


<div> MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI</div> <div>TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES</div>																	
COURSE NAME : DIPLOMA IN PRODUCTION ENGINEERING / DIPLOMA IN PRODUCTION TECHNOLOGY																	
COURSE CODE : PG / PT																	
DURATION OF COURSE : 6 SEMESTERS										WITH EFFECT FROM 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
PATTERN : FULL TIME - SEMESTER										SCHEME : G							
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
TH	TU	PR	Max	Min	Max	Min		Max	Min	Max	Min						
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Manufacturing Processes β	MPR	17402	03	--	04	03	100	40	25#	10	--	--	50@	20		
3	Electrical Engineering β	EEN	17404	03	--	02	03	100	40	--	--	--	--	25@	10		
4	Heat Engineering	HEN	17406	04	--	02	03	100	40	--	--	25#	10	25@	10		
5	Fluid Mechanics & Machinery β	FMM	17411	04	--	02	03	100	40	25#	10	--	--	25@	10		
6	Theory of Machines β	TOM	17412	03	--	02	03	100	40	--	--	--	--	25@	10		
7	Professional Practices-II β	PPT	17035	--	--	02	--	--	--	--	--	--	--	50@	20		
TOTAL				18	--	16	--	550	--	50	--	25	--	225	--	50	
**	Industrial Training (Optional) Examination in 5 th Semester Professional Practices-III																
Student Contact Hours Per Week: 34 Hrs.																	
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.																	
Total Marks : 900																	
@ - Internal Assessment, # - External Assessment, <div></div> No Theory Examination, \$ - Common to all branches, #* - Online Examination, β - Common to ME, MH, MI																	
Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work																	
** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.																	
Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5 th Semester.																	
➤ Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).																	
➤ Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.																	
➤ Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.																	

Course Name : All Branches of Diploma in Engineering & Technology**Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU****Semester : Fourth****Subject Title : Environmental Studies****Subject Code : 17401****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	01	50#*	--	--	25@	75

#* Online Theory Examination**NOTE:**

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

Rationale:

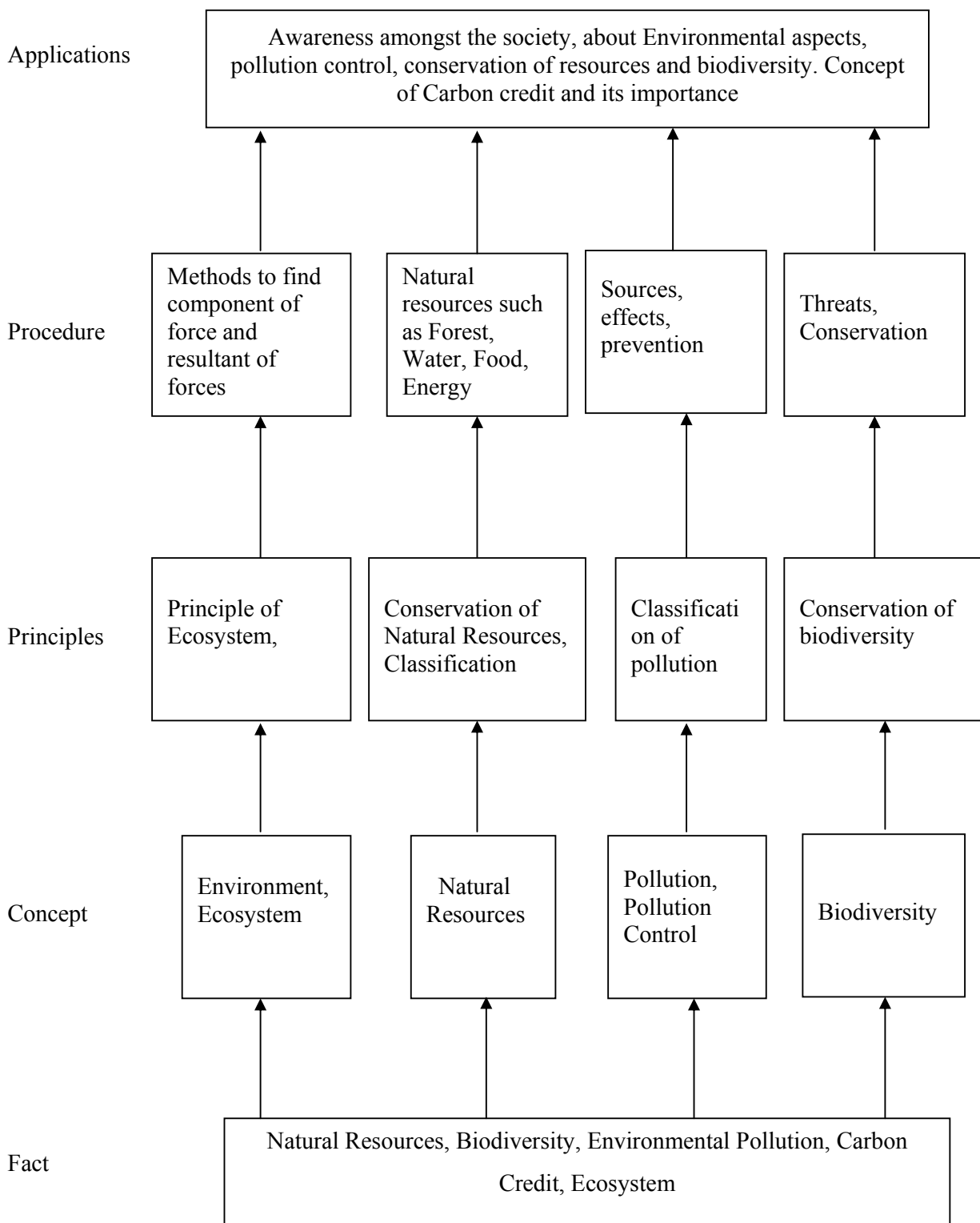
Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

1. Understand importance of environment.
2. Know key issues about environment.
3. Understands the reasons for environment degradation.
4. Know aspects about improvement methods.
5. Know initiatives taken by the world bodies to restrict and reduce degradation.

Learning Structure:

Theory:

Topic and Contents	Hours	Marks
Topic 1: Nature of Environmental Studies Specific Objectives: <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public Contents: <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
Topic 2: Natural Resources and Associated Problems Specific Objectives: <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment Contents: <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
Topic 3. Ecosystems <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
Topic 4. Biodiversity and Its Conservation <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water harvesting: Definition, Methods and Benefits • Climate Change, Global warming, Acid rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust: Basic concepts and their effect on climate • Concept of Carbon Credits and its advantages 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
Total	16	50

Practical:**Skills to be developed:****Intellectual Skills:**

1. Collection of information, data
2. Analysis of data
3. Report writing

Motor Skills:

1. Presentation Skills
2. Use of multi media

List of Projects:

Note: Any one project of the following:

1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. Jagdish Krishnaswamy	Environmental Studies	Wiley India

Course Name : Mechanical Engineering Group**Course Code : ME/PG/PT/MH/MI/FE/FG****Semester : Fourth****Subject Title : Manufacturing Processes****Subject Code : 17402****Teaching and Examination Scheme**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	04	03	100	25#	--	50@	175

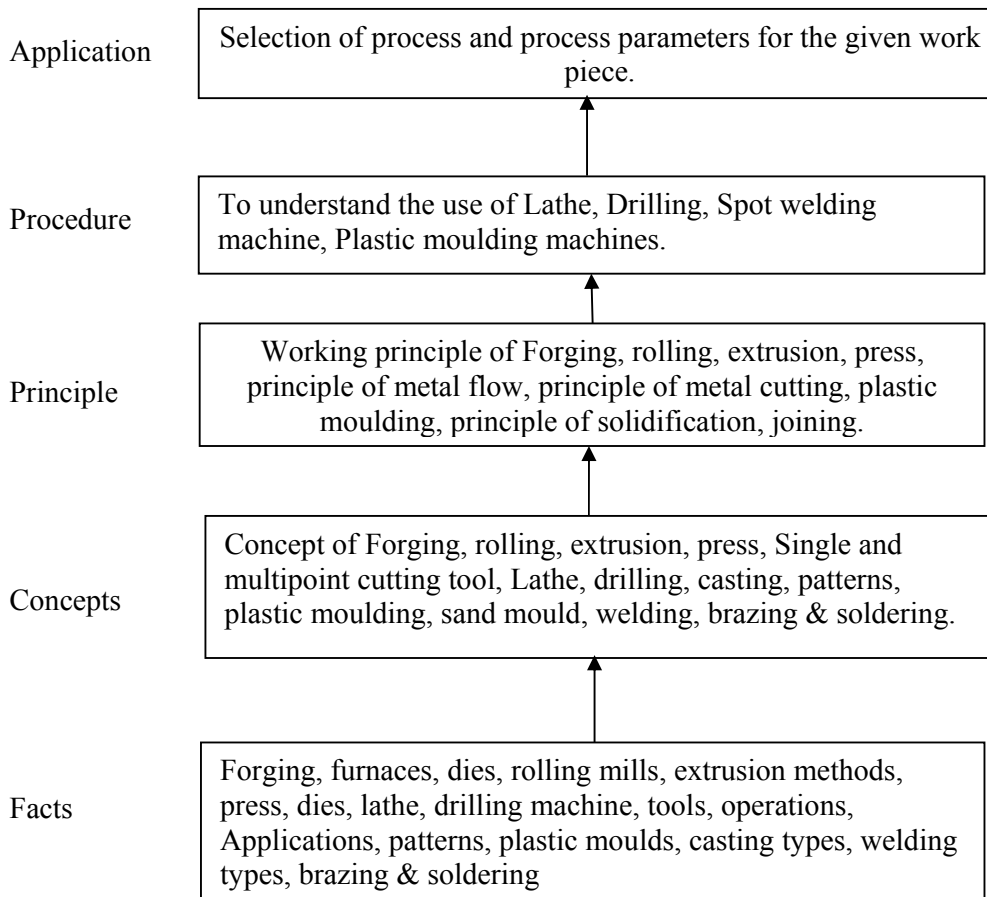
Rationale:

Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. This is a core technology subject. The diploma technician should know how the raw material gets processed through various processes and ultimately results into finished goods. Hence it is essential that, he has understanding of basic manufacturing processes, machines, tools and equipments. With sound knowledge of this subject, the diploma technician will be able to handle and control practical situations more effectively and confidently.

Objectives:

The student will be able to:

- 1) Use the basic machine tools like lathe and drilling.
- 2) Produce and inspect the job as per specified dimensions.
- 3) Select the specific manufacturing processes for the desired output.
- 4) Adopt safety practices while working on various machines.
- 5) Explain the different types of plastic moulding processes.
- 6) Select the basic manufacturing process for different components to be machined.

Learning Structure:

Theory:

Topic and Content	Hours	Marks
1:Forming Processes Specific Objectives: <ul style="list-style-type: none"> ➤ To list basic manufacturing processes and write working principal of different manufacturing processes like Drop forging, Rolling and Extrusion ➤ To identify and select proper manufacturing process for a specific component Content 1.1 Drop forging: 06 Marks Upset forging, press forging(die forging),open die & closed die forging, forging operations 1.2 Rolling: 06 Marks Principle of rolling, hot & cold rolling, Types of rolling mill, application of rolling 1.3 Extrusion: 06 Marks Direct & indirect extrusion, Advantages, disadvantages and Applications.	08	18
2. Press working: Specific Objectives: <ul style="list-style-type: none"> ➤ To define Press working machine principal ➤ To state various classification of press machine. ➤ To state different operations performed on press machine and their p[practical applications Content 2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing 06 Marks 2.2 Die set components and types of dies 06 Marks 2.3 Forming Operations: Bending, drawing 04 Marks	08	16
3. Casting Processes: Specific Objectives: <ul style="list-style-type: none"> ➤ To state different between pattern and model ➤ To list different types of pattern and their applications ➤ To state various types of pattern allowances. ➤ To state various types of casting processes. Content 3.1 Pattern making: 06 Marks Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns 3.2 Moulding: 06 Marks Types of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding. 3.3 Casting: 06 Marks Furnaces: Construction and working of cupola furnace, electric arc furnace. - Methods & applications of - Centrifugal casting, shell moulding, investment casting, Casting defects - Causes & remedies. 3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies. 04 Marks	10	22
4. Welding Specific Objectives:	07	14

<p>➤ To define Arc welding and Gas welding Principal.</p> <p>➤ To state difference between soldering and brazing processes</p> <p>Content</p> <p>4.1 Introduction & classification of welding processes - Gas welding, carbon arc welding, shielded metal arc welding, TIG welding, MIG welding, plasma arc welding, resistance welding types- spot, seam projection. Electron beam welding, laser beam welding, welding defects. 10 Marks</p> <p>4.2 Introduction to soldering and brazing – Process, fillers, heating methods & applications. 04 Marks</p>		
<p>5. Machining Operations</p> <p>Specific Objectives:</p> <p>➤ To state the working principal of lathe and drilling machines.</p> <p>➤ To list out various operations performed on lathe and drilling machines</p> <p>Content</p> <p>5.1 Lathe Machine: 12 Marks Introduction, classification and basic parts of center lathe & their functions, Lathe operations like facing, plain turning, taper turning, thread cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool signature, cutting parameters.</p> <p>5.2 Drilling Machine: 08 Marks Introduction, classification, basic parts of radial drilling machine and their functions, twist drill nomenclature, drilling machine operations like drilling, reaming, boring, counter sinking, counter boring, spot facing. Cutting parameters.</p>	10	20
<p>6. Plastic Moulding:</p> <p>Specific Objectives:</p> <p>➤ To state different properties of plastics</p> <p>➤ To explain various plastic mauling methods like Injection, blow, compression molding</p> <p>Content Introduction, Properties of plastics, types of plastics, plastic moulding methods - compression moulding, injection moulding, blow moulding, extrusion, vacuum forming and calendaring.</p>	05	10
Total	48	100

Practical:

Skills to be developed:

Intellectual skills:

- 1) Identify basic manufacturing processes like forging, rolling and extrusion, for required component.
- 2) Specify need of pattern allowances.
- 3) Decide process parameters for different operations.
- 4) Decide tools required for a manufacturing process.
- 5) Identify a joining method for fabrication.

Motor Skills:

- 1) Operate lathe, drilling machine.

- 2) Set the tool and select the cutting parameters for machining operations.
- 3) Set the tools, job and decide cutting parameters.
- 4) Inspect various dimensions of jobs by using measuring instruments.
- 5) Make simple wooden / thermocole pattern.

List of Practical:

- 1) One turning job on lathe containing the operations like plain turning, step turning, taper turning, grooving, knurling and chamfering.
- 2) One job using Spot welding machine. (Min. 4 spots on 0.5-1mm thick metal strip.)
- 3) One simple job on TIG / MIG welding setup or visit to TIG / MIG welding shop.
- 4) Moulding practice for any one pattern.
- 5) Industrial visit to observe plastic processing shop and report on the visit.
- 6) One composite job containing the operations like lathe with axial & across drilling (like Nut- Bolt assembly or any other equivalent job).
- 7) Demonstration of eccentric turning using four jaw chuck.

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.
- 4] Assignments are to be assessed by the concerned subject teacher/ workshop superintendent.

Guidelines for conducting Practical Examination for MANUFACTURING PROCESSES

1. The job drawing must be jointly decided by the External and Internal examiner prior to one day in advance from the commencement of practical examination. Every student should be supplied the copy of job drawing before examination.
2. Time for practical examination should be **THREE HOURS**.
3. Practical examination of the students shall consists of Turning job containing different operations like Facing, straight Turning, Taper turning, Chamfering, Knurling , Threading, Grooving. (Minimum 5 operations) Students will perform the job as per the drawing provided to them.
4. Raw material size – Bar dia. 40 to 50 mm, length 80 to 100 mm.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
01	S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology-Volume I & II	Media Promoters and Publishers Limited
02	O. P. Khanna & Lal	Production Technology Volume- I & II	Production Technology Volume- I & II

			Dhanpat Rai Publications
03	W. A. J. Chapman, S. J. Martin	W. A. J. Chapman, S. J. Volume –I,II	Viva Books (p) Ltd.
04	O.P. Khanna	A text book of Foundry Tech.	Dhanpat Rai Publications
05	H.S. Bawa	Workshop Technology Volume- I & II	Tata McGraw-Hill
06	P.C. Sharma	Production Engineering	S. Chand Publications

Course Name : Mechanical Engineering Group**Course code : ME/MH/MI/PG/PT****Semester : Fourth****Subject Title : Electrical Engineering****Subject Code : 17404****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	---	25@	125

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

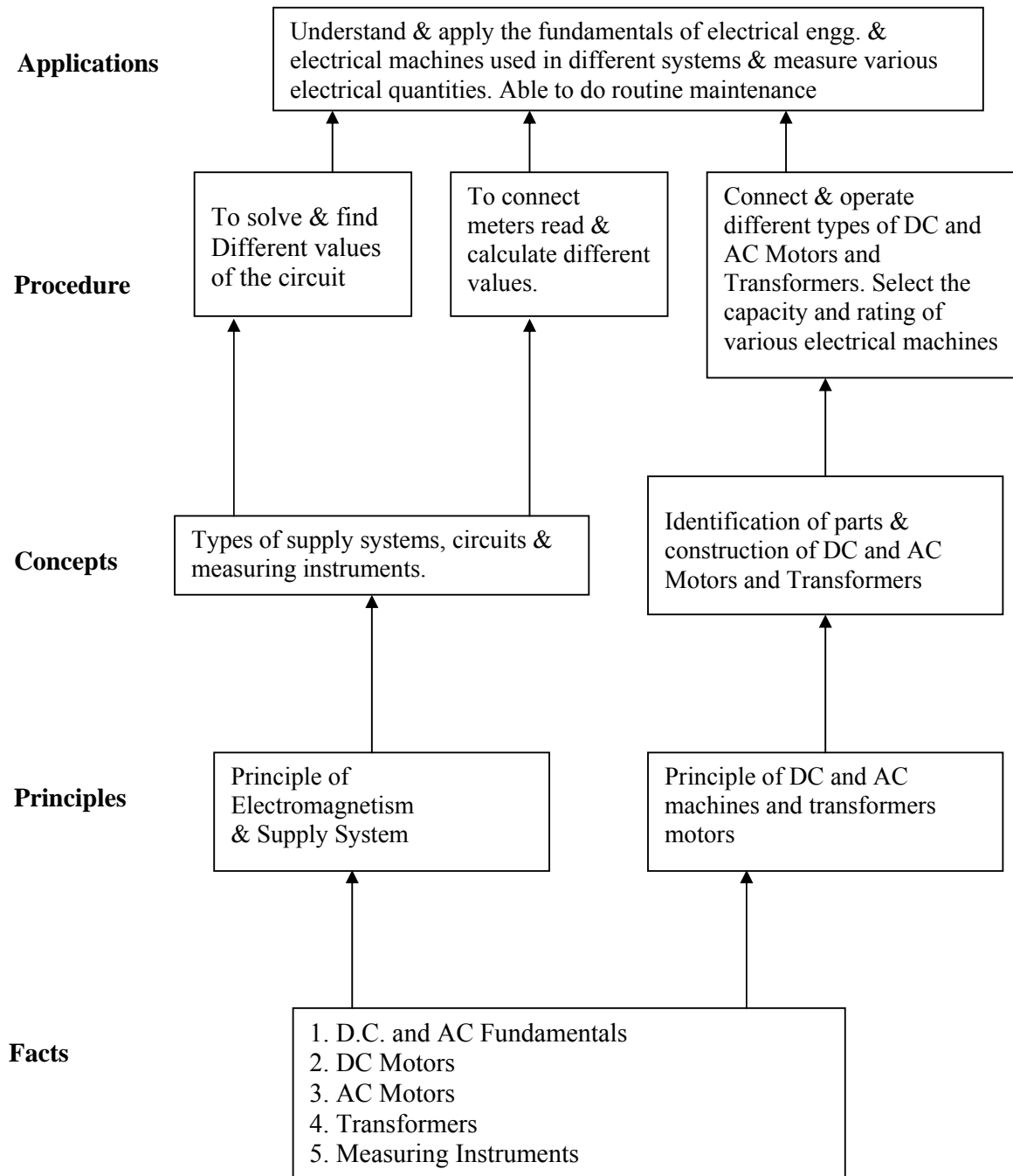
Rationale:

This subject is introduced with intention to teach students of mechanical branch facts, concepts, principles and procedure of operating electrical machines, circuits and systems and their applications. This subject is most important in regards to selection of electrical drives for various applications and will provide sufficient knowledge about electrical machines, equipments used in industry/field. This subjects deals with measurements of electrical quantities to judge the performance of electrical machines

General Objectives:

Student will be able to:

1. Differentiate between a.c. and d.c. supply.
2. Identify different type's motors, transformers and drives.
3. Select suitable drive as per the requirements.
4. Understand various types of electric heating and welding operations in manufacturing processes.
5. Supervise routine maintenance of electrical machines and supply systems.
6. Use the tariff system.
7. Calculate energy requirements and cost of energy.

Learning Structure:

Theory:

Topic and Content	Hours	Marks
1. Introduction to Electric Power System and A. C. Supply 20 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ State various components of power system. ➤ Distinguish between a.c. and d.c. supply. ➤ Calculate electrical quantities of a.c. supply and circuit parameters of R-L and R-C circuits. ➤ Calculate line and phase quantities and various powers in three phase circuit Contents: Introduction 04 Marks 1.1 Electrical power supply system generation, transmission, distribution. AC supply & DC Supply. AC Fundamentals: 08 Marks 1.2 Definitions; cycle, frequency, phase, period, maximum value, average value, r.m.s. value. (Simple Numericals) 1.3 Concept of current, voltage, power & energy in series R-L and R-C circuits. (Simple Numericals) Three phase supply: 08 Marks 1.4 Star and Delta circuit, 1.5 Line and Phase relationship, power equation. (No Derivation, Simple Numericals)	10	20
2.Measuring Instruments: 06 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ Differentiate between ac and dc meters. ➤ Use multimeter for measurements of current, voltage and passive parameter. Contents: 2.1 Introduction to construction, operation and use of AC and DC ammeter, voltmeter (PMMC and MI meters only). 2.2 Electro-dynamic wattmeter, energy meter and digital multimeter, Clip on meter.	04	06
3. DC Motor 04 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ State working principle of d.c. motor. ➤ Select type of d.c. motor as per requirement. Contents: 3.1 Construction and principle of operation. 3.2 Speed-torque characteristics. D.C. shunt, series and compound motors. Their specifications and applications.	02	04
4. Transformer: 14 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ State the working principle of transformer. ➤ Calculate transformation ratio, efficiency and regulation from direct load test. Contents:	06	14

4.1 Construction and principle of operation. 4.2 EMF equation and transformation ratio. 4.3 Load test for efficiency and regulation. Specifications and rating. 4.4 Auto transformer & 3 phase transformer concept only. 4.5 Applications of transformers.		
5. AC Motor: 24 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ Describe working principle of three phase induction motor. ➤ Calculate slip and rotor frequency and draw speed-torque curves. ➤ Use starter for three phase induction motor. ➤ State the working principle of single phase induction motor and its types. ➤ Select proper type of single phase induction motor. Contents: 5.1 Three Phase Induction Motor: 10 Marks <ul style="list-style-type: none"> ➤ Construction and principle of operation of 3 phase induction motor. ➤ Speed torque characteristics, slip, speed control of Induction Motor by variable frequency drive(VFD)-working principle and block diagram only, Reversal of rotation (Simple Numerical on speed and slip calculations) ➤ Starters-Direct ON Line Starters and Star-Delta Starters-Working principle, circuit diagram and applications. 5.2 Single Phase Induction Motors 04 Marks a) Capacitor start, b) Capacitor start and run, c) Shaded pole 5.3 Other Motors: 06 Marks Study the following motors with respect to specifications and rating, construction and applications. <ul style="list-style-type: none"> ➤ Universal motor ➤ Servo motor ➤ Stepper motor 5.4 Alternator: 04 Marks Construction, principle of operation & applications. Self and separate excitation.	10	24
6.Utilization of Electrical Energy: 18 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ Classify and select electric drives on the basis of speed-torque characteristics and enclosures. ➤ State the working principle of electric heating, welding and electroplating. ➤ Use electric motor for electro-agro system. Contents: 6.1 Industrial Applications: 04 Marks <ul style="list-style-type: none"> ➤ Classification of drives ➤ Factors for selection of motor for different drives. ➤ Types of enclosures. 6.2 Electric Heating & Welding: 10 Marks Working principle & types of heating and welding and their applications. 6.3 Electrometallurgical & Electro Agro Systems: 04 Marks Concept and principle used in electroplating. <ul style="list-style-type: none"> ➤ Electrical machines used in electro-agro systems. 	08	18
7.Electric Wiring, Illumination, Electric Safety, Tariff & Power Conservation : 14 Marks Specific Objectives:	08	14

Student will be able to : <ul style="list-style-type: none"> ➤ Do wiring of switchboards. ➤ Select type of lamp as per requirement. ➤ State the importance of MCB and ELCB and electric safety. ➤ Explain the need of earthing and importance of pf. improvement. Contents: <p>7.1 Introduction to switches used in mechanical machines. Simple Electric Installations with 2 sockets, 2 fans, 2 lamps, with switches and fuses</p> <p>7.2 Introduction to different accessories like MCB, ELCB, wires & cables.</p> <p>7.3 Fluorescent, CFL and LED lamps with their ratings and applications.</p> <p>7.4 Concept of energy conservation and energy audit</p> <p>7.5 Necessity of earthing, type, safety tools, first aid.</p> <p>7.6 Types of tariff, pf improvement only methods.</p> <p>7.7 Fire extinguishing methods adopted in electrical engineering</p> <p>7.8 Trouble shooting electrical installations and machines.</p>		
Total	48	100

Skills to be developed for practical:

Intellectual skills

Student will be able to:

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

Motor skills:

Student will be able to:

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.
6. Prepare energy consumption bill with present tariff structure.

List of Practical:

1. Know your electrical laboratory.
2. Find the performance of R-L series circuit with single phase A.C. supply and determine the current, power and power factor.
3. Find the performance of R-C series circuit with single phase A.C. supply and determine the current, power and power factor.
4. Verify the relationship between line and phase values of voltages and currents in three phase balanced star and delta connected load.

5. Determine efficiency and single phase transformer at no load, half load and full load by conducting load test.
6. Determination of slip of three phase induction motor by use of tachometer at no load and full load.
7. Observe the change in direction of rotation of three phase induction motor by changing the phase sequence R-Y-B
8. Prepare switch board for two lamps, one fan, one fan regulator and one 5 ampere socket.
9. Connect single phase energy meter in simple lamp circuit for measurement of energy consumption for one hour.
10. Search fault in faulty machines or installation.
11. Demonstration of servo motor and stepper motor.

[Note: Practicals 1 to 9 shall be performed by 2 students and practical 10 in a group of 4 students]

Assignment:

1. **Industrial visit:** Visit to show various motors, electrical devices, accessories used in mechanical industrial applications like dairy, crushers, dall mill, oil mill or small scale unit. [The group size is as suggested by industry]
2. Detail study of electrical motors manufacture's catalogues to study mounting installation, frame work, coupling, rotor inertia etc. [To be performed individually]

NOTE: All Practicals and assignment are compulsory and should be considered in assessment formats A1, A2 And So On.

Learning Resources:

1. Books:

Sr.No.	Author	Title Of Book	Edition	Publisher
01	B.L. Theraja	Electrical Technology (Vol. I and IV)	Multicolour Edition 2005 And Subsequent Reprint	S.Chand & Co. Ramnagar New Delhi
02	E. Hughes	Electrical Technology	Second Edition	ELBS/Pearson
03	R.S. Ananda Murthy	Basic Electrical Engineering	Second Edition	Pearson
04	Theodore Wildi	Electrical Machines, Drives and Power Systems	Sixth Edition	Pearson
05	Sunil T. Gaikwad	Basic Electrical Engineering	First Edition	WILEY India

2. Websites:

www.wikipedia.com
www.youtube.com
www.narosa.com
www.dreamtechpress.com

Course Name : Diploma in Production Engineering**Course Code : PG/PT****Semester : Fourth****Subject Title : Heat Engineering****Subject Code : 17406****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	25#	25@	150

NOTE:

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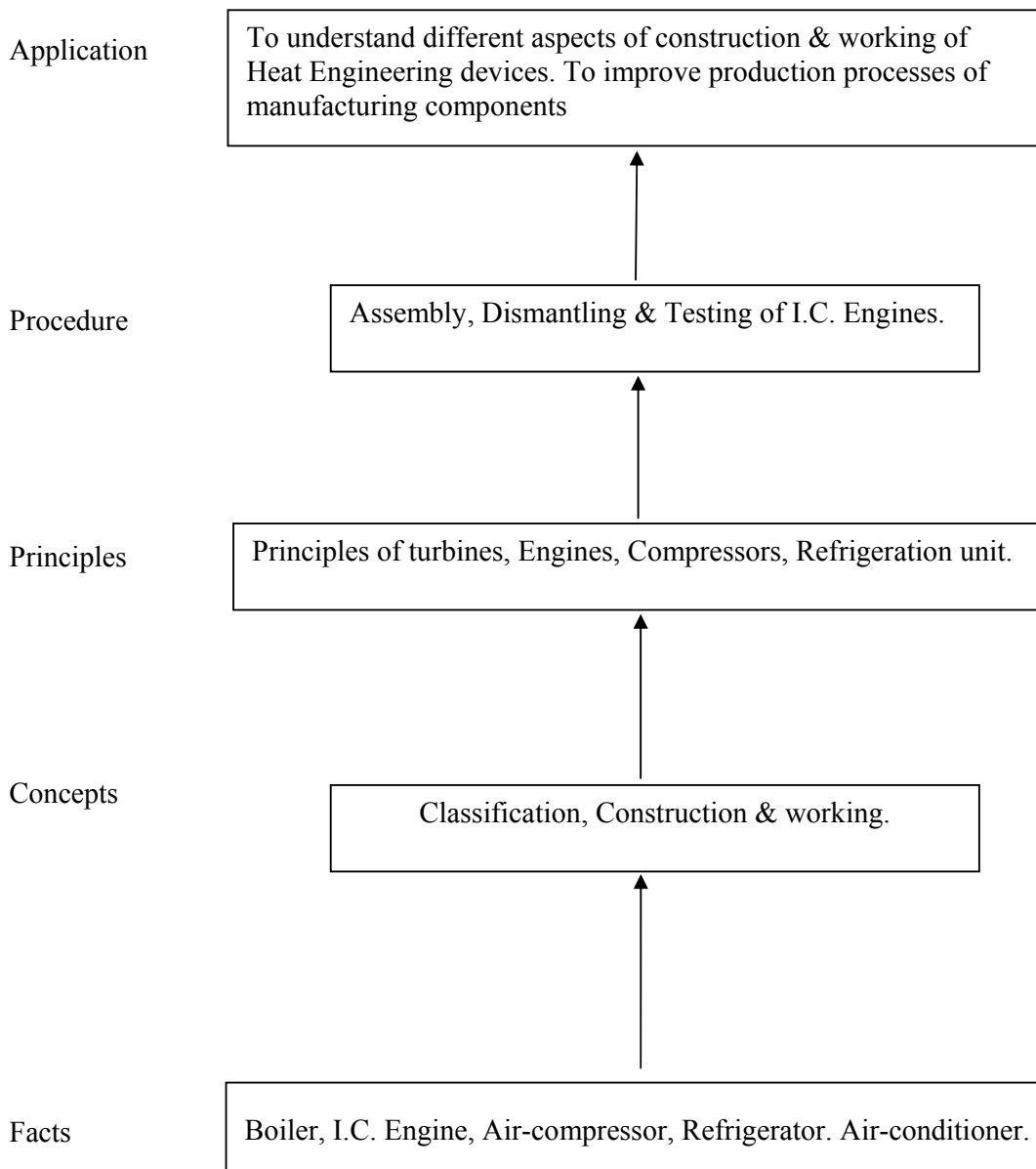
Rationale:

Production Engineer is involved in manufacturing aspects of power producing and power absorbing devices. I.C. Engines are used on large scale in automobiles and power sector. Compressors find many applications due to automation. Use of refrigeration and air-conditioning systems is increasing in industrial and domestic fields. Knowledge of working of these devices can help him in improving the performance of these devices.

Objectives:

The Student will be able to:

1. Understand construction and working of Boilers and turbines.
2. Understand constructional features of air compressor.
3. Know the applications of refrigeration.
4. Classify air-conditioning systems

Learning Structure:

Theory Content:

Topic and Contents	Hours	Marks
1. Sources of energy 10Marks Specific objectives ➤ State the various types and sources of energy. Content: 1.1 Brief description of energy Sources. 1.2 Classification of energy sources <ul style="list-style-type: none"> Renewable- Solar- Flat plate and concentrating collectors and its application. Wind, Tidal, Geothermal, Biogas, Biomass, Bio-diesel, Hydraulic, Photovoltaic Cell, Solar Water Heater, Solar Distillation. Non-Renewable- Fossil fuels, including CNG, LPG, Nuclear 1.3 Fuel cell – Types of fuel cells	08	10
2.Fundamentals of Thermodynamics 20 Marks Specific objectives: ➤ State laws of thermodynamics. Content: 2.1 Concepts of pure substance, types of system, properties of system, Extensive and Intensive properties with units and their conversion. 06 Marks 2.2 Work and Energy - Thermodynamic definition of work, heat, difference between heat and work, P.E., K.E, Internal Energy, Flow work, concepts of enthalpy. 06 Marks 2.3 Laws of Thermodynamics - Zeroth Law, First law - Principle of conservation of energy, irreversibility, second law, entropy. 08 Marks (Note: Simple numerical may be asked.)	14	20
3. Ideal Gases 16 Marks Specific objectives: ➤ Describe thermodynamic processes of the gases. Content: 3.1 Concept of Ideal gas - Charle's law, Boyle's law, Avogadro's law, equation of state, characteristic gas constant and universal gas constant. 08 Marks 3.2 Ideal gas processes - Isobaric, Isochoric, Isothermal, Adiabatic, Polytropic with representation of the processes on P-V and T-S diagrams 08 Marks (Note: Simple numerical may be asked.)	08	16
4.Boilers and Steam Turbines 12 Marks Specific objectives: ➤ Describe working of boilers and turbines. Content: 4.1 Introduction and classification of boilers. 4.2 Construction and working of Cochran, Babcock and Wilcox Boilers. 4.3 Construction and working of impulse and reaction turbines. 4.4 Introduction to steam power plant.	08	12
5. I.C. Engines 14 Marks Specific objectives: ➤ Describe working of I.C engine.	08	14

Content: 5.1 Classification of I.C. Engines. 5.2 Construction, working and comparison of two stroke and four stroke petrol and diesel engines.		
6. Air Compressors 14 Marks Specific objectives: ➤ State the types and working of compressors. Content: 6.1 Introduction and classification of air compressor. 6.1 Uses of compressed air. 6.2 Construction and working of single stage and two stage reciprocating compressor. 6.3 Screw compressor and centrifugal compressor- construction, working and applications.	10	14
7. Refrigeration and Air-conditioning 14 Marks Specific objectives: ➤ Explain refrigeration cycle. ➤ Describe working of air conditioner. Content: 7.1 Vapour compression cycle. 7.2 Components of vapour compression cycle and its application. 7.3 Classification of air conditioning systems. 7.4 Window Air Conditioner.	08	14
Total	64	100

Practical:

Skills to be developed:

Intellectual Skills:

1. Plan for trial test.
2. Calculate derived parameters.

Motor Skills:

1. Operate I.C. Engines.
2. Observe and sketch boiler mountings and accessories.
3. Test reciprocating air compressor and take measurements.

List of Practical:

1. Trial on domestic solar water heater and calculate its efficiency.
2. Trace and draw the flue gas path and water – steam circuit with the help of boiler model.
3. Trial on single/multi cylinder petrol or diesel engine with heat balance sheet.
4. Measurement of I.C. Engine pollutants with the help of Exhaust gas Analyzer.
5. Trial on single / two-stage Reciprocating compressor and determine volumetric, isothermal efficiency.
6. Trial on Refrigeration Test Rig for calculation of C.O.P, power required, refrigerating effect.
7. Identification of the components and trace the flow of refrigerant in domestic refrigerator/window air conditioner.

8. Visit to sugar factory/biogas plant/solar system/wind mills and draw the block diagram of plant layout and system.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
01	V.M. Domkundwar	Thermal Engg.	Dhanpat Rai and Co
02	P.L. Ballaney	Thermal Engg.	Khanna Publishers 24 th edition
03	R. S. Khurmi	Thermal Engg.	S. Chand and Co. Ltd. 15 th edition
04	R. K. Rajput	Thermal Engg.	Laxmi Publication, Delhi
05	Patel, Karmchandani	Heat Engine Vol.I and II	Acharya publication
06	P.K. Nag	Engg. Thermodynamics	Tata McGraw Hill 23 rd edition

Course Name : Mechanical Engineering Group**Course Code : ME/MH/MI/PG/PT/FE/FG****Semester : Fourth****Subject Title : Fluid Mechanics and Machinery****Subject Code : 17411****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	25#	--	25@	150

NOTE:

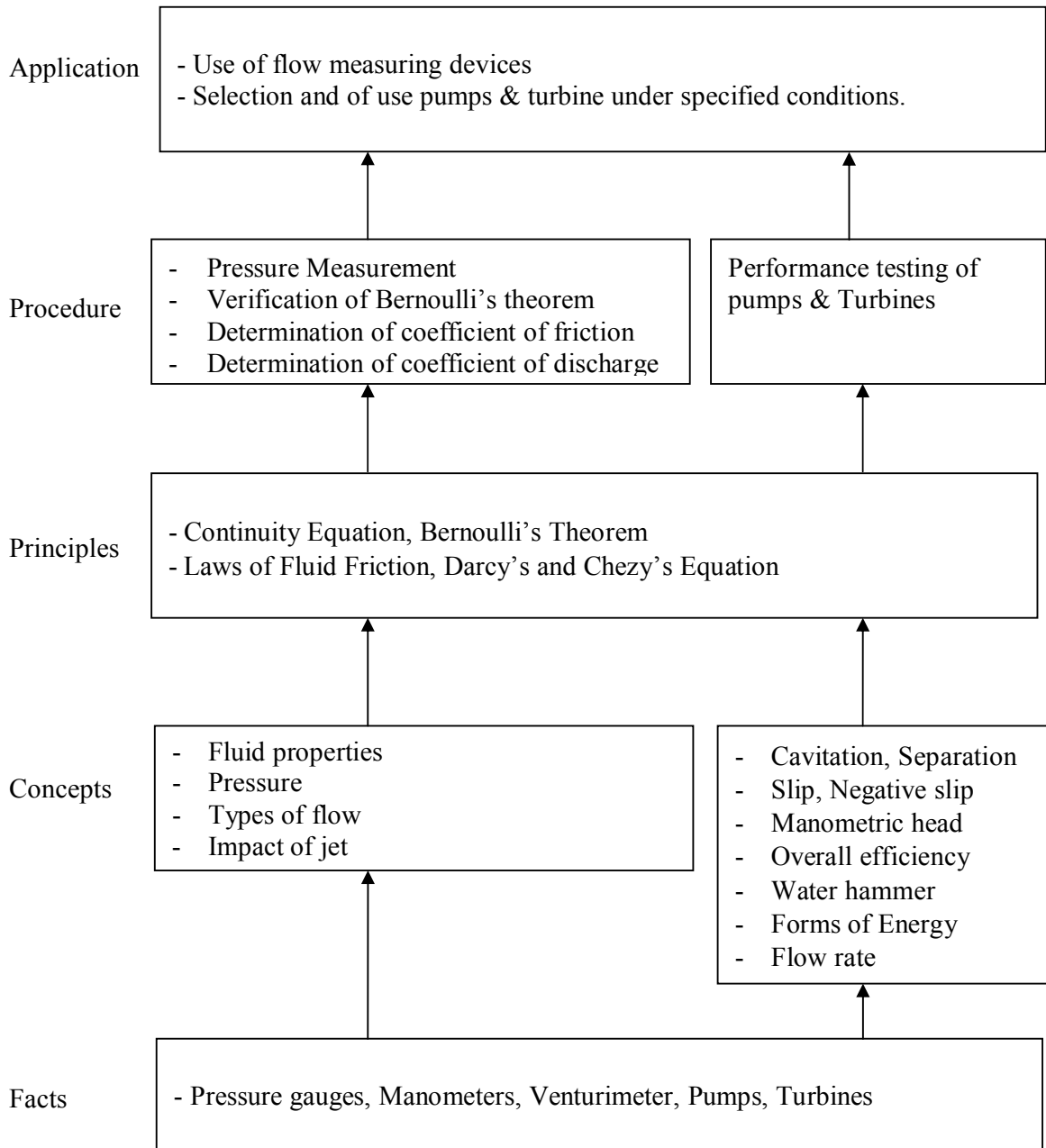
- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

Rationale:

Knowledge of fluid properties, fluid flow & fluid machinery is essential in all fields of engineering. Hydraulic machines have important role in water supply, irrigation, power generation and also in most of the engineering segments. This subject requires knowledge of basic engineering sciences, applied mechanics, mathematics etc. The fundamentals of this subject are essential for the subject "Industrial Fluid Power" in sixth semester.

General Objectives: The student will be able to

- 1) **Define** various properties of fluids
- 2) Measure pressure, velocity and flow rate using various instruments.
- 3) **State** continuity equation, Bernoulli's equation and its applications.
- 4) Estimate various losses in flow through pipes.
- 5) **Explain** concept of impact of jet on various types of vanes.
- 6) **Draw** the construction, working of hydraulic pumps and turbines.
- 7) Evaluate performance of turbines and pumps.

Learning Structure:

Theory:

Topics and Contents	Hours	Marks
1. Properties of fluid and Fluid Pressure Specific Objectives: <ul style="list-style-type: none"> ➤ Define fluid properties. ➤ Differentiate between fluid pressure intensity and pressure head. ➤ Solve numerical related to properties of fluid, fluid pressure and manometers. Contents: 1.1 Properties of Fluid 06 Marks Density, Specific gravity, Specific volume, Specific Weight, Dynamic viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility 1.2: Fluid Pressure & Pressure Measurement 14 Marks <ul style="list-style-type: none"> • Fluid pressure, Pressure head, Pressure intensity • Concept of absolute vacuum, gauge pressure, atmospheric pressure, absolute pressure. • Simple and differential manometers, Bourden pressure gauge. • Total pressure, center of pressure- regular surface forces on immersed bodies in liquid in horizontal, vertical and inclined position 	12	20
2. Fluid Flow Specific Objectives: <ul style="list-style-type: none"> ➤ State Bernoulli's theorem and apply it to venturimeter, orifice and pitot tube. Contents: <ul style="list-style-type: none"> • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform, non uniform, rotational, irrotational. • Continuity equation, Bernoulli's theorem • Venturimeter – Construction, principle of working, coefficient of discharge, Derivation for discharge through venturimeter. • Orifice meter – Construction, Principle of working, hydraulic coefficients. Derivation for discharge through Orifice meter • Pitot tube – Construction, Principle of Working 	10	14
3. Flow Through Pipes Specific Objectives: <ul style="list-style-type: none"> ➤ State laws of friction and list various losses in flow through pipes. ➤ Solve numerical on laws of friction and list various losses in flow through pipes. Contents: <ul style="list-style-type: none"> • Laws of fluid friction (Laminar and turbulent) • Darcy's equation and Chezy's equation for frictional losses • Minor losses in fittings and valves • Hydraulic gradient line and total energy line • Hydraulic power transmission through pipe 	10	14
4. Impact of Jets Specific Objectives: <ul style="list-style-type: none"> ➤ Analyze explain the impact of jet on vanes in various conditions. 	06	10

<p>➤ Solve numerical on impact of jet on vanes in various conditions.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Impact of jet on fixed vertical, moving vertical flat plates. • Impact of jet on curved vanes with special reference to turbines and pumps 		
<p>5. Hydraulic Turbines</p> <p>Specific Objectives:</p> <p>➤ Explain working principle of various hydraulic turbines.</p> <p>➤ Calculate work done, power generated and various efficiencies of hydraulic turbines.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Layout and features of hydroelectric power plant, surge tanks and its need. • Classification of hydraulic turbines and their applications. • Construction and working principle of Pelton wheel, Francis and Kaplan turbine. • Draft tubes – types and construction, Concept of cavitation in turbines, • Calculation of Work done, Power, efficiency of turbine 	12	18
<p>6. Pumps</p> <p>Specific Objectives:</p> <p>➤ Explain working of centrifugal, reciprocating and multistage pumps.</p> <p>➤ Explain the concept of cavitation in pumps.</p> <p>➤ Calculate manometric head, work done and various efficiencies related to the pumps.</p> <p>➤ Select the pump for a given application.</p> <p>6.1 Centrifugal Pumps 14 Marks</p> <p>Contents:</p> <ul style="list-style-type: none"> • Construction, principle of working, priming methods and Cavitation • Types of casings and impellers. • Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH. • Performance Characteristics of Centrifugal pumps. • Trouble Shooting. • Construction, working and applications multistage pumps • Submersible pumps and jet pump <p>6.2 Reciprocating Pump 10 Marks</p> <ul style="list-style-type: none"> • Construction, working principle and applications of single and double acting reciprocating pumps. • Slip, Negative slip, Cavitation and separation. • Use of Air Vessels. • Indicator diagram with effect of acceleration head & frictional head. <p>(No numerical on reciprocating pumps)</p>	14	24
Total	64	100

Practical:**Skills to be developed:****Intellectual Skills:**

- 1) Select appropriate flow and pressure measuring devices for a given situation.
- 2) Analyze the performance of pumps and turbines.

Motor Skills:

- 1) Use flow and pressure measuring devices.
- 2) Operate pumps and turbines.

List of Practicals:

1. Measure water pressure by using Bourdon's pressure gauge and U-tube Manometer. Also measure discharge of water by using measuring tank and stop watch.
2. Calibrate Bourdon's pressure gauge with the help of Dead weight pressure gauge.
3. Verify Bernoulli's theorem.
4. Determine Coefficient of Discharge of Venturimeter.
5. Determine coefficient of Discharge, Coefficient of Contraction and Coefficient of Velocity of Sharp edged circular orifice.
6. Determine Darcy's friction factor 'f' in pipes of three different diameters for four different discharges.
7. Determine minor frictional losses in pipe fittings.
8. Determine overall efficiency of Pelton wheel by using Pelton wheel test rig.
9. Determine overall efficiency of Centrifugal Pump & plot its operating characteristics by using Centrifugal pump test rig.
10. Determine overall efficiency of Reciprocating pump by using Reciprocating Pump test rig.

Assignments

1. Information collection of Centrifugal, reciprocating, multistage pumps and submersible pumps from local market and from internet. Comparison of various models manufactured by different manufacturers. [The market survey is to be completed in a group of (max.) three to four students and the report of the same is to be included as part of term work.]

Learning Resources:**Books:**

Sr. No	Author	Title	Publication
01	Ojha, Berndtsson, Chnadramouli	Fluid Mechanics and Machinery	Oxford University Press
02	Som S K , Biswas G.	Introduction to Fluid Mechanics and Fluid Machines 3 rd Edition	Tata McGraw-Hill Co. Ltd.
03	Modi P.N. Seth S M	Hydraulics and Fluid Mechanics including Hydraulic Machines	Standard Book House New Delhi
04	Subramanya K.	Fluid Mechanics and Hydraulic Machines: problems and solution	Tata McGraw-Hill Co. Ltd.
05	Product catalogues of various pump manufacturers		

Course Name : Mechanical Engineering Group**Course code : AE/ME/MH/MI/PG/PT****Semester : Fourth****Subject Title : Theory of Machines****Subject Code : 17412****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	---	25@	125

NOTE:

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

Rationale:

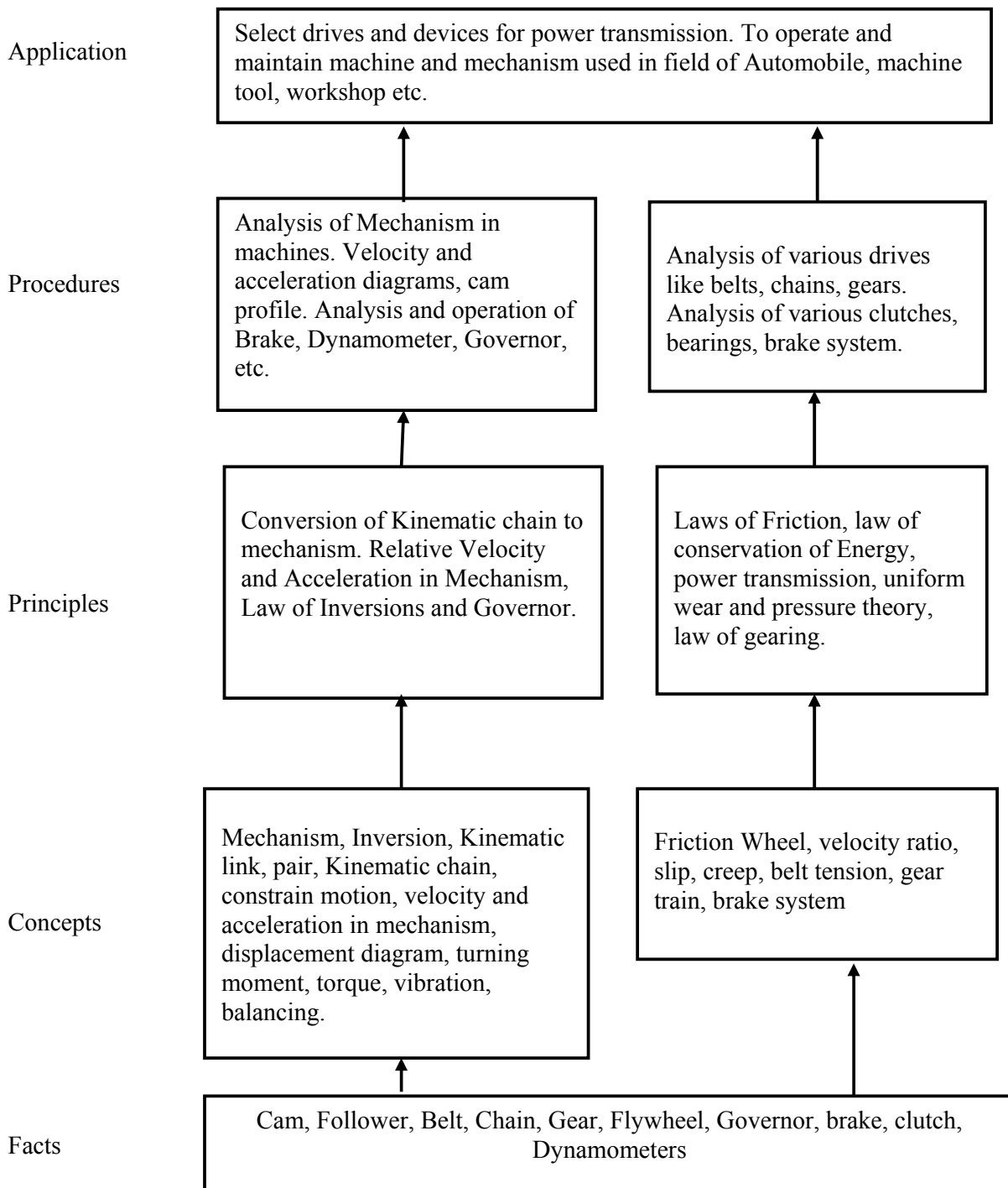
It is a core technology subject in Mechanical Engineering Discipline. Mechanical Engineers often come across various machines in practice. They should be able to identify and interpret various elements of machines in day to day life. In maintaining various machines, a diploma engineer should have sound knowledge of fundamentals of machine and mechanism. It will be helpful for them to understand the mechanisms from operational point of view in a better way. This subject imparts the kinematics involved in different machine elements and mechanisms like gear, cam-follower, follower, belt-pulley, flywheel, brake, dynamometer, clutch, etc.

Detailed knowledge of these aspects with deep insight into the practical applications develops a professional confidence in them to become successful Engineer.

This subject serves as a prerequisite for subjects like Machine Design to be learned in higher semester.

Objectives:**The student will be able to:**

1. Understand different machine elements and mechanisms.
2. Understand Kinematics and Dynamics of different machines and mechanisms.
3. Draw cam profile suitable to various displacement diagram.
4. Select Suitable Drives and Mechanisms for a particular application
5. Understand the function, operation and application of flywheel and governor.
6. Understand the function, operation and application of brake, dynamometer, clutch and bearing
7. Find magnitude and plane of unbalanced forces.

Learning Structure:

Theory:

Topic and Content	Hours	Marks
1. Fundamentals and type of Mechanisms Specific objectives: <ul style="list-style-type: none"> ➤ Define various terms related to mechanisms. ➤ Explain construction and working of various mechanisms 1.1 Kinematics of Machines:- Definition of Kinematics, Dynamics, statics, Kinetics, Kinematic link, Kinematic pair and its types, constrained motion and its types, Kinematic chain and its types, Mechanism, inversion, machine and structure. ----- 8 Marks 1.2 Inversion of Kinematic Chain <ul style="list-style-type: none"> • Inversion of four bar chain, coupled wheels of Locomotive, Beam engine, Pantograph. • Inversion of single slider Crank chain –Pendulum pump, Rotary I.C. Engine mechanism, Oscillating cylinder engine, Whitworth quick return mechanism. Quick return mechanism of shaper. • Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism, Elliptical trammel, Oldham's Coupling -----8 Marks 	07	16
2. Velocity and Acceleration in Mechanisms Specific objectives <ul style="list-style-type: none"> ➤ Draw velocity and acceleration diagram for given mechanism 2.1 Concept of relative velocity and relative acceleration of a point on a link, angular acceleration, inter-relation between linear and angular velocity and acceleration. 2.2 Analytical method (No derivation) and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism. -----8 Marks 2.3 Drawing of velocity and acceleration diagram of a given configuration, diagrams of simple Mechanism. Determination of velocity and acceleration of point on link by relative velocity method(Excluding Coriolis component of acceleration) ----- 8 Mark	08	16
3. Cams and Followers Specific objectives <ul style="list-style-type: none"> ➤ Define the terms related to Cam ➤ Classify Cams and Followers ➤ Draw cam profile as per the given applications 3.1 Concept, definition and applications of Cams and Followers. Cam terminology 3.2 Classification of Cams and Followers. 3.3 Different follower motions and their displacement diagrams - Uniform velocity, Simple harmonic motion, uniform acceleration and Retardation. ---- 4 Marks 3.4 Drawing of profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (graphical method) -----8 Marks	06	12
4. Power Transmission Specific objectives <ul style="list-style-type: none"> ➤ Give broad classification of Drives. ➤ Select Suitable Drives and Mechanisms for a particular application ➤ Calculate various quantities like velocity ratio, belt tensions, slip, angle of contact, power transmitted in belt drives 	10	20

<p>4.1 Belt Drives- flat belt, V-belt & its applications, material for flat and V-belt. Selection of belts, angle of lap, length of belt, Slip and creep. Determination of velocity ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission (Simple numericals) ----- 8 Marks</p> <p>4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages & Disadvantages of chain drive over other drives, Selection of Chain & Sprocket wheels, methods of lubrication. ----- 4 Marks</p> <p>4.3 Gear Drives – Classification of gears, Law of gearing, gear terminology. Types of gear trains, their selection for different applications. Train value & velocity ratio for simple, compound, reverted and epicyclic gear trains.8 Marks</p>		
<p>5. Flywheel and Governors ----- 8 Marks</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Differentiate between flywheel and governor ➤ Explain with neat sketch the construction and working of various governors <p>5.1 Flywheel –Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no Numericals) Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.</p> <p>5.2 Governors- Types, concept, function and application & Terminology of Governors.</p> <p>5.3 Comparison between Flywheel and Governor.</p>	04	08
<p>6. Brakes and Dynamometers. ----- 10Marks</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ List the differences between brakes and dynamometers ➤ Explain with neat sketch the construction and working of various brakes and dynamometers ➤ Calculate braking force, braking torque and power lost in friction in shoe and band brake <p>6.1 Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.</p> <p>6.2 Construction and working i) shoe brake, ii) Band brake iii) Internal expanding shoe brake iv) Disc Brake</p> <p>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</p> <p>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</p>	05	10
<p>7. Clutches and Bearings.</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Explain the difference between uniform pressure and uniform wear theories ➤ Explain with neat sketch, the construction and working of various clutches ➤ Calculate torque required to overcome friction and power lost in friction in clutches and footstep bearings <p>7.1 Clutches- Uniform pressure and Uniform Wear theories. Function of Clutch and its application, Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch v) Diaphragm clutch, (Simple numericals on single and Multiplate clutches).</p>	06	12

7.2 Bearings- i) Simple Pivot, ii) Collar Bearing iii) conical pivot. Torque and power lost in friction. (Simple numericals)		
8. Balancing Specific objectives <ul style="list-style-type: none"> ➤ Explain the concept of balancing ➤ Find balancing mass and position of plane, analytically and graphically. 8.1 Concept of balancing. Balancing of single rotating mass. Analytical/Graphical methods for balancing of several masses revolving in same plane.	02	06
Total	48	100

Practicals:**Skills to be developed:****Intellectual Skills:**

1. Determine velocity and acceleration of links in a given mechanism.
2. Analyse balancing of rotating masses in a single plane.
3. Interpret interrelationship between components of various braking mechanisms.
4. Compare various power transmission devices.

Motor Skills:

1. Drawing of velocity and acceleration diagrams.
2. Dismantle and assemble given brakes and clutches.
3. Draw cam profiles for a given application
4. Draw velocity and acceleration diagram of the given mechanisms
5. Draw force polygon for unbalanced masses revolving in same plane

Note - The Term work shall consist of Journal / lab manual and A-3 size sketch book.

List of Practical:

1. Sketch and describe working of quick return mechanism for a shaper. Find the ratio of time of cutting stroke to the return stroke to understand quick return motion in shaping operation.
2. Sketch and describe the working of the following mechanisms with its application,
 - a) Bicycle free wheel sprocket mechanism
 - b) Geneva mechanism
 - c) Ackerman's steering gear mechanism
 - d) Foot operated air pump mechanism
3. Determine velocity and acceleration of various links of the given two mechanism, by relative velocity method for analysis of motion of links.
4. Determine velocity and acceleration in an I. C. engine's slider crank mechanism by Kleins's construction.
5. Draw the profile of a radial cam for the given follower type to obtain the desired follower motion.
6. Determine slip, length of belt, angle of contact in an open belt drive to understand its performance.
7. Draw a schematic diagram of centrifugal governor and describe its working. Draw a graph between radius of rotation versus speed of governor to understand its function.

8. Dismantle and assemble mechanically operated braking mechanism of two wheelers. Sketch the two wheeler braking system and identify the functions of various components.
9. Dismantle and assemble multi-plate clutch of two wheeler. Draw neat sketch and state the functions of various components.
10. Determine graphically counterbalance mass and its direction for complete balancing of a system of several masses rotating in a single plane.

Learning Resources:**Books:**

Sr. No.	Title	Author	Edition	Publication
01	Theory of Machines	Khurmi Gupta	--	Eurasia publishing House Pvt. Ltd. 2006 edition
02	Theory of Machines	S.S. Rattan	Third	McGraw Hill companies, II Edition
03	Theory of Machines	P.L. Ballaney	--	Khanna Publication
04	Theory of Machines	Jagdishlal	--	Bombay metro-politan book limited
05	Theory of Machines	Sadhu Singh	Second	Pearson
06	Theory of Machines	Ghosh – Mallik	--	Affiliated East west press
07	Theory of Machines	Thomas Bevan	Third	Pearson
08	Theory of Machines	J.E. Shigley	Third	Oxford

Course Name : Mechanical Engineering Group**Course Code : AE/ME/PG/PT/MH/MI****Semester : Fourth****Subject Title : Professional Practices-II****Subject Code : 17035****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	02	--	--	--	--	50@	50

Rational:

The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. This can be achieved by arranging industrial visits, expert lectures attitude to present them-selves, get alternative solutions and validation of the selected alternatives, socially relevant activities, and modular courses. Professional Practices is helpful in broadening technology base of students beyond curriculum. Model making exercises allow students to think more creatively and innovatively and inculcating habit of working with their own hands. Modular courses are introduced with a view of learning and acquiring higher technology skills through industry experts and consultants from the respective fields.

Objectives:

The student will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topics
- 3) Present seminar using power projection system.
- 4) Interact with peers to share thoughts.
- 5) Work in a team and develop team spirit.

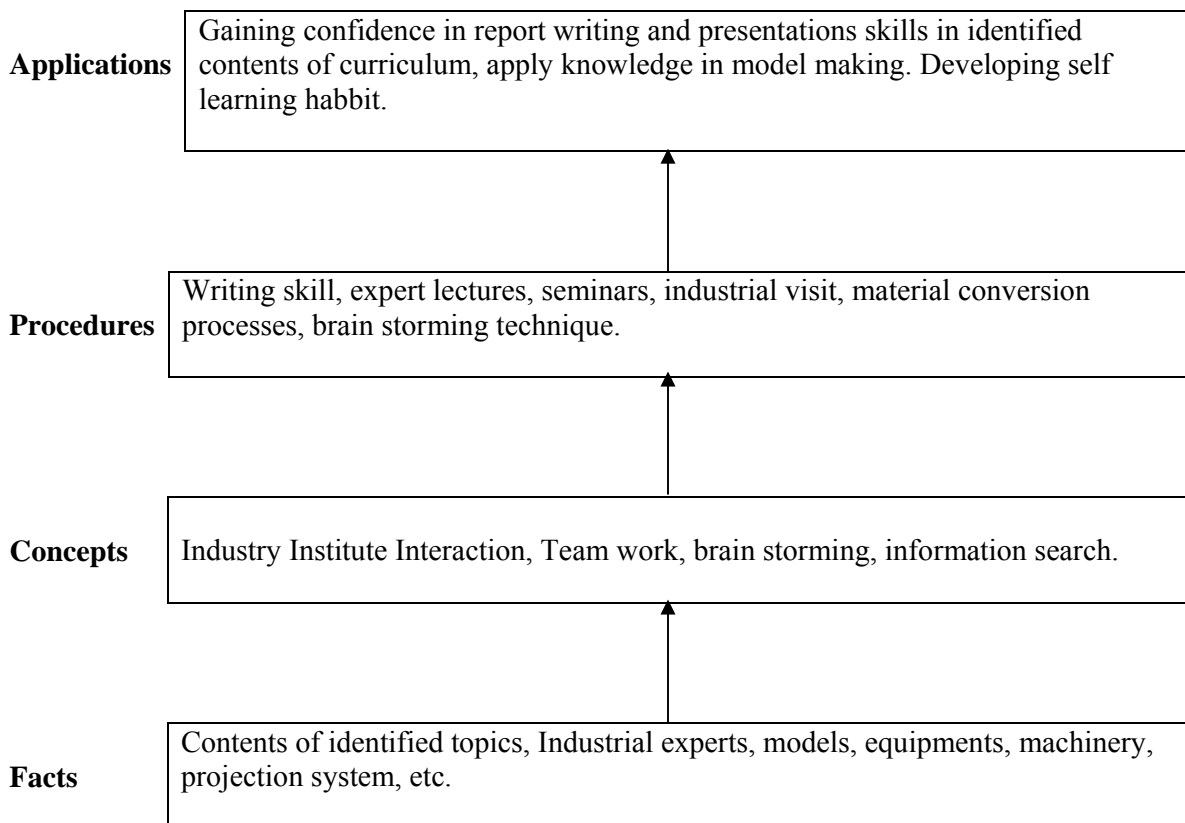
Intellectual Skill:

Student will be able to-

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

Motor Skills:

- 1) Observe industrial practices during visits.
- 2) Prepare slides / charts for presentation in seminar.
- 3) Develop a model

Learning Structure:

Content:

Topic & Content	Hours
<p>1. Information Search: Information search be made through manufacturers catalogue, Hand books, magazines journal and websites, and submit a report on any Two Topics in a group of 3 to 4 students, report size shall not be more than 10 pages. Following topics are suggested, any other equivalent topics may be selected.</p> <ol style="list-style-type: none"> Present scenario of electric power generation in Maharashtra state /India. Composite materials – Types, properties & application Material handling equipments commonly used in industries. Advances in Automobile engines. Hydraulic steering systems of Automobile. Mechanisms used to produce straight-line motion. Mechanisms used for generating intermittent motion. Advanced surface coating techniques like chemical vapor deposition, ion implantation, physical vapor deposition. Types of cutting tools- specification, materials and applications. Booking of E-Tickets for Railways/Buses/Air travel. Profiles of 2 multinational companies. Engine lubricants, coolants and additives Power steering, power windows ABS(anti lock braking systems) MPFI(multi point fuel injection) system Role of MIDC, MSSIDC, DIC, Financial institutions in development of industrial sector. Solar energy systems - Components and their functions, applications Design data book - Study and use of types of data. 	06
<p>2. Lectures by professionals/Industry Experts: Two lectures of two hour duration be arranged on any two topics suggested below or any other suitable topics to acquire practical information beyond scope of curriculum. Students shall prepare a brief report of each lecture as a part of their term work.</p> <ol style="list-style-type: none"> Components of project Report. Various loan schemes of banks, LIC and other agencies for education and other purposes. Use of plastics & rubbers in Automobiles industries. Type of processes used to protect material surfaces from environmental effect. Product life cycle. Industrial application of mechatronics. Special features of CNC machines Gear manufacturing & gear teeth finishing processes. Gear boxes-industrial & Automobile applications. Super-finishing operation &their industrial applications. Processing methods for plastic components. Features of modern boilers Strainers and filters –Types, functions and applications Industrial drives-Types, components, comparison and applications. Introduction to Apprenticeship Training Scheme 	04
<p>3. Seminars: One seminar be arranged on the subjects related to 4th semester. Or topics beyond curriculum. Each student shall submit a report up to 10 pages and deliver the seminar. batch size – 2-3 students.</p>	04

<p>Source of information – books, magazine , Journals, Website ,surveys, Topics suggested for guidance-</p> <ol style="list-style-type: none"> Clutches- Types, Principles, working, & applications. High pressure boilers. Heat exchangers-Types, working, applications. Hydraulic turbines-Types, working & applications. Hydraulic pumps -Types, working & applications. Sensors -Types, principle, & applications. Super conductor technology - Types, principle, & applications. Semi conductors- Types, materials, & applications. Industrial breaks- Types, construction, working, & applications. 	
<p>4. Industrial Visits</p> <p>Structured industrial visits be arranged and report of the same shall be submitted by each student to form a part of the term work.</p> <p>No of visits- At least one</p> <p>Scale of industry- medium scale unit, large scale unit.</p> <p>Group size- practical batch</p> <p>Report-not exceeding 7 to 10 pages.</p> <p>Purpose :</p> <ul style="list-style-type: none"> ➤ To study the profile of industry ➤ To see the advanced manufacturing processes & machinery. ➤ To observe working of CNC machines, work centre's ,flexible manufacturing systems ➤ To observe working in foundry, forging shop, press shop, heat treatment shop etc. ➤ To observe chip less manufacturing machines & processes. ➤ To study process sheets , quality control charts & production drawings, metallurgical testing laboratory ➤ To observe Tool room, standards room etc. <p>Following types of industries may be visited in & around the institute.</p> <ol style="list-style-type: none"> Foundry Forging units Sheet metal processing unit Machine/ Automobile component manufacturing unit Fabrication unit/ powder metallurgy component manufacturing unit. Machine tool manufacturing unit. Any processing industry like chemical, textile, sugar, agriculture, fertilizer industries. Auto workshop / four wheeler garage. City water supply pumping station Hydro electric power plant, Wind mills, Solar Park 	04

<p>5. Socially Relevant Activities Conduct any one activity through active participation of students and write the report. Group of students- maximum 4 Report- Not more than 6 pages List of suggested activities- (activities may be thought in terms of campus improvement)</p> <ol style="list-style-type: none"> Awareness about carbon credit Anticorruption movement Awareness about cyber crimes. Developing good citizens. Management of E- WASTE Recycling of waste materials. Accident prevention & enforcement of safely rules. Awareness about pollution and pollution control. Any other relevant activity may be performed) 	04
<p>6. Mini Projects Students, in a group of 4, shall perform any one activity listed below.</p> <ol style="list-style-type: none"> Model making out of card board paper ,wood ,thermocool, plastics, metal, clay etc <ol style="list-style-type: none"> Any new idea/principle converted into model Mechanisms Jigs/fixtures Material handling device, etc. Toy making with simple operating mechanisms Layout of workshop/department/college Experimental set up/testing of a parameter Display board indicating different type of machine components like bearing, fasteners, couplings ,pipe fitting, valves, cams & followers, exploded views of assemblies, type of welding equipment ,welding rods (drawings, photo graphs) Any relevant project which will make students to collect information & work with their own hands. <p>Students shall arrange exhibition of all mini projects in the class/hall and present the task to the audience/ experts/examiners. The student shall submit a brief report (Max. 5 pages) of the mini project.</p> <p style="text-align: center;">OR</p> <p>Modular course: Modular courses on any one of the suggested or equivalent topic be undertaken by a group of 15 to 20 students.</p> <ol style="list-style-type: none"> Advance features in CAD Meshing of solid model using any suitable software Developing Unfold Sheet or Hyperblank by using Blanking Software CAM Software Basics of PLC programming Applications of mechatronics Piping Technology Modern packaging technology Enterprise Resource Planning Bio-pneumatic Robots Bio-mimicry 	10
Total	32

Note:–

The students who wish to undergo in plant training shall go through details regarding it in the syllabus of Professional Practices – III for fifth semester and complete the training in summer vacation at the end of fourth semester examination.

All such students will be assessed out of ten marks as per guidelines mentioned in the curriculum of professional practice III in the fifth semester

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development Corporation, GOI.
02	DK Publishing	How things works encyclopedia	DK Publishing
03	Trott	Innovation mgmt.& new product development	Pearson Education
04	E.H. McGrath, S.J.	Basic Managerial Skills for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, Available on MSBTE Web Site.		

2. Web sites

www.engineeringforchange.org
www.wikipedia.com
www.slideshare.com
www.teachertube.com

Course Name : All Branches of Diploma in Engineering & Technology

**Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/
ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG**

Industrial Training (Optional) after 4th semester examination.

Note:- Examination in Professional Practices of 5th Semester.

INDUSTRIAL TRAINING (OPTIONAL)

Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- Their work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Professional Practices-III and marks will be given accordingly out of 50.