

STUDY & EVALUATION SCHEME

Diploma in Engineering – Second Year

Branch –Automobile Engineering

Year – IInd, Semester – IVth

S. No.	Subject Code	Subject	Periods		Exam.				
			L	P	CT	TA	Total	ESE	
Theory Subjects									
1.	DMA - 401	Applied Mathematics-II (B)	03	00	30	20	50	100	150
2.	DME - 401	Hydraulics & Hydraulic Machines	03	00	30	20	50	100	150
3.	DME - 402	Material Science –II	03	00	30	20	50	100	150
4.	DME - 403	Thermal Engineering - II	03	00	30	20	50	100	150
5.	DME - 404	Manufacturing Process	03	00	30	20	50	100	150
6.	DME - 406	Basic Electrical Engg.	03	00	30	20	50	100	150
Practical Subjects									
1.	DME - 451	Hydraulics Lab.	00	03	10	10	20	30	50
2.	DME - 452	Workshop (Manufacturing Process)	00	03	10	10	20	30	50
3.	DME - 456	Basic Electrical Engg. Lab	00	03	10	10	20	30	50
4.	GP- 451	General Proficiency	-	-	-	-	50	-	50
		Total	18	09	-	-	-	-	1100

APPLIED MATHEMATICS-II (B)

(DMA-401)

(Common to All Diploma Engineering Courses)

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UNIT-1

Differential Calculus-II [8]

Function of two variables, identification of surfaces in space, partial derivatives, chain rule, higher order partial derivatives, Euler's theorem (without proof) for homogeneous functions, Jacobians.

UNIT-2 [8]

Vectors Calculus

Scalar and Vector function. Derivative, Gradient, Divergence & Curl of functions. Directional derivatives. Line, Surface & Volume integrals.

UNIT-3 [8]

Laplace Transformation

Definition & properties of Laplace & Inverse Laplace transformation. Unit step function, periodic function. Solution of ordinary differential equations by Laplace transformation.

UNIT-4 [8]

Beta and Gamma Functions

Definition of Beta and Gamma functions, relation between Beta and Gamma functions, their use in evaluating integrals.

Fourier Series

Fourier series of odd and even functions.

UNIT-5

[8]

Probability and Statistics

Definition of probability, laws and conditional distribution, discrete and continuous distribution. Binomial, Normal and Poisson distribution.

Method of Least-Square and Curve Fitting: Straight line, parabola.

References:

1. Applied Mathematics: Kailash Sinha, Meerut publication.
2. Applied Mathematics: H.R Luthra, Bharat Bharti Prakashan.
3. Applied Mathematics: H.K Das, C.B.S Publication.
4. Mathematics for Polytechnic: S.P Deshpande, Pune Vidyarthi Griha.

HYDRAULICS & HYDRAULIC MACHINES:

(DME-401)

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UNIT-I

INTRODUCTION:

Fluid, Fluid Mechanics, Hydraulics, Hydro-statics, Hydro dynamics, Ideal fluid.

HYDROSTATICS:

Properties of fluids, Pressure and depth relationship, Hydrostatic pressure, pascal's law, total pressure on flat

surfaces, Centre of pressure on flat surfaces. (Simple Numerical Problems)

8

UNIT-II

BUOYANCY :

Bouyancy, Condition of equilibrium of a floating body, Meta centre and Meta centric height. (Simple Numerical Problems)

FLUID FLOW:

Different types of flow, Reynold's number, Equation of continuity and its applications. (Simple Numerical Problems)

ENERGY AND MOMENTUM EQUATION:

Types of energies, Energy equation and its application. Bernoulli's theorem flow measurement instruments where energy equation is used e.g. Venturimeter, Orifice meter, Flow nozzle, pitot tube, Prandtl tube. (Simple Numerical Problems)

8

UNIT-III

ORIFICES:

Flow through orifices, Co-efficient of contraction, Coefficient of velocity, Co-efficient of discharge, Large

vertical orifices, Drowned orifice, time of emptying a rectangular and circular tanks with flat bottoms. (Simple Numerical Problems)

NOTCHES & WEIRS:

Different types of notches, Measurement of discharge over rectangular notch, V-notch, Francis and Brazin's formula for rectangular weirs. Submerged weirs, Broad crested weirs. (Simple Numerical Problems)

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UNIT-IV

FLOW THROUGH PIPES:

Losses in pipe flow due to friction, sudden enlargement, contraction and bends, Elbow & Tee. (Simple Numerical Problems)

CHANNELS:

Characteristics of flow, Uniform flow through channels. Rectangular and Trapezoidal channels, Application of Chezy's, Manning and Kutter's formula. Most economical channel sections of rectangular and trapezoidal shapes. (Simple Numerical Problems)

8

UNIT-V

HYDRAULIC MACHINES:

Impulse and reaction turbines, Principle of working of Pelton wheel, Francis and Kaplan turbines with simple line diagrams, their classification, construction, working, operational problems. Centrifugal and reciprocating pumps, Hydraulic press and Hydraulic Jack.

Ref. Books:

R.S. Khurmi – Fluid Mechanics & Machineries – S. Chand Publications

MATERIAL SCIENCE-II

(DME-402)

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UNIT-I

NON-METALIC MATERIALS:

Timber:

Conversion of Timber: Its meaning necessity, Seasoning of timber, Preservation of Timber : Types of preservation, Methods of application, Defects in timber, Surface treatment, Soaking treatment, Hot and Cold treatment; Common Indian timber specific uses, properties identification, units of purchase. Brief study of produces of Timber, Plywood, Hard board, Batten Board, Veneer board. 8

UNIT-II

Plastic and Other Synthetic Materials:

Plastics-Important sources-Natural and Synthetic, Classification, thermoset and thermoplastic, Various trade names, Important Properties and engineering use of plastics. Market forms-Pallets, Granules, Powder and Liquid forms; Uses of Sungloss rexin, Linoleum, Plastic coated paper, Fibres-Important sources. Inorganic fibres, Natural Organic Fibres and Synthetic organic fibre and their use.

UNIT-III

Hardwares:

General specification, uses and methods of storage of G.I. and C.I. steel, Copper, A.C. pressure conduits, R.C.C. spun, P.V.C. pipes and their uses. General sheets specification (I.S.) and uses. Method of storage of G.I. sheets, M.S. sheets, General specification of pipe fittings viz. Elbow, Tee, Bend, Crosses and

Sockets. General specification and use of wire nails, wood screws and door hinges, toggle bolts, sliding bolts.

IDENTIFICATION AND TESTING OF METAL ALLOYS:

Selection, specification forms and availability of materials. Testing of materials(Destructive and nondestructive), Identification of metal by giving mini project. 8

UNIT-IV

HEAT TREATMENT OF METALS:

Elementary concept,purpose, Iron-carbon equilibrium diagram. T.T.T. or 'S' curve in steels and its significance, micro structure of steels and martensitic transformation (elementary idea). Hardening, Tempering, Annealing, Normalising and case hardening. Ageing, Various temperature ranges for different metals and alloy (From heat treatment hand book) 6

UNIT-V

MISCELLANEOUS MATERIALS:

Important properties, characteristics and use of the following materials.

(a) Abrasives-Natural and Manufactured, sand stone, emery and corundum, diamond, garnet, silicon carbide, Boron carbide, aluminum oxide, anyother abrasives qualities of good abrasive.

(b) Celluloid or Xylomite

(c) Felt

(d) Magnetic Materials

(e) Mica

(f) Refractory Materials-Fire clay, Dolomite, Magnesite, Poreclain, Fire bricks and their uses

(g) Jointing Materials-Glues and Adhesives, Cements Pyroxylene cement, Rubber cement, Magnestic cement.

(h) Composite Materials : Introduction to polymers of metal matrix composite, Carbon fibre, Glass fibre

(i) Germanium alloys (metal glasses)

(j) Source of procurement of various Ferrous and nonferrous and composite materials

Ref. Books :

Manufacturing Process – Kalpak Jain

Material Science – K. M. Gupta

THERMAL ENGINEERING-II

(DME-403)

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UNIT-I

GAS TURBINE :

Elements of gas turbine, working principle, fuel and fuel system, open and close cycle, methods of testing, operating characteristics, Atkinson cycle, Brayton cycle, Heat exchanger, Inter cooler, Reheater, Applications, Performance. Brief concept of heat exchanger. 8

UNIT-II

AIR COMPRESSOR :

Definition and their use, Difference between reciprocating and rotary compressor, their types and working workdone during compression in single stage and two stage, Heat rejected and inter cooling in tow stage compression, volumetric efficiency, compressor lubrication. 8

UNIT-III

THERMAL POWER PLANT :

Main parts and working of plant, Thermodynamics cycle, Fuel handling, Combustion and combustion equipments, Problem of ash disposal, Circulating of water schemes and supply of make up water, Selection of economiser, Super heater, Preheater, Feed water heater and dust collector, Steam power plant, Heat balance and efficiency. 8

UNIT-IV

NUCLEAR POWER PLANT :

Elements of nuclear power plant, Types of nuclear reactor, Fuel moderators, Coolants, Controls, Disposal of nuclear wastes, Classification of nuclear power plant, Cost of nuclear power, Nuclear fuels. 8

UNIT-V

INTEGRAL COMBUSTION PLANT :

Engine classification, Engine cycle, C.I. engine combustion, S.I. engine combustion, Engine structure, Fuel admission system, Air intake system, Engine cooling system, Lubrication system, Engine starting system, I.C. engine in steam plant-Features and working. 8

Ref. Book: R.S. Khurmi – Thermal Engineering

MANUFACTURING PROCESS

(DME-404)

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UNIT-I

GENERAL FORMING PROCESSES:

Classification and elementary idea of metal forming processes on the basis of the properties of deformability (Plasticity), fusibility and divisibility Viz Rolling, Forging, Drawing, Extruding, Spining, Pressing, Punching, Blanking.

6

WELDING:

Weldedge prepration, Introduction to various welding processes with procedure equipments and applications such as

- (i) Electric arc welding.
- (ii) Resistance welding-Spot welding, Flash butt, Percussion welding.
- (iii) Thermit welding.
- (iv) Carbon arc welding
- (v) Metal-Inert-Gas welding (MIG).
- (vi) Tungsten arc welding (TIG).
- (vii) Atomic Hydrogen arc welding.
- (viii) Stud welding.

(ix) Laser Beam, Electrom Beam Welding, Explosions
Welding, Ultrasonic Welding.

(x) Under water welding

(xi) Submerged Arc welding

10

UNIT-II

WELDING:

Definition, arc initiation, arc structures, types of arc, metal transfer characteristics and influencing parameters, weld bead geometry, various types of electrodes used in various processes. Selection of electrode from catalogue, current and voltage setting from welder's hand book.

WELDING OF SPECIAL MATERIALS:

(i) Welding of plastics, equipment, filler, rods, weldability, procedures and precautions.

(ii) Welding of Grey Cast Iron, shielded metal arc gas welding procedures.

(iii) Welding of Aluminium, Argon arc and gas welding procedures.

(iv) Welding of copper, Brass and Bronze, Gas shielded metallic arc welding, TIG., Oxyacetylene method.

(v) Welding of Alloy steels welding, Stainless steel, welding by oxyacetylene process, MIG, TIG.

Specification of electrode as per latest I.S.

code.

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TESTING OF WELDS & RELEVANT WELDING CODES:

(a) Destructive methods.

(b) Non destructive methods-visual, X-ray, Gamma-ray,

Magnetic particles, flaw detection, fluorescent,

dye penetrant and ultrasonic testing.

6

UNIT-III

COST ESTIMATION OF WELDING :

Material cost, Fabrication cost, Preparation cost,

Welding cost and Finishing cost, Over head cost,

Cumulative effect of poor practices on cost,

Calculation of cost of welding gas consumption and

welding electrodes.

8

FOUNDRY PRACTICE:

PATTERN AND MOULDING:

The pattern materials used, Types of patterns,

Allowances and pattern layout, Colour scheme pattern

defects, Types of cores and their utility.

8

UNIT-IV

MOULDING PROCESS

Classification of mould materials according to characteristics, Types of sands and their important test, parting powders and liquids. Sand mixing and preparation, Moulding defects.

8

MELTING AND POURING:

Fuels and metallic materials used in foundry. Melting furnaces used in foundry such as pit furnace, Tilting and cupola furnaces, metals and alloys. Additions to molten metal, Closing and pouring of the moulds.

Coring-up, venting and closing, use of ladles, spur and risers, Defects due to closing and spuring. Basic idea of fettling operations. Surface treatment, Salvaging of castings, Factors determining soundness of casting.

Handling of molten metal from furnace to mould.

8

UNIT-V

SPECIAL CASTING:

Elementary idea of special casting processes-Shell mould casting, die casting, investment mould casting, centrifugal and continuous casting full mould casting.

Elementary idea of mechanisation of foundries.

ESTIMATING AND COSTING :

Calculation of material cost for casting and Forging.

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POWDER METALLURGY:

Introduction, principle, scope and names of processes.

Production of metal powders, compaction, sintering and sizing. Self lubricated bearings. Advantages of the process and its limitations. (Elementary concept only).

Ref. Books :

Advanced Welding Technology – M.I. Khan

Manufacturing Processes – Kalpak Jian

Manufacturing Science – K.M. Moeed.

BASIC ELECTRICAL ENGINEERING

(DME-406)

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UNIT-I

Steady State Analysis of A.C. Circuits

Sinusoidal and phasor representation of voltage and current, single a.c. circuit Behaviour of resistance, inductance, capacitance and their combination in Series & parallel, and power factor, series & parallel resonance, bandwidth and Quality factor

9

UNIT-II

Network Theory

Mesh and nodal analysis for a.c. and d.c.networks, Network theorem Superposition theorem. Thevenin's theorem, Norton's theorem and Maximum Power transfer theorem, Star-Delta transformation.

Measuring Instruments.

Construction and principle of operation of voltage and current measuring Instrument, introduction to power and energy meteres

9

UNIT-III

Three phase AC Circuits

Star-Delta connection, line and phase voltage/current relations, three phase Power and its measurement.

Magnetic Circuit and Transformer

Magnetic circuit concept, principle of operation, phasor diagram, equivalent Circuit, efficiency, voltage regulation of single phase transformer, open Circuit and short circuit test.

9

UNIT-IV

D.C. Generator

Construction, types of d.c. generators, e.m.f. equation, Magnetization and Load characteristics, Losses and efficiency, Speed control of d.c. Motors, Applications.

D.C. Motor

Working principle, types of d.c. motor, speed, characteristic, efficiency And applications.

Single Phase Induction Motor

Principle of operation, Methods of starting, split phase induction motor, Capacitor motor, capacitor start motor two value capacitor motor. 8

UNIT-V

Three Phase Induction Motor

Production of rotating field, Principle of operation, slip-torque characteristics, applications.

Three Phase Synchronous Motor

Construction, principle of operation and applications 8

Reference Books

1. V. Del Toro "Principles of Electrical Engg." Prentice Hall International
2. W. H. Hayt & J.E. Kennedy, "Engineering Circuit Analysis." Mc.Graw Hill
3. I. J. Nagrath, "Basic Electrical Engg." Tata Mc Graw Hill
4. A.E. Fitzgerald, D.E. Higginbortham and A Grabel, "Basic Electrical Engg." Mc Graw Hill.

HYDRAULICS LAB

(DME-451)

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Any Ten

A. Demonstration of the following for study & sketch.

1. Piezometer tube, Mechanical flow meter, Manometers, Pressure gauge.
2. Hydraulic ram, press and jack.
3. Pelton wheel and Francis turbine or their model.
4. Centrifugal and Reciprocating pumps.

B. Performance Experiments :-

5. Measurement of discharge over notches and its verification.
6. To determine coefficient of discharge of a Venturimeter.
7. To determine coefficient of contraction, coefficient of velocity and coefficient of discharge for a given orifice.
8. To determine the loss of head of water due to friction in a water pipe line.
9. To study performance
 - i. Pelton Wheel
 - ii. Francis Turbine.
10. To study the performance of a

i. Centrifugal Pump

ii. Reciprocating Pump.

iii. Gear Pump

11. To measure the velocity of water flow in a open channel by a current meter

12. To verify Bernaulli's theorem.

WORKSHOP (MANUFACTURING PROCESSES)

(DME-452)

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I. FOUNDRY PRACTICE (WORKSHOP):

Minimum work in each section is indicated against that

1. PATTERN MAKING:

(a) Making Patterns (At least two).

(i) Solid one piece pattern.

(ii) Split two piece pattern.

(iii) Split three piece pattern.

(iv) Gated pattern.

(v) Four Piece pattern.

(vi) Sweep pattern.

(vii) Skeleton pattern.

(viii) Segmental pattern.

(b) MAKING CORE BOXES (At Least 2) For:

(i) Straight Core Box.

(ii) Bent Core Box.

(iii) Unbalanced Cores.

2. SAND PREPARATION AND TESTING:

(a) Sand Testing (At Least 2 Experiments).

(i) Grading (Grain Size).

(ii) Determination of Moisture content

(iii) Determination of Clay content.

(iv) Determination of Permeability for gases.

(b) Preparation of :

(i) Green Sand Composition.

(ii) Dry Sand Composition.

(iii) Loam Sand Composition.

(iv) Oil Sand For Cores.

3. MOULDING:

(a) Making at least 8 sands moulds of different forms

with different types of pattern using.

(i) Floor Moulding.

(ii) Two Box Moulding.

(iii) Three Box (or more) Moulding.

(b) At least one of the following :

(i) Making and setting of cores of different types.

(ii) Making one shell mould apparatus.

4. MELTING AND POURING:

(Each to be Demonstrated at least once in the session).

(a) Demonstration of Melting of cast iron in

(i) Pit Furnace.

(ii) Cupola.

(b) Demonstration of melting a Non-Ferrous metal in :

(i) Pit Furnace.

(ii) Tilting Furnace.

(c) Pouring of Metals in Moulds (Ferrous and Non Ferrous).

5. CLEANING, INSPECTION AND NON DESTRUCTIVE TESTING:

(a) Shaking, cleaning and fettling of casting (At least 2 Casting).

(b) (i) Inspection of cast component (visual) and preparing inspection report (At least one report).

(ii) Establishing cause of Defects seen (At least one cause).

(iii) Dye penetration test for casting

(iv) Magnetic flw detection test/Ultra sound flaw detection test for castings.

6. CASE STUDY OF:

At least 2 sand casting products from sand preparation, pattern layout to final finished casting by shell moulding, centrifugal casting, investment casting and continuous casting.

7. ADVANCE WELDING SHOP :

(a) Study of various Gas cutting and welding equipments :- Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., Various electrodes and filler metals and fluxes.

Practice of welding and cutting of different metals by making suitable jobs by different methods :-

1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs.

2. Tig Welding practice of Non-Ferrous metals, like Copper,

Brass and Aluminium.

3. Practice of Gas cutting manually.
4. Practice of Gas cutting by cutting machine.
5. Practice of Arc cutting.
6. Study of Welding defects.
7. Inspection and Tests of welded joints.
8. Practice of Spot and Seam welding.
9. Practice of Welding pipe joints, Pipes and Pressure vessels.

BASIC ELECTRICAL ENGINEERING LAB

(DME-456)

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List of Practicals

A minimum of 10 experiments from the following:

1. Verification of Network theorems.
2. Study of diode characteristics.
3. To study a half wave and full rectifier circuit with and without capacitor filter and determine the ripple factor.
4. Determination of common base and common emitter characteristics of a transistor
5. Study of phenomenon of resonance in RLS series circuit.
6. Measurement of power in a three phase circuit by two wattmeter method
7. Measurement of efficiency of a single phase transformer by load test
8. Determination of parameters and losses in a single phase transformer by OC and SC test
9. DC generator characteristics.
10. Speed control of de shunt motor
11. Study running and reversing of a three phase induction motor.
12. Study of a single phase energy meter.
13. To study the various logic gate (TTL)

Additional experiments may be added based on contents of syllabus.