUSTION IN ENGINE**

8.1) Combustion theory in petrol engine, pre-ignition, detonation, ignition supply, shapes of combustion chamber

8.2) Combustion theory in diesel engine, detonation, ignition delay, types of C.I engine, combustion chamber, open, turbulent, pre combustion and energy cell

9) **AUTOMOBILE EMISSION & ITS CONTROL**

Types of pollutants from emission, sources of emission from S.I & C.I engine

Emission control system, PCV & catalytic converters, working principle

10) **ELECTRICAL SYSTEM**

Types, generating or charging system, types ,battery, generator (dynamometer),a ,c generator (alternator)

Battery, types, lead acid battery,components,container,plates,separators,electrolyte,working principle with chemical reaction, battery capacity & rating, hydrometer

Dynamo & alternators, working principle, advantages & disadvantages

Starting system, bendix drive, working principle

Ignition system, types, coil ignition system, line diagram & working principle,components, ignition coil, distributors, condenser, spark plug, firing order of four & six cylinder engine

CAD / CAM (ELECTIVE) DME-603/2

Total Marks : 100 , CPW : 3, Credit : 3

Group- a (1st half)

INTRODUCTION :

Computers in industrial manufacturing
Defination of CAD & CAM, Product cycle
Automation & CAD/ CAM

FUNDAMENTALS OF CAD

Introduction
Conventional design process
Computer aided design process (Geometric Modelling, Engineering analysis, Design review & Evaluation, Automated Drafting),
Benefits of CAD in Engineering industry

HARDWARE IN CAD

Function of CAD workstation
Component of CAD workstation

Comparative study of various types of graphics terminal considering image generation techniques

Color & animation capability

Use of input devices (keyboard, joystick, thumbwheels, light pen, electronic tablet/pen, digitizers)

Use of output devices (plotter, printer)

Function of CPU (functions in the context of CAD)

Types & purpose of storage devices

COMPUTER GRAPHICS SOFTWARE

General feature of computer graphic software

Software configuration of a graphic system

Function of a graphic package

Three dimensional models (wire- frame model, solid model & comparison)

Group- b (2nd half)

FUNDAMENTALS OF CAM

Introduction

NC machine, basic components of NC systems (program of instruction, machine control unit & machine tool)

Problems with NC systems

CNC machine tool (general configuration, function, advantages)

DNC (configuration, type of DNC, benefit)

Adaptive control system (configuration & benefit)

Classification of CNC system(based on feed back system & based on motion control system)

Salient features of CNC machine components (feed back devices, spindle drives, axes feed drive, automatic tool changer, worktable, chip conveyer)

MANUAL PART PROGRAMMING

Axis identification

Co ordinate system(absolute & relative co ordinate referencing)

Zero point (machine zero, job zero, zero shift)

Planning & programming procedure for part programme

Part programming format (fixed sequential format, word address format)

Symbols preparatory function (absolute & incremental function, metric system , codes like G01, G02, G00, G71, G90, G03, G04 etc.)

Miscellaneous function (M code)

Tool information (T code, tool offset)

Speed & feed data (S & F data)

Interpolation (linear & circular)

Canned cycle (G78, G79, G81, G82, G84, G85, G86)

Cutting plane selection(G17,G18,G19)

Cutter radius compensation (G40, G41, G42)

Preset & programme dwell (G92 & G04)

Parametric sub routine

Simple part programme of turned components through turning centre (T70 Lathe) & any simple milling operation through machining centre (CNC Milling)

POWER PLANT ENGINEERING (ELECTIVE) DME-603/3

Total Marks : 100 , CPW : 3, Credit : 3

DETAIL COURSE CONTENT

Group- A (1st half)

1.0 INTRODUCTION :

Importance of Electric Power plant – concept of power stations – types.

Sources of energy – Fossil fuels – Nuclear Fuel – Water (brief discussion).

Other energy source – Solar energy – Tidal power – Wind Power – Geothermal energy from waste (brief discussion only).

2.0 THERMAL POWER PLANT :

General layout of modern Thermal Power plant – Component of plant.

Site selection for thermal power plant.

Cycles for steam power plant –

Rankine cycle, Reheat cycle, Regenerative cycle, reheat Regenerative cycle. Represent the cycles on T – S and H – S diagram (simple problem)

3.0 COAL HANDLING AND COMBUSTION :

Out plant handling of coal.

In plant handling of coal.

Pulverised coal firing system.

Classification of burners – Long Flame burner, Short flame burners, Tangential burners, Cyclone burner.

Use of oil and gas as fuel.

4.0 ASH HANDLING AND DUST COLLECTION :

Ash handling system & its disposal.

Dust collection and its disposal.

Soot blowers.

Electrostatic precipitators.

5.0 DRAUGHT SYSTEM :

Introduction.

Forced fan draught.

Induced fan draught.

Blanced fan draught.

Function of chimney.

Group- B (2nd half)

6.0 STEAM GENERATORS :

Classification.

Natural and forced circulation principle.

High pressure boilers – a) Longitudnal drum boiler (Babcock and Wilcox radiant boiler), b) La – mont Boiler, c) Benson boiler, d) Loeffler boiler, e) Velox boiler f) Supercharged boiler (brief discussion).

Choice of boiler.

7.0 STEAM TURBINES :

7.1 Classification of turbines and their working.

7.2 Componending of steam turbine.

7.3 Losses in steam turbine.

7.4 Governing of steam turbine.

7.5 Selection of turbine.

8.0 CONDENSORS (SURFACE), AND CIRCULATING WATER SYSTEM :

8.1 Introduction.

8.2 Elements of steam condensing plant.

8.3 Air leakage, its effect and its removal.

8.4 Circulating water system.

8.5 Spray pond.

8.6 Cooling tower.

9.0 ELECTRICAL EQUIPMENTS :

9.1 Generators.

9.2 Switch gear installation.

- 9.3 Circuit breakers.
- 9.4 Power transformer.
- 9.5 Protective devices.
(All of the items – brief discussion, working principle and uses.)

10.0 MEASUREMENTS AND INSTRUMENTATION :

- 10.1 Importance of measurement and instrumentation in power plant.
 - 10.2 Measurement of purity.
 - 10.3 Measurement of smoke and dust.
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REFRIGERATION & AIR-CONDITIONING (ELECTIVE) DME-603/4

Total Marks : 100 , CPW : 3, Credit : 3

DETAIL COURSE CONTENT

Group- A (1st half)

1.0 INTRODUCTION

Terms and definition – Heat engine, refrigerator, heat pump, refrigeration, refrigerant, refrigerating effect, refrigeration capacity, cop, relative cop
Methods of refrigeration (names and application)

1.0 AIR REFRIGERATION SYSTEM

Reversed carnot cycle, determination of cop
Bell-Coleman cycle- open system, closed system. Determination of cop
(problem)

Boot- Strap air cycle- schematic and T-S diagrams. Necessity of aircraft cooling and sources of cooling loads.

2.0 VAPOUR COMPRESSION REFRIGERATION SYSTEM

Fundamental operations and analysis with schematic T-S and p-h diagrams for simple cycle , c.o.p

Advantages and disadvantages of vapour compression system over air refrigeration system

Actual vapour compression cycle—variation from theoretical cycle

Effects of sub cooling and superheating

Simple problems

3.0 VAPOUR ABSORPTION SYSTEM

Flow diagram and operation of NH₃- WATER cycle, components- generator, rectifier, condenser, evaporator, absorber, heat exchanger, pump

Flow diagram and operation of Lithium bromide – water cycle

Flow diagram and operation of electrolux refrigerator

Comparison between vapour compression and vapour absorption systems.

Group-b (2nd half)

5.0 REFRIGERANTS

Definition and function of refrigerant

Desirable properties of refrigerant

Classification of refrigerant

Important requirements, secondary requirements

Selection of refrigerant for required purpose

6.0 **REFRIGERATION COMPONENTS, CONTROL AND SAFETY DEVICES**

Brief description and field of application of reciprocating compressor, rotary compressor, centrifugal compressor

Brief description and field of application of air cooled and water cooled condensers

Brief description and field of application of evaporators

Brief description and field of application of expansion devices-capillary tube, thermostatic expansion valve

Control and safety devices- low side float valve, high side float valve, solenoid valve, compressor over current and over heating protection, high and low pressure cut-outs

7. APPLICATION OF REFRIGERATION

Food preservation- spoilage agents and their control, preservation by refrigeration

Cold storage-construction (layout), capacity and application

Refrigerators and freezers

Ice plant- construction (layout), capacity and application

Ice- cream plant- construction (layout) and operational features

Dry ice production- construction (layout) and operation of simple system, application

Water cooler

P R O J E C T -II

SUBJECT CODE- DME-604S

Total Marks : 200 , CPW : 10, Credit : 2

D E T A I L C O U R S E C O N T E N T

OBJECTIVE

Project Work is intended to provide opportunity for students to develop understanding of the interrelationship between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills. The basic objective of a project class would be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, it should provide a taste of real life problem that a diploma-holder may encounter as a professional. It will be appreciated if the polytechnics develop interaction with local industry and local developmental agencies viz. different *Panchayet* bodies, the municipalities etc. for choosing topics of projects and / or for case study. The course further includes preparation of a Project Report which, among other things, consists of technical description of the project. The Report should be submitted in two copies, one to be retained in the library of the institute. The Report needs to be prepared in computer using Word and CADD software wherever necessary.

Seminar on Project Work is intended to provide opportunity for students to present the Project Work in front of a technical gathering with the help of different oral, aural and visual communication aids which they learnt through different courses in the Parts – I & II of the diploma course. In the Seminar, students are not only expected to present their Project Work, but also to defend the same while answering questions arising out of their presentation.

GENERAL GUIDELINE

Project Work is conceived as a group work through which the spirit of team building is expected to be developed. Students will be required to carry out their Project Works in groups under supervision of a lecturer of their core discipline who will work as a Project Guide. It is expected that most of the lecturers of the core discipline will act as project guide and each should supervise the work of at least two groups. Number of students per group will vary with the number of lecturers acting as Project Guide and student strength of that particular class.

COURSE & EXAMINATION SCHEDULE

THE PROJECT

Each group has to undertake the complete design and manufacture of at least any one of the following articles:—

- i) Screw jack (small conventional type or leaf type)
- j) Jigs or Fixture (small)
- k) Small vice
- l) Wall bracket
- m) Turn buckle
- n) Surface gauge
- o) Manufacturing of grills
- p) Coupling.

The above are suggestions and a student group need not to restrict their selection of Project Tropic from within them. Any suitable items may also be taken depending upon the available workshop facilities (i.e materials & infrastructure). The project work should involve some of the following aspects:—

3. Prepare complete work study & also calculate the cost of item,
4. Visit to industry as a part of project work is compulsory.

The Project Report should contain among others:

- (a) Design, drawing, complete work study of the manufactured items, and,
- (b) Brief report of industrial visit.

ME WORKSHOP – IV

SUBJECT CODE- DME-605S

Total Marks : 100 , CPW : 4, Credit : 2

FOUNDRY SHOP

- 1) INTRODUCTION :- Name, purpose, specification of various tools & equipments used in the foundry shop.
- 2) Preparation of various type of moulding sand.
- 3) Making of simple moulds & core also.
- 4) Practice mould (at least two)
- 5) Visit to foundry shop & submission of report on cupola charging & machine moulding

ADVANCE FITTING

Preparation of closed ended male & female fitting (within filing tolerance) [ANY TWO]

- a) Hexagonal
 - b) Dovetail
 - c) Tee
 - d) Curved surface
- 1) Production of reamed hole & tapped hole at different positions on a M.S flat according to dimension
 - 2) Production of external threads using hand tap & die also

ME LABORATORY – IV

SUBJECT CODE- DME-606S

Total Marks : 100 , CPW : 4, Credit : 4

FLUID MECHANICS & MACHINE LAB

- 1) Measurement of pressure using pr. Gauges & manometers
- 2) To verify Bernoulli's theorem using Bernoulli's apparatus
- 3) Determination of Friction factor in pipe flow
- 4) Calibration & determination of Co efficient of discharge through a) Venturimeter b) Orificemeter c)V-notch or Rectangular notch
- 5) Determination of minor losses
- 6) Study of Reciprocating & Centrifugal pump & determination of their discharge
- 7) Study of Model of water turbines

N.B :- Study of reciprocating ,centrifugal pump & water turbines may be conducted by model, charts & ohp facilities through LRUC DEPTT.

METROLOGY LAB-II.

- 1) Study of plug gauge, ring gauge, screw pitch gauge, snap gauge, centre gauge etc.
- 2) Study of gear tooth measurement by gear tooth vernier
- 3) Study of Co- ordinate measuring machine (CMM M/C)
- 4) Study of metalographic structure of steel
- 5) NDT like a) Die penetrant method
b) Magnaflux method

N.B :- Study of CMM M/C, Metalographic structure & others which are not available may be done by model, charts & OHP through LRUC DEPTT.

AUTOMOBILE ENGINEERING LABORATORY DME-607S/1

Total Marks : 100 , CPW : 4, Credit : 2

ELECTIVE LAB.(SESSIONAL)

- Job 1.** Study of common faults & remedies of engine cylinder, piston, piston rings, piston pin, connecting rod, crankshaft, camshaft & its bearings etc.
- Job 2.** Study of overhead valve actuating mechanism & its components, common faults, remedies & adjustment
- Job 3.** Study of fuel injection system , trouble shooting & remedies
- Job 4.** Study of fuel pump (mechanical & electrical type) of petrol engine , trouble shooting & its remedies
- Job 5.** Study of carburettor, its different circuits & its tuning
- Job 6.** Study of clutch , trouble shooting & its remedies
- Job 7.** Study selecting of gear box of commercial vehicle, trouble shooting its remedies
- Job 8.** Study & selecting of differential gear box, common faults & remedies
- Job 9.** Study of suspension system of 4 wheeler/ 6 wheeler automobile (like leaf spring, torsion bar, coil spring etc.) & its trouble shooting & remedies
- Job 10.** Study of steering system (steering links, steering gear box etc.), trouble shooting & its remedies
- Job 11.** Study of braking system(2 wheeler/ 4 wheeler) , trouble shooting & its remedies
- Job 12.** Study of constructional details & working of battery , its testing
- Job 13.** Study, testing & selecting of various components & its functions of coil ignition system
- Job 14.** Study of starting system & constructional details of self starter
- Job 15.** Study, testing & selecting of charging system & constructional details of dynamo

Job 16. Study of cooling & lubrication system

N.B.:- a) SIX (6) days on job training at any workshop/ garage to be conducted if possible;
B) The students are to undertake at least eight of the above stated assignments.

CAD/CAM LABORATORY DME-607S/2

Total Marks : 100 , CPW : 4, Credit : 2

ELECTIVE LAB.(SESSIONAL)

. Practice important command of AUTOCAD, 2D & 3D Modelling

- Job 1.** Study of CNC turning center m/c tool (T70& etc)
 - Job 2.** Study of machining center m/c tool
 - Job 3.** Preparation of simple part programme using turning centre T70 &etc.
 - Job 4.** Testing of above part programme using simulation & dry run
 - Job 5.** Production of components (at least two)
 - Job 6.** Preparation of part programme of following components using machining center
 - Job 7.** Testing of above part programme using simulation & dry run
 - Job 8.** Production of components (at least two)
-

POWER PLANT ENGINEERING LABORATORY DME-607S/3

Total Marks : 100 , CPW : 4, Credit : 2

ELECTIVE LAB.(SESSIONAL)

Sessional Report to be prepared based on technical data collected from POWER PLANT visit

1. Coal handling system

2. Ash handling system
 3. Cooling /Circulating water system
 4. Boiler
 5. Turbine
 6. Condenser
 7. D. M plant
 8. Fuel firing & draft system
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REFRIGERATION & AIR CONDITIONING LABORATORY DME-607S/4

Total Marks : 100 , CPW : 4, Credit : 2

ELECTIVE LAB (SESSIONAL)

1. Study of a Vapour Compression Refrigeration system including use of components like a) dry filter b) Shut off valve c) Solenoid valve d) Oil separator
2. Study & use of different type of compressors, expansion devices, evaporators & safety devices
3. Study of domestic refrigerator
4. Study of packed/room air conditioner
5. Study of water cooler
6. Study of an ice plant
7. Study of a deep freezer
8. Study of a cold storage
9. Study of vapour absorption system
10. Study of air conditioning system
11. Study of a desert cooler
12. A sessional report based on to visit to a cold storage/ice making plant/central air conditioning plant.

N.B:- Sl. No. 3 & 13 are compulsory and any three from the rest

Total Marks : 50, Credit : 1, CPW : 2

Each class may be divided into two groups. Each group may meet once a week and discuss topics mentioned below under.

Professionalism: Professional characteristics, professional education, professional development in Industry.

Values and Ethics in Profession: Value system- goodness, means and ends; Ethics- ethical premises, expectations, conflicts and practices; Moral and ego, Ethics and morality.

Right, virtue, ethics and justice, utility and justice; Privacy, Challenges to privacy, Privacy on the Internet.

Professional Competence: Important technical topics covered in Semesters II-V as well as topics of current professional interest.

Books:

1. Ethics and Engineering ----by Martin and Schinizer, TMC.
2. Issues and Ethics—by Correy G.Correy , Brooks & Cole Pub.
3. Ethics and Professionalism ---by John Kultgen
4. Ethics and the conduct of business-- by John R.Boatright, PE.

FINAL V I V A – V O C E (DME-610)

Total Marks : 50 , credit :1

C O U R S E C O N T E N T

The syllabi of all the theoretical and Sessional subjects taught in the 6 Semesters of diploma education.

E X A M I N A T I O N S C H E M E

The Final Viva-Voce Examination shall take place at the end of the SIXTH Semester. It is to be taken by one External and one Internal Examiner. The External Examiner is to be from industry / engineering college / university / government organisation and he / she should give credit out of 35 marks; whereas, the Internal Examiner should normally be the Head of the Department and he / she should give credit of 15 marks. In the absence of the Head of the Department, the senior most lecturer will act as the Internal Examiner.
