STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

III SEMESTER DIPLOMA IN MECHANICAL ENGG.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam. (ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Applied Mathematics (Common)	1600301	04	03	10	20	70	100	28	40	03
2.	Mechanical Engineering Drawing	1625302	03	03	10	20	70	100	28	40	03
3.	Mechanics of Solids	1625303	02	03	10	20	70	100	28	40	02
4.	Mechanical Engineering Materials	1625304	03	03	10	20	70	100	28	40	03
5.	Electrical Engineering	1625305	02	03	10	20	70	100	28	40	02
		Total :-	**14**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Mechanics of Solids Lab	1625306	02	03	15	35	50	20	01
7.	Electrical Engineering Lab	1625307	02	03	15	35	50	20	01
8.	Manufacturing Technology Lab	1625308	04	06	15	35	50	20	03
Total :-			**08**				**150**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Mechanical Engineering Drawing (TW)	1625309	04	15	35	50	20	02
10.	Development of life Skill -II	1625310	03	08	17	25	10	02
11.	Professional Practices-III	1625311	04	08	17	25	10	02
Total :-			**11**			**100**		
Total Periods per week Each of duration One Hour 33				Total Marks = **750**				**24**

APPLIED MATHEMATICS (COMMON)

Subject Code 1600301	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

CONTENTS :THEORY

	Name of Topics	Hours	Marks
UNIT-01	**Integration:** 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by substitution 1.3.2 Integration of rational functions. 1.3.3 Integration by partial fractions. 1.3.4 Integration by trigonometric transformation. 1.3.5 Integration by parts. 1.4 Definite Integration. 1.4.1 Definition of definite integral. 1.4.2 Properties of definite integral with simple problems.	**10**	**20**
	1.5 **Applications of definite integrals.** 1.5.1 Area under the curve. Area bounded by two curves, 1.5.2 Volume of revolution. 1.5.3 Centre of gravity of a rod, plane lamina. 1.5.4 Moment of Inertia of uniform rod, rectangular lamina 1.5.5 Theorems of parallel and perpendicular axes.	**08**	**12**
UNIT-02	**Differential Equation** 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant. 2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Nonhomogeneous, Exact, Linear and Bernoulli equations. **2.3 Applications of Differential equations.** **2.3.1 Rectilinear motion (motion under constant and variable acceleration)** 2.3.2 Simple Harmonic Motion.	**10**	**12** **08**
UNIT-03	**Probability Distribution** 3.1 Binomial distribution. 3.2 Poisson's distribution. 3.3 Normal distribution 3.4 Simple examples corresponding to production process.	**08**	**12**
UNIT-04	**Numerical Methods** **4.1 Solution of algebraic equations** Bisection method, Regulafalsi method and Newton – Raphson method. **4.2 Solution of simultaneous equations containing 2 and 3 unknowns** Gauss elimination method. Iterative methods- Gauss Seidal and Jacobi's methods.	**06** **06**	**08** **08**
	Total	**48**	**80**

Text/Reference Books:-		
Name of Authors	**Titles of the Book**	**Name of the Publisher**
Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
Calculus: single variable	Robert T. Smith	Tata McGraw Hill
Advanced Mathematics for Engineers and Scientist	Murray R Spiegel	Schaum outline series McGraw Hill
Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Dehli
Introductory Methods of Numerical analysis	S. S. Sastry	Prentice Hall Of India New Dehli
Numerical methods for Engg. 4^{th} ed.	Chapra	Tata McGraw Hill
Numerical methods for scientific & engineering computations	M. K. Jain & others	Wiley Eastern Publication.

MECHANICAL ENGINEERING DRAWING (MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625302	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

	Name of the Topic	Hours	Marks
UNIT-01	**Auxiliary views:** - Study of auxiliary planes, Projection of objects on auxiliary planes. Completing the regular views with the help of given auxiliary views (Use first angle method of projection).	08	12
UNIT-02	**Intersection of solids:-** Curves of intersection of the surfaces of the solids in the following cases (a) Prism with prism, Cylinder with cylinder, Prism with Cylinder When (i) the axes are at 90° and intersecting (ii) The axes are at 90° and Offset (b) Cylinder with Cone When axis of cylinder is parallel to both the reference planes and cone resting on base on HP and with axis intersecting and offset from axis of cylinder	08	10
UNIT-03	**Developments of Surfaces**. Developments of Lateral surfaces of cube, prisms, cylinder, pyramids, cone and their applications such as tray, funnel, Chimney, pipe bends etc.	08	10
UNIT-04	**Conventional Representation:-** 1. Standard convention using SP – 46 (1988) (a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber (b) Long and short break in pipe, rod and shaft. (c) Ball and Roller bearing, pipe joints, cocks, valves, internal / external threads. (d) Various sections- Half, removed, revolved, offset, partial and aligned sections. (e) Knurling, serrated shafts, splined shafts, and chain wheels. (f) Springs with square and flat ends, Gears, sprocket wheel (g) Countersunk & counterbore. (h) Tapers	04	08
UNIT-05	**Limits, Fits and Tolerances:-** 1. Characteristics of surface roughness- Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods. 2. Introduction to ISO system of tolerencing, dimensional tolerances, elements of interchangeable system, hole & shaft based system, limits, fits & allowances. Selection of fit. 3. Geometrical tolerances, tolerances of form and position and its geometric representation. 4. General welding symbols, sectional representation and symbols used in Engineering practices	04	08
UNIT-06	**Details to Assembly** 1. Introduction- 2. Couplings – Universal couplings & Oldham's Coupling 3. Bearing – Foot Step Bearing & Pedestal Bearing 4. Lathe tool Post 5. Machine vice & Pipe Vice 6. Screw Jack 7. Steam Stop Valve	08	12

UNIT-07	**Assembly to Details** 1. Introduction – 2. Pedestal Bearing 3. Lathe Tail Stock 4. Drilling Jig 5. Piston & connecting rod 6. Gland and Stuffing box Assembly 7. Valve – Not more than eight parts 8. Fast & loose pulley	**08**	**10**
	Total	**48**	**70**

Text/ Reference Books:

Name of Authors	**Titles of the Book**	**Name of the Publisher**
N.D.Bhatt	Machine Drawing	Charotar Publication, Anand
IS Code SP 46 (1988)	Code of practice for general engineering drawing.	Engineering Drawing Practice for School and colleges
L.K.Narayanan, P.Kannaich, K.VenkatReddy	Production Drawing	New Age International Publication
P.S.Gill	Machine Drawing	S.K.Kataria and Sons
M.L.Dabhade	Engineering Graphics (For Topic on Auxiliary Views)	--
Sidheshwar	Machine Drawing	Tata McGraw Hill
D.Jolhe	Engineering Drawing	Tata McGraw Hill

MECHANICS OF SOLIDS (MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625303	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	02	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS :THEORY

	Name of the Topic	Hours	Marks
UNIT-01	**Mechanical Properties of Materials, Simple stresses & Strains** 1.1 Types of loads, Simple stresses & strains viz. tensile, compressive, Shear, Crushing, Thermal stresses, Hoop stresses & corresponding strains, Volumetric Strain, Bulk modulus, Hook's law, Young's modulus, Modulus of Rigidity, stress-strain curves for ductile & brittle materials, Poisson's ratio. 1.2 Concept of stresses & strains in thin cylindrical & spherical shells subjected to internal pressure. 1.3 Concepts of Buckling – Rankine's & Euler's formulae for buckling load for columns / shafts under compression, concepts of equivalent length for various end conditions. 1.4 Concepts of Deflection & slope of beams – relation between bending moment & slope. Deflection of simply supported beams and cantilever beams subjected to point load. (No derivation) (Problems on compressive & tensile stresses, Thermal stresses, butt & lap riveted joints, simple cases of buckling).	10	18
UNIT-02	**Strain Energy** 2.1 Concept, derivation & use of expression for deformation of axially loaded members under gradual, sudden & impact load. 2.2 Strain energy due to self-weight.	03	04
UNIT-03	**Bending Moment & Shear Force** 3.1 Shear force, bending moment & relation between them. 3.2 Shear force & bending moment diagrams for simply supported beam & cantilevers subjected to point loads & Uniformly distribution load, concept of Uniformly varying load & couples acting on beam 3.3 Location of point of contraflexure. (Problems to be based on simply supported & cantilever beams with point load & UDL only)	08	12
UNIT-04	**Moment of Inertia** 4.1 Definition of Moment of inertia, Moment of inertia of different laminae, radius of gyration. 4.2 Parallel & perpendicular axis theorem. 4.3 Moment of inertia of rectangular, circular, semicircular. Triangular, Hollow Rectangular, symmetrical I - Section, Channel section, Tee- section, angle section about centroidal axis. 4.4 Polar moment of inertia.	03	06
UNIT-05	**Bending & Shear stresses** 5.1 Theory of simple bending, equation of bending. 5.2 Assumptions in the theory of bending, moment of resistance, section modulus & neutral axis. 5.3 Shear stresses – concepts of direct & transverse shear stress.	06	06

UNIT-06	**Combination of Bending & Direct stresses** 6.1 Axial load, eccentric load, direct stresses, bending stresses maximum & minimum stresses. 6.2 Application of the above concepts for machine parts such as offset links, C-clamp, Bench vice, Drilling machine frame, stresses at base of a short column, condition for no tension at extreme fibres, total stress variation diagrams. (Simple problems on above applications)	**08**	**10**
UNIT-07	**Principal Planes & Principal Stresses** 7.1 Definition of principal plane & principal stresses. 7.2 Expression for normal and tangential stress, maximum shear stress. 7.3 Stresses on inclined planes. 7.4 Position of principal planes & planes of maximum shear. 7.5 Graphical solution using Mohr's circle of Stresses.	**06**	**08**
UNIT- 08	**Torsion** 8.1 Concept of Pure Torsion, Torsion equation for solid and hollow circular shafts. Assumptions in theory of pure Torsion. 8.2 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft)	**04**	**06**
	Total	**48**	**70**

Text /Reference Books:

Name of Authors	**Titles of the Book**	**Name of the Publisher**
Andrew Pytel Fedrinand L. Singer	Strength of Material	Addison-Wesley An imprint of Addison Wesley Longman, Inc. Forth edition
G.H.Ruder	Strength of Material	ELBS with Macmillan third edition
B.K.Sarkar	Strength of Material	Tata McGraw hill New Delhi
Dr. R. K.Bansal	A Text Book strength of Material	Laxmi Publication New Delhi
S Ramamrutham	Strength of Material	Dhanpat Rai & Publication New Delhi
R.S.Khurmi	Strength of Material	S.Chand Company Ltd. Delhi
G.K.Narula K.S.Narula	Materials Science	Tata McGraw hill New Delhi

MECHANICAL ENGINEERING MATERIALS (MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625304	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

	Name of the Topic	Hours	Marks
UNIT-1.	**Engineering Materials and their Properties** 1.1 Introduction, Classification and Application of Engineering materials, I.S specification of materials like plain carbon steel, Grey Cast iron, low alloy steels & bearing Materials. 1.2 Properties of metals 1.2.1 Physical Properties – Structure, Density, Melting point. 1.2.2 Mechanical Properties – Strength, elasticity, ductility, malleability, plasticity, toughness, hardness, hardenability, brittleness, fatigue, thermal conductivity, electrical conductivity, thermal coefficient of linear expansion 1.3 Introduction to Corrosion, types of Corrosion, Corrosion resisting materials.	06	08
UNIT-2.	**Ferrous Metals and Alloys** 2.1 Characteristics and application of ferrous metals 2.2 Phase equilibrium diagram for Iron and Iron Carbide. 2.3 Flow diagram for production of Iron and Steel, Classification, composition and uses of cast iron, effect of sulphur, silicon and phosphorous. 2.4 Classification, composition and application of low carbon steel, medium carbon steel and high carbon steel with their chemical composition. 2.5 Alloy Steels: - Low alloy steel, high alloy steel, tools steel & stainless steel. Effect of various alloying elements such as – Chromium, nickel, manganese, molybdenum, tungsten, vanadium. 2.6 Tool Steels: - High speed Steels (HSS), Hot & cold Working dies, shear, punches etc., properties & applications. 2.7 Magnetic materials: - Properties & Applications of commonly used magnetic materials (Permanent magnets and temporary magnets). 2.8 Special Cutting Tool Materials – Diamond, Stelites & Tungsten Carbide	12	18
UNIT-3.	**Non Ferrous Metals and Alloys** 3.1 Properties, applications & chemical compositions of Copper alloys (naval brass, muntz metal, Gun metal & bronzes), Aluminium alloys (Y-alloy & duralumin) & bearing materials like white metals, leaded bronzes & copper lead alloys. 3.2 Desired properties of bearing materials.	06	10
UNIT-4.	**Heat Treatment of Steels** 4.1 Introduction to Heat treatment processes such as Annealing, subcritical annealing, Normalizing, Hardening, Tempering (Austempering & Martempering) - Principle, Advantages, limitations and applications. 4.2 Surface Hardening - Methods of surface hardening, i) case hardening ii) Flame Hardening, iii) Induction Hardening, iv) Nitriding, v) Carburizing - Principle, advantages, limitations and applications	08	14

UNIT-5.	**Non Metallic Materials** 5.1 Polymeric Materials – Introduction to Polymers- types, characteristics, properties and uses of Thermoplastics, Thermosetting Plastics & Rubbers. 5.2 Thermoplastic Plastics - characteristics and uses of ABS, Acrylics, Nylons and Vinyls 5.3 Thermosetting Plastics - Characteristics and uses of polyesters, Epoxies, Melamines & Bakelites. 5.4 Rubbers – Neoprene, Butadiene, Buna & Silicons – Properties & applications. 5.5 Properties and applications of following Engineering Materials – Ceramics, Abrasive, Adhesive and Insulating materials such as Cork, Asbestos, Thermocole and Glass Wool 5.6 Introduction to Composite Materials – Laminated & Fibre reinforced materials - Structure, Properties & Applications.	**08**	**10**
UNIT-6.	**Powder Metallurgy & Nondestructive Testing** 6.1 Advantages, limitations and applications of Powder Metallurgy for engineering products. Brief Description of Process of Powder Metallurgy – Powder making, blending, compacting, sintering, infiltration & impregnation. 6.3 Applications of Powder metallurgy for tungsten carbide tip tools & porous bearing. 6.4 Importance of Non-destructive testing, Difference between Destructive and Nondestructive testing. 6.5 Nondestructive testing methods - Radiography (X-Ray & Gamma Ray), Ultrasonic crack detection, Dye penetrant test, Magnaflux test – Comparison & applications.	**08**	**10**
	Total	**48**	**70**

Text/Reference Books:

Name of Authors	Titles of the Book	Name of the Publisher
O.P.Khanna	A Text Book of Material Science and Metallurgy	Dhanpat Rai and Sons [1999]
Dr.V.D. Kodgire	Material Science And Metallurgy	Everest Publishing House [1990]
R.K.Rajput	Material Science and Engineering	S.K.Katari and Sons [2002 reprint 2003]
S.K.Hazra and Choudhari	Material Science and Processes	Indian Book Distribution Co. [1982]
Kenneth G. Budinski and Micheal K. Budinski	Engineering Materials Properties and Selection	Pearson Education, New Delhi
ASME	ASME Material Manuals	
Sidney H. Avner	Introduction to Physical metallurgy	Tata Mc Graw Hill edition (2^{nd})

ELECTRICAL ENGINEERING (MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625305	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	02	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

	Name of the Topic	Hours	Marks
UNIT-01	**Introduction** to Electrical power supply system Generation, Transmission, Distribution & Utilization. AC supply & DC supply	02	02
UNIT-02	**AC Fundamentals**: cycle, frequency, phase, period, max, average, r.m.s. value. Concept of current, voltage, power & energy in R, L, & C circuits	03	06
UNIT-03	Three phase supply: Star & Delta circuit, Line & Phase relationship, power equation.	03	06
UNIT-04	**Measuring Instruments**: Introduction to construction, operation and use of AC & DC ammeter, voltmeter, Electrodynamic Wattmeter, energy meter & digital multimeter, Clip on meter.	04	06
UNIT-05	**DC Motor:** Construction and principle of operation. Speed torque characteristics. Types, specifications & ratings and applications. Types of insulation used.	06	07
UNIT-06	**A. C .Machines**		
	Transformer: Construction and principle of operation. EMF equation and transformation ratio. Load test, efficiency and regulation. Specifications & rating. Auto transformer & 3 phase transformer concept only. Applications of transformers.	06	09
	AC motor: Construction and principle of operation of 3 phase induction motor. Speed torque characteristics, slip, speed control (VFD), reversal of rotation, starters. Single phase motor, universal motor, stepper motor & servo motor. Motor specification & ratings. Applications of these motors in various fields. Testing of motors.	06	10
	Alternator: Construction, principle of operation & applications. Self and separate excitation. **Synchronous Motor:-** Construction, principle of operation, methods of starting & applications	03	04
UNIT-07	**Utilisation of Electrical Energy**		
	Industrial applications: Classification of drives, factors for selection of motor for different drives, Enclosures & Mountings	02	05
	Electric heating & welding: Working principle & types selection of system, specifications & rating	02	03
	Electrometallurgical & Electro Agro Systems: Concept & principle used in electroplating, Electrical machines used in electro-agro systems (irrigation pumps)	02	03
UNIT-08	**Electric wiring & Illumination**: Simple Electric Installations with 2 sockets,2 fans, 2 lamps, fuses. Introduction to different accessories like MCCB, ELCB, wires & cables. Different types of lamps their specifications,	04	04
UNIT-09	**Electric safety**, tariff & power conservation, necessity of Earthing, types safety tools, first aid measures, types of tariff, pf improvement only methods, energy conservation & audit, fire extinguishing methods adopted in electrical engineering.	05	05
	Total	48	70

Text/Reference Books:

Name of Authors	Titles of the Book	Name of the Publisher
E. Hughes	Electrical Technology	ELBS
H. Cotton	Electrical Technology	Pitman
B. L. Theraja	Electrical Technology Vol I To IV	S. Chand

MECHANICS OF SOLIDS LAB(MECHANICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1625306	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS :PRACTICAL

Skills to be developed:

Intellectual Skill:

1 Identification of different parts of machine and their function.

2 Interpretation failure patterns of different metal under different action.

3 Extrapolating test result or observation during test.

4 Testing different metals and comparison of experimental result.

Motor Skill:

1 Sketch of standard specimen, arrangement for test on respective machines.

2 Measurement of different parameters.

3 Handling Instrument.

4 Observing behavior of different metal during test.

	List of Practical:
1.	Study & demonstration of Extensometer.
2.	Tension Test on mild steel, Aluminium & compression test on cast iron on Universal Testing Machine.
3.	Direct Shear Test of mild steel on Universal Testing Machine.
4.	Brinell Hardness Test on Mild Steel.
5.	Rockwell hardness Test on Hardened Steel.
6.	Izod & Charpy - Impact tests of a standard specimen.
7.	Torsion Test on Mild steel bar.
8.	Term Work :- Drawing sheet on shear force & bending Moment diagrams for a given loading (At least four problems.). a) Estimation of principal stresses and maximum shear strain for a given combined loading by analytical & Mohr's circle method. (At least two problems.).

ELECTRICAL ENGINEERING LAB (MECHANICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1625307	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS :PRACTICAL

Skills to be developed:

Intellectual skills:

1. Identify and select suitable electrical instruments for measurement.
2. Identify and give specifications of electrical motors and transformers.
3. Interpret wiring diagrams for various applications.
4. Identify safety equipments required.
5. Decide the procedure for setting experiments.

Motor skills:

1. Draw wiring diagram
2. Make wiring connections to connect electrical equipments and instruments.
3. Measure electrical power, earthing resistance and other electrical quantities.
4. Calibrate electrical instruments.
5. Use of safety devices while working.

Prepare energy consumption bill with present tariff structure.

A) List of Practical:

1) For a given resistive & inductive series & parallel circuit, select ammeter, voltmeter & wattmeter. Make the connections and measure current, voltage and power drawn by the circuit. Measure it by clip on meter & compare it.

2) For a given DC Shunt/Series motor, select suitable meters, make connections as per diagram, check the connections and run the motor. Take the meter readings to draw speed torque characteristics. Make suitable changes in the connections to reverse the direction of rotation.

3) For the above given motor prepare a circuit to control its speed above & below normal, plot its graph.

4) List specifications of given single phase transformer. Perform no load test on the transformer to find transformation ratio.

5) Connect an electronic energy meter to a load, take reading & prepare energy consumption bill with present tariff structure

6) Prepare actual wiring on a board to study and operate one lamp controlled by one switch, staircase wiring, go down wiring using casing capping.

B) Field work:

7) Observe Electric wiring of main building in your campus list the accessories used and draw a general layout

8) Observe earthing of your laboratory, measure its resistance & list its significance

C) Mini project:

9) Prepare a simple electric wiring circuit comprising of 2lamps, 2 sockets, 1 fan with a fuse & check it.

10) Prepare trouble-shooting chart of above motors and identify the faults of a motor or a transformer

MANUFACTURING TECHNOLOGY LAB (MECHANICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1625308	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	—	—	—	External	:	35	

Contents :Practical		Hrs/week
Chapter	**Name of the Topic**	**Hours**
Unit-01	**Forging** 1.1 Forging Processes – Drop forging, Upset forging, Die forging or press forging. 1.2 Types of dies - Open Die, Closed Die(Single Impression and Multi-impression) Closed die Forging operations - Fullering, Edging, Bending, Blocking, Finishing 1.3 Forgeable material and forgeability, Forging temperature, Grain flow in forged parts, Types of Presses and hammers.	**03**
Unit-02	**Rolling and Extrusion** 2.1 Principles of rolling and extrusion. 2.2 Hot and cold rolling. 2.3 Types of rolling mills. 2.4 Different sections of rolled parts. 2.5 Methods of extrusion – Direct, Indirect, backward & impact Extrusion, Hot extrusion, Cold extrusion Advantages, disadvantages and applications.	**03**
Unit-03	**Press working** 3.1 Types of presses and Specifications. 3.2 Press working operations - Cutting, bending, drawing, punching, blanking, notching, lancing 3.3 Die set components.- punch and die shoe, guide pin, bolster plate, stripper, stock guide, feed stock, pilot. 3.4 Punch and die Clearances for blanking and piercing, effect of clearance.	**04**
Unit-04	**Lathe Operations** 4.1 Types of lathes – light duty, Medium duty and heavy duty geared lathe, CNC lathe. 4.2 Specifications. 4.3 Basic parts and their functions. Operations and tools – Turning, parting off, Knurling, facing, Boring, drilling, threading, step turning, taper turning.	**03**
Unit-05	**Drilling** 5.1 Classification. 5.2 Basic parts and their functions - Radial drilling machine. 5.3 Types of operations. 5.4 Specifications of drilling machine. 5.5 Types of drills and reamers	**02**
Unit-06	**Milling** 6.1 Classification. 6.2 Basic parts and their functions – column and knee type. 6.3 Types of operations 6.4 Types of milling cutters.	**02**
Unit-07	**Casting** 7.1 Patterns - Material used, types, Patterns allowances, Cores, Core allowances. 7.2 Moulds - Mould materials, Types of sand, Mounding processes Sand molding, Pit molding, machine molding. Shell molding. 7.3 Melting practice. Types of furnaces with specific application Cupola furnace, Electric arc furnace. 7.4 Casting principle and operation 7.5 Special casting processes. viz die casting, centrifugal casting, Investmen casting. 7.6 Casting defects	**08**

Unit-08	**Welding** 8.1 Classification. 8.2 Gas welding techniques. 8.3 Types of welding flames. 8.4 Arc Welding – Principle, Equipment, Applications 8.5 Shielded metal arc welding. 8.6 Submerged arc welding. 8.7 TIG / MIG welding. 8.8 Resistance welding - Spot welding, Seam welding, Projection welding 8.9 Welding defects. 8.10 Brazing and soldering: Types, Principles, Applications	**07**
	Total	**32**

Notes:

1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher/ workshop superintendent)

2] Theory behind practical is to be covered by the concerned subject teacher/ workshop superintendent. 3] Workshop diary should be maintained by each student duly signed by respective shop instructors

Practical:

Skills to be developed:

Intellectual Skills:

1. Identify basic manufacturing processes.
2. Understand need of pattern allowances.
3. Identify joining methods for fabrication.
4. Specify press tool dies for given cutting/forming operations.
5. Understand various sand casting processes.
6. Understand types of pattern, materials of construction and identify casting defects.

Motor Skills:

1. Operate lathes, drilling, milling machines
2. Use welding machines and equipment
3. Set the tools, jobs and decide cutting parameters of machines
4. Make simple pattern out of wood/themocol
5. Inspect diamensions of jobs using measuring instruments

LIST OF PRACTICALS

1) Assignment on forging die nomenclature.
2) One turning job on lathe containing the operations like plain turning, step turning, grooving, knurling, chamfering.
3) One composite welding job having two different joints. (Batch of four students per job.)
4) One simple job on TIG / MIG welding setup or visit to TIG / MIG welding setup and write report.
5) One composite job containing the operations like face milling, side and face milling (slotting), drilling / tapping (drilled hole should be perpendicular to slotting operation).
6) Making of one simple wooden Pattern (max. 4 students per group, each group should make different type of pattern).
7) Making of one Thermo-Cole Pattern (max. 4 students per group, each group should make different

Name of Authors	Titles of the Book	Name of the Publisher
S. K. Hajra Chaudary, Bose, Roy	Elements of workshop echnology – Volume I & II	Media Promoters and Publishers limited
D. L. Wakyl	Processes and design for manufacturing	Prentice Hall
O. P. Khanna and Lal	Production Technology - Volume I & II	--
W.A.J. Chapman	Workshop Technology - Volume I , II & III	--
Jhon A Schey	Introduction to Manufacturing Processes	McGraw Hills International
M. Aduthan and A. B. Gupta	Manufacturing Technology	New Age International

MECHANICAL ENGINEERING DRAWING (TW) (MECHANICAL ENGG. GROUP)

Subject Code	Term Work						Credits
1625309	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

CONTENTS : TERM WORK

List of Term Work :-

(Use first angle method of projection)

1. **Intersection of Solids**

   (i) One Sheet containing atleast two problems.

   (ii) Atleast four problems for home assignment in sketch book.

2. **Development of surfaces**

   Any two problems on development of surfaces of different objects. (one Sheet)

3. **Auxiliary views**

   One sheet containing two problems

   At least two problems as home assignment in sketch book

4. Conventional Representation as per SP – 46 (1988) - one sheet

5. Limit, Fit, Tolerances and Machining Symbols – one sheet

6. Assembly to detailed drawings of components including conventional representation of tolerances and surface finish symbols:

   One sheet covering any one assembly and its details

   At least two problems as home assignment in sketch book.

7. **Details to Assembly**

   Draw One sheet covering any one assembly and its details.

   Solve at least two problems as home assignment in sketchbook.

8. Two problems on assembly drawings using any CAD Package

(Assembly containing maximum 6 to 7 components-minimum 12 hours)

DEVELOPMENT OF LIFE SKILLS-II (MECHANICAL ENGG. GROUP)

Subject Code	Term Work						Credits
1625310	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

Contents : Term Work		Hrs/week
	Name of Topics	**HOURS**
Unit-1	**SOCIAL SKILLS** SOCIETY, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY.	**01**
Unit-2	Swot Analysis – Concept , How to make use of SWOT.	**01**
Unit-3	**Inter personal Relation** Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	**02**
Unit-4	**Problem Solving** **I)STEPS IN PROBLEM SOLVING,** 1)IDENTIFY AND CLARIFY THE PROBLEM, 2)INFORMATION GATHERING RELATED TO PROBLEM, 3)EVALUATE THE EVIDENCE, 4)CONSIDER ALTERNATIVE SOLUTIONS AND THEIR IMPLICATIONS, 5)CHOOSE AND IMPLEMENT THE BEST ALTERNATIVE, 6)REVIEW **II)Problem solving technique**.(any one technique may be considered) 1) Trial and error, 2) Brain storming, 3) Lateral thinking	**02**
Unit-5	**Presentation Skills** Body language -- Dress like the audience Posture, Gestures, Eye contact and facial expression. PRESENTATION SKILL – STAGE FRIGHT, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board	**03**
Unit-6	**Group discussion and Interview technique** – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making **INTERVIEW TECHNIQUE** NECESSITY, TIPS FOR HANDLING COMMON QUESTIONS.	**03**
Unit-7	**Working in Teams** UNDERSTAND AND WORK WITHIN THE DYNAMICS OF A GROUPS. TIPS TO WORK EFFECTIVELY IN TEAMS, ESTABLISH GOOD RAPPORT, INTEREST WITH OTHERS AND WORK EFFECTIVELY WITH THEM TO MEET COMMON OBJECTIVES, TIPS TO PROVIDE AND ACCEPT FEEDBACK IN A CONSTRUCTIVE AND CONSIDERATE WAY , LEADERSHIP IN TEAMS, HANDLING FRUSTRATIONS IN GROUP.	**02**

Unit-8	**Task Management** INTRODUCTION, TASK IDENTIFICATION, TASK PLANNING ,ORGANIZING AND EXECUTION, CLOSING THE TASK	**02**
	Total	**16**

List of Assignment: (Any Eight) :-

1) SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats.Following points will be useful for doing SWOT.

a) Your past experiences,

b) Achievements,

c) Failures,

d) Feedback from others etc.

2) Undergo a test on reading skill/memory skill administered by your teacher.

3) Solve the puzzles.

4) Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.(One activity per group)

5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.

6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme.####

7) Conduct an interview of a personality and write a report on it.

8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed

9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

Note: - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

Mini Project on Task Management. Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

Text /Reference Books :

Name of Authors	Titles of the Book	Name of the Publisher
Adams Time management	Marshall Cooks	Viva Books
Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India, Pvt Ltd
Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
Decision making & Problem Solving	by Adair, J	Orient Longman
Develop Your Assertiveness	Bishop , Sue	Kogan Page India
Make Every Minute Count	Marion E Haynes	Kogan page India
Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
Presentation Skills	Michael Hatton (Canada – India Project)	ISTE New Delhi
Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
Time management	Chakravarty, Ajanta	Rupa and Company
Working in Teams	Harding ham .A	Orient Longman

INTERNET ASSISTANCE

1. http://www.mindtools.com
2. http://www.stress.org
3. http://www.ethics.com
4. http://www.coopcomm.org/workbook.htm
5. http://www.mapfornonprofits.org/
6. http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7. http://eqi.org/
8. http://www.abacon.com/commstudies/interpersonal/indisclosure.html
9. http://www.mapnp.org/library/ethics/ethxgde.htm
10. http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11. http://members.aol.com/nonverbal2/diction1.htm
12. http://www.thomasarmstron.com/multiple_intelligences.htm
13. http://snow.utoronto.ca/Learn2/modules.html
14. http://www.quickmba.com/strategy/swot/

PROFESSIONAL PRACTICES-III (MECHANICAL ENGG. GROUP)

Subject Code	Term Work						Credits
1625311	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

Contents :Term Work		Hrs/week
Chapter	**Activities**	Hours
Unit-1	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. **TWO** industrial visits may be arranged in the following areas / industries : i) Manufacturing organizations for observing various manufacturing processes including heat treatment ii) Material testing laboratories in industries or reputed organizations iii) Auto workshop / Garage iv) Plastic material processing unit v) ST workshop / City transport workshop	**08**
Unit-2	Lectures by Professional / Industrial Expert be organized from **ANY THREE** of the following areas : i) Use of a plastics in automobiles. ii) Nonferrous Metals and alloys for engineering applications iii) Surface Treatment Processes like electroplating, powder coating etc. iv) Selection of electric motors. v) Computer aided drafting. vi) Industrial hygiene. vii) Composite Materials. viii) Heat treatment processes. ix) Ceramics x) Safety Engineering and Waste elimination	**08**
Unit-3	**Individual Assignments :** **Any two** from the list suggested a) Process sequence of any two machine components. b) Write material specifications for any two composite jobs. c) Collection of samples of different plastic material or cutting tools with properties , specifications and applications. d) Preparing models using development of surfaces. e) Assignments on bending moment , sheer forces , deflection of beams and torsion chapters of strength of material. f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable. g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes. h) List the various properties and applications of following materials – a. Ceramics b. fiber reinforcement plastics c. thermo plastic plastics d. thermo setting plastics e. rubbers. OR Conduct **ANY ONE** of the following activities through active participation of students and write report i) Rally for energy conservation / tree plantation. ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc. iii) Conduct aptitude , general knowledge test , IQ test iv) Arrange **any one** training in the following areas : a) Yoga. B) Use of fire fighting equipment and First aid Maintenance of Domestic appliances	**08**

Unit-4	**Modular courses (Optional) :** A course module should be designed in the following areas for max. 12 hrs. Batch size – min. 15 students. Course may be organized internally or with the help of external organizations. a) Forging Technology. b) CAD-CAM related software. c) Welding techniques. d) Personality development. e) Entrepreneurship development.	**08**
Unit-5	**3-D Design using software** Computer screen, coordinate system and planes, definition of HP,VP, reference planes How to create them in $2^{nd}/3^{rd}$ environment. Selection of drawing site & scale. Commands of creation of Line, coordinate points, Axis, Poly lines, square, rectangle, polygon, sp line, circles, ellipse, text, move, copy, offset, Mirror, Rotate, Trison, Extend, Break, Chamfer, Fillet, Curves, Constraints fit tangency, perpendicularity, dimensioning Line convention, material conventions and lettering. The Student should draw – different orthographic Views (including sections), Auxiliary views according to first/ Third angle method of projection. (Minimum two sheets, each containing two problems) after learning the contents as above.	**16**
	Total	**48**