Name of the Course : Diploma in Mechanical Engineering (Production)
Subject Title: Computer Programming(Same with Mechanical).

Course code: MEP	**Semester :** Fourth
Duration : 17 weeks	**Maximum Marks : 50**
Teaching Scheme:	**Examination Scheme**
Theory : 1 hrs/week	Mid Semester Exam: Marks
Tutorial: hrs/week	Assignment & Quiz: Marks:
Practical : 2 hrs/week	End Semester Exam: Marks
Credit: 2	**Practical: Internal Sessional continuous evaluation**:25 Marks
	Practical: External Sessional Examination:25 Marks

Aim :-	
S.No	
1	

Objective :-

To understand how to give instructions to computers.

To expose a student to the basic principles of programming through a structured programming language like 'C'.

To enable the students to learn about any advanced Object Oriented programming Language.

S No	The student will able to
1	Break a given task into subtasks.
2	Enhance logical thinking.
3	Develop 'C' programs for simple applications.

Pre-Requisite:-	
S.No	
1	Sound knowledge of computer.

Contents		Hrs/week
Chapter	*Name of the Topic*	**Hours**
01	Problem, definition and analysis, algorithm, flow charts, tracing and dry running of algorithms. Introduction to 'C' programming, simple program using Turbo 'C' compiler and execution of 'C' program	**02**
02	C Fundamentals: Character set, constants, data types, identifiers, key words, variable declarations, Types of Operators – unary, binary, arithmetic, relational, logical, assignment. Hierarchy of operators, expressions, library functions, Use of input/ output functions viz. Printf( ), Scanf( ), getch( ), putch( )	**03**
03	Use of Control Statements:- if-else, if-else-if, switch-case, while loop, do – while loop, for loop, break and continue. Writing, Compiling, Executing and debugging programs	**05**
04	Introduction to Subscripted variables, arrays, defining and declaring one and two dimensional arrays, reading and writing	**03**
05	Concept of String, string input / output functions Defining and accessing a user defined functions, Passing of arguments, declaration of function prototypes Storage classes: automatic, external, static variables	**03**
	Total	**16**

Practical:
Skills to be developed:
Intellectual Skills:

- Prepare and interpret flow chart of a given problem.
- Represent data in various forms.
- Use various control statements and functions

Motor Skills:

- Write program in 'C' language.
- Run and debug 'C' program successfully.

LIST OF PRACTICALS

To write simple programme having engineering application involving following statements

1. Use of Sequential structure: atleast **two** problems
2. Use of if-else, if-else-if statements: atleast **five** problems
3. Use of for statement: atleast **eight** problems
4. Use of Do-While Statement: atleast **two** problems
5. Use of While statement: atleast **five** problems
6. Use of brake and Continue statement: atleast **two** problems
7. Use of multiple branching Switch statement: atleast **two** problems
8. Use of different format specifiers using Scanf( ) and Printf( ): atleast **two** problems
9. Use of one dimensional array e.g. String, finding standard deviation of a group data: atleast f**ive** problems
10. Use of two dimensional array of integers/ reals: atleast **two** problems
11. Defining a function and calling it in the main: atleast **five** problems

Examination Schedule Internal practical Sessional:

Attending classes, practicing programs & submitting respective assignment in time		20	
Viva - voce		5	
Total:		25	
Examination Schedule: External practical Sessional examination Examiner: **Lecturer**			
For submission of assignment in scheduled time		10	
On spot program		10	
viva voce		05	
Total		25	

.

Reference books :- Nil	
Suggested List of Laboratory Experiments :- Nil	
Suggested List of Assignments/Tutorial :- as mentioned in list of practical	

List of Books:

Author	Title	Publication
Yashwant Kanitkar	Let us 'C'	BPB publications
Balguruswamy	Programming in 'C'	Tata Mc- Graw Hill
Pradip Dey & Manas Ghosh	Programming in 'C'	Oxford Higher Education
Byron Gotfried	Introduction to 'C' programming	Tata McGraw Hill
Denis Ritchie and Kerninghan	Introduction to 'C' programming	Prentice Hall Publications

FLUID MECHANICS AND HYDRAULIC MACHINES

Name of the course: Mechanical Engineering(Production) **Subject: FLUID MECHANICS AND HYDRAULIC MACHINES**	
Course Code:ME(P)	Semester:Fourth
Duration:17 weeks	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory:3 hrs/week	End Semester Exam:70
Tutorial:hrs/week	Teacher's Assesment(Assignment & Quiz):10 Marks
Practical:2 hrs/week	Internal Assesment:20 Marks
Credit:4	Practical Sessional internal continuous evaluation:25 Marks
	Practical Sessional external examination: 25 Marks

Aim:-

Sl. No.	
1.	To study various fluid properties, pressure measurement & Fluid statics.
2.	To understand the kinematics, dynamics of fluid flow.
3.	To study various discharge, flow, velocity measuring devices & pipe flows.
4.	To study Hydraulic turbines & pumps.
5.	To study Fluid power equipments & valves.

Objective:-

Sl. No.	The students should be able to:
1.	Know various fluid properties & statics
2.	Know dynamics & kinematics of Fluid flow.
3.	Understand various discharge, flow velocity measuring devices .
4.	Understand characteristic of hydraulic turbines & pumps.
5.	Know the principle of Fluid power & their application.

Pre-Requisite: Elementary knowledge of Physics & Mathematics.

Contents			**Hrs./week**	
FLUID MECHANICS & HYDRAULIC MACHINES.				
Chapter		Name of the Topic	Hours	Marks
		GROUP-A		
1	1.0	**PROPERTIES OF FLUID**	03	
	1.1	Properties of fluids:- Density, specific weight, specific volume, specific gravity		
	1.2	Viscosity, Newton's law of viscosity, kinematic viscosity(simple numerical).		
	1.3	Surface tension & capillarity(simple numerical), compressibility & bulk modulus.		
2	2.0	**PRESSURE AND ITS MEASUREMENT**:	03	
	2.1	Fluid pressure at a point, pascal's Law, Absolute pressure, gauge pressure & Atmospheric pressure.		
	2.2	Simple Manometers, peizometer,U-tube Manometer, Differential Manometer (simple numerical)		
3	3.0	**HYDROSTATIC FORCES ON SURFACES**:	06	
	3.1	Force on a horizontal submerged plane surface, vertical plane submerged surface, inclined submerged plane surface and force on curved submerged surfaces(problems).		

	3.2	Buoyancy, center of buoyancy, metacentric height and its determination – analytical and experimental, stability of floating and submerged bodies-simple problems.		
		GROUP- B		
4	4.0	**KINEMATICS OF FLOW**:	05	
	4.1	Methods of describing fluid flow (Eulerian method), classification of flow-steady and unsteady flow, uniform and non-uniform flow, laminar and turbulent flow, compressible and incompressible flow, one, two and three dimensional flow, stream line, path line, streakline, flow rate and continuity equation (one dimensional),		
5	5.0	**DYNAMICS OF FLOW**:	05	
	5.1	Euler's equation along a stream line, Bernoulli's equation from Euler's equation, Bernoulli's equation for real fluid, momentum equation,simple problems on Bernoulli's equation.		
	5.2	Velocity measurement : Pitot tube, Pitot static tube – problems. Flow measurement : Orifices, weirs and notches, rectangular, V-notch and trapezoidal notch, venturimeter-simple problems.		
		GROUP-C		
6	6.0	**FLOW THROUGH PIPES**:	04	
	6.1	.Flow regions & Reynolds number, loss of head (i) due to friction through a pipeline (Darcy & Weisbach equation) – (ii) Sudden expansion & contraction & (iii) entrance & exit losses (without any proof), power absorbed in viscous flow-simple problems.		
	6.2	Power transmission through pipes, conditions for Maximum power transmission & Maximum efficiency, (simple problems). Hydraulic Gradient & Total Energy line.		
		GROUP-D		
7	7.0	**HYDRAULIC TURBINES**:-	05	
	7.1	Classification of hydraulic turbines and selection criteria. Pelton turbine, Francis turbine & Kaplan turbine (only constructional features), simple problems on pelton turbine.		
	7.2	General layout of hydro-electric power plant, definitions of gross head, net head, volumetric efficiency, hydraulic efficiency, mechanical efficiency and overall efficiency.(with reference to Pelton Turbine only).		
8	8.0	**CENTRIFUGAL PUMP:**	06	
	8.1	Centrifugal pump : Classification of centrifugal pumps, static head, manometric head, net positive suction head, velocity diagram and work done forward curved vane, backward curved vane, radial vane, head-discharge curve,		

		pressure rise in impeller, pump losses and efficiencies, priming – simple problems.		
9	9.0	**RECIPROCATING PUMP:**	04	
		Reciprocating pump : Working principle, single acting, double acting, slip, indicator diagram, discharge, work done and power required to drive a pump.		
		GROUP-E		
10	10.0	**FLUID SYSTEMS & HYDRAULIC VALVE**:	04	
		Types of hydraulic circuits – open type and closed type, Definition of valve, Various types of valves for hydraulic system (components and their working principles) – Pressure control valves – Pressure relief and pressure reducing valve, flow control valve, direction control valve (rotary spool type and sliding spool type) – check valve, hydraulic cylinder –single acting and double acting, symbolic representation of hydraulic circuits with examples, Accumulator, Pressure intensifier		
		Sub Total	45	
Internal Assesment Examination & Preperation of Semester Examination			6	
		Total	51	

Practical:

Skills to be developed:

Intellectual Skill :

1. Understand Measurement of pressure by Manometers.
2. Understand Bernoulli's theorem and Venturimeter, Orificemeter.
3. Understand the Reynold's number.
4. Interpret Cc, Cv, Cd for flow through orifice.
5. Understand the models of centrifugal & reciprocating pump.

Motor Skills :

1. Conduct trial on Manometers.
2. Study of Venturimeter, orificemeter ,v-notch, Rectangular notch.
3. Conduct trial on pipe flow for determination of friction factor.
4. Conduct trial on Cc,Cv,Cd.
5. Conduct trial on models on centrifugal & reciprocating pump.

List of Practical:

1. Measurement of pressure using manometers and pressure gauge,
2. To verify Bernoullis theorem from Bernoulli's apparatus.
3. To determine the Reynold's number for laminar flow through a pipe,
4. To determine Cc, Cv, Cd for flow through orifice under constant head,
5. Calibration of a) Venturi meter, (b) Orifice meter,
6. Calibration of V-notch,Rectangular notch,
7. To determine the co-efficient of pitot tube,
8. Determination of minor losses in pipes,
9. Determination of friction factor in pipe flow,
10. Study of models of centrifugal and reciprocating pump,
11. Study of a Hydraulic circuit used for actuating a hydraulic piston cylinder system.

N.B. : At least six experiments/studies are to be performed by each student.

TEXT BOOKS:-

Name of Authors	Titles of the Book	Name of the publisher
R.K.Bansal	A Text Book of Fluid Mechanics & Hydraulic Machines	Laxmi publication, Delhi.
R.S.Khurmi	A T.B of Hydraulics, Fluid Mechanics & Hydraulic Machines	S.Chand &Co. Ltd.
Som & Biswas	A T.B of Fluid Mechanics	TMH.
S R Majumdar	Oil hydraulic systems	TMH.
R. K. Rajput	A T.B .of fluid Mechanics & Machines	

Reference books: Nil

Suggested list of laboratory experiments:- nil.

Suggested list of Assignments/Tutorial:-

1 .Draw law of viscosity graphically.
2. Draw Venturimeter, orificemeter, V- notch.
3. Draw Layout of Hydroelectric power plant.

EXAMINATION SCHEME:END SEMESTER EXAMINATION

GROUP	MODULE/CHAPTER	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTION			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2,3	5	ANY 20	1	20	2	FIVE(AT LEAST ONE FROM EACH GROUP)	10	50
B	4,5	4				2			
C	6	3				2			
D	7,8,9	5				2			
E	10	3				2			

EXAMINATION SCHEME FOR PRACTICAL SESSIONAL

Internal Examination: Examiner- Lecturer in Mechanical Engg./Jr. Lecturer/Demonstrator.

Five No. of Experiments / Study attended & respective lab note submitted in due time.	5*3=15		
VIVA VOCE	10		
TOTAL	25		

Externall Examination: Examiner- Lecturer in Mechanical Engg./Jr. Lecturer/Demonstrator.			
Five No. of Experiments / Study attended & respective lab note submitted in due time.	5*3=15		
VIVA VOCE	10		
TOTAL	25		

Name of the Course : Mechanical Engineering (Production) **Subject: ENGINEERING THERMODYNAMICS**	
Course code: MEP	**Semester : Third**
Duration : 17 weeks	**Maximum Marks : 200**
Teaching Scheme	**Examination Scheme**
Theory : **3** hrs/week	Internal Assessment: **20** Marks
Tutorial: hrs/week	Teacher's Assessment (Assignment & Quiz): **10** Marks
Practical : **3** hrs/week	End Semester Exam: **70** Marks
Credit: **5**	Practical: Internal Sessional continuous evaluation: **50** Marks
	Practical: External Sessional examination: **50** marks

Aim :-	
S. No.	
1	To understand the concept of energy, work, heat & their conversion.
2	To understand the concept of thermodynamics and study of various thermodynamic laws with their applications.
3	To study the properties of gas & properties of steam and their application in different thermodynamic system.
4	To study the basics of Vapour Power Cycle and Gas Power Cycle
5	To study the basics of Heat transfer and its application.

Objective :-	
S. No.	The Students should be able to:
1.	• Apply fundamental concepts of thermodynamics to thermodynamic systems.
2.	• Understand various laws of thermodynamics.
3.	• Apply various gas laws & ideal gas processes to various thermodynamic systems.
4.	• Understand the properties of steam and should be able to solve simple numerical of two phase system by using steam table / Mollier chart.
5.	• Understanding the basics of Vapour Power Cycle and Gas Power Cycle
6.	• Understand the basics of Heat transfer and its application.

Pre-Requisite: Elementary knowledge on Physics and basic Mathematics

Contents			Hrs/week	
THERMAL ENGINEERING- I				
Chapter		**Name of the Topic**	**Hours**	**Marks**
		GROUP-A		
1	1.0	**FUNDAMENTALS OF THERMODYNAMICS**	10	
	1.1	**Fundamental concepts of the following:**		
	1.1.1	Pure substance.		
	1.1.2	System, Boundary, Surrounding.		
	1.1.3	Classification of system, including open system, closed system, isolated system.		
	1.1.4	Properties of system, including Intrinsic and Extrinsic properties with units and its conversion like Pressure (Atmospheric Pressure, Gauge Pressure and Absolute pressure), Volume, Sp-mass and		
	1.1.5	Temperature.		
	1.1.6	State of a system, change of state, Path, Process.		
	1.1.7	Equilibrium of a system, including Mechanical, Thermal, Chemical and Thermodynamic equilibrium.		
	1.1.8	Cycle, including Thermodynamic cycle and Mechanical cycle.		

	1.2 1.2.1 1.2.2 1.2.3 1.2.4 1.2.5 1.3 1.3.1 1.3.2 1.3.3 1.3.4	S.T.P and N.T.P. **Energy:** Definition and units of Transient energy (Work and Heat), Stored energy (P.E., K.E and Internal energy), Point Function & Path Function. Displacement work & Flow work. Definition & units of Power. Definition and units of Enthalpy. Definition of Specific heat, Specific heat at constant pressure (Cp), Specific heat at constant volume (Cv) and Adiabatic Index (Cp/Cv). **Laws of Thermodynamics and their Application:** Zeroth Law of Thermodynamics and Temperature measurement. Principle of Energy Conservation. First law of Thermodynamics, Simple Energy Equation for non-flow process (Q - W) = ΔE, Steady Flow Energy Equation and its application to system like boiler, nozzle, turbine, compressor & condenser (Simple numerical), Concept of Perpetual Motion Machine of 1st kind, limitations of First law of Thermodynamics. Second Law of Thermodynamics: Kelvin – Plank Statement & Clausius' Statement, Heat Engine, Heat Pump and Refrigerator, Thermal Efficiency, C.O.P., Concept of Perpetual Motion Machine of 2nd kind, definition and units of Entropy.		
2	2.0 2.1 2.2 2.3 2.5	**PROPERTIES OF GASES** Definition and comparison of Ideal Gas & Real Gas. Charle's Law, Boyle's Law and Avogadro's Law, Equation of State (PV=mRT), Characteristic Gas Constant and Universal Gas Constant. Relation among two Specific Heats (Cp & Cv) with Characteristic Gas Constant. Ideal gas processes: Governing equation of processes (Pressure & Volume relations), Representation of the processes on P-V and T-S diagram, Deduce the expression to calculate Work transfer, Heat Transfer, Change of I.E., change of enthalpy and Change of Entropy for the following Processes: Constant Pressure Process, Constant volume Process, Constant temperature Process, Adiabatic Process & Polytropic Process (Simple numerical on Processes).	10	
		GROUP-B		
3	3.0 3.1 3.2	**PROPERTIES OF STEAM** Explanation of steam generation process with the help of P-V & T-S diagram. Basic terms & properties of steam: Saturation Temperature, Saturation Pressure, Saturated liquid, Dry Saturated Steam, Wet Saturated Steam, Saturated steam, Superheated Steam, Critical Temperature, Dryness Fraction, Degree of Superheat, Sensible Heat, Enthalpy of Evaporation or Latent Heat of Evaporation, Enthalpy of Steam, Specific Volume, Entropy of Steam. (Simple	10	

		numerical)		
	3.3	Steam Table & its use, Enthalpy- Entropy diagram of steam (Mollier Chart) and its use.		
	3.4	Measurement of dryness fraction: Throttling process, Steam Calorimeters, Types and Principle for calculation of Dryness Fraction of Steam using a) Throttling Calorimeter, & b) Combined Separating & Throttling Calorimeter (Simple numerical).		
	3.5	Comparison of Gas & Vapour Vapour Processes: Constant Pressure, Constant Volume, Constant Entropy & Constant Temperature processes and representation of the processes on P-V, T-S & H-S diagram,(Simple numerical using Steam Table and Mollier Chart)		
4	4.1	**GAS POWER CYCLE**	06	
	4.1.1	Carnot Cycle		
	4.1.2	Stirling Cycle		
	4.1.3	Ericsson Cycle		
	4.1.4	Otto Cycle		
	4.1.5	Diesel Cycle		
	4.1.6	Duel Cycle		
	4.1.7	Brayton Cycle		
	4.2	**VAPOUR POWER CYCLE**		
	4.2.1	Simple Steam Power Cycle		
	4.2.2	Rankine Cycle		
	4.2.3	Comparison of Rankine and Carnot Cycle		
	4.2.4	Inpractibility of Carnot Cycle in actual cases		
	4.2.5	Modified Rankine Cycle		
	4.2.6	Reheat Cycle		
	4.2.7	Regenerative Cycle		
	4.2.8	Actual Reheat-regenerative Cycle		
5	5.0	**BASIC OF HEAT TRANSFER**	09	
	5.1	Explanation of Three Basic Modes of Heat Transfer (Conduction, Convection and Radiation).		
	5.2	Fourier's Law of heat conduction, Thermal Conductivity and concept of Thermal Resistance.		
	5.2.1	Heat Transfer through Plane Homogeneous Wall, Heat Transfer through Composite Wall, Heat Transfer through Hollow Cylinder and Heat Transfer through combined Conduction and Convection (Simple numerical).		
	5.3	Stefan-Boltzman Law of heat radiation with explanation of terms with unit. (No numerical)		
	5.3.1	Definition and inter relation of Absorptivity, Reflectivity and Transmissivity		
	5.3.2	Concept of Black and Gray Bodies.		
	5.4	Principle of heat exchanger, Construction, working principle and application of Shell and Tube, Plate Type, Multiphase Heat Exchangers. (No deduction and numerical)		

		Sub Total:	45	
		Internal Assessment Examination & Preparation of Semester Examination	6	
		Total	51	

Practical:

Skills to be developed:

Intellectual Skill :

1. Understand various concepts and fundamentals of thermodynamics.
2. Understand concepts and laws of ideal gasses.
3. Interpret steam tables, Mollier chart and relationship between different thermodynamic properties.
4. Understand various Gas Power Cycle and Vapour Power Cycle
5. Understand modes of heat transfer and concept of heat exchanges.

Motor Skills :

1. Conduct trial on Bomb Calorimeter for calculating the calorific value of coal.
2. Conduct trial on Dryness Fraction Measuring Instrument for calculating the dryness fraction of steam.
3. Conduct trial on the setup for calculation of thermal conductivity of metal rod.

List of Practical:

1. Study of Bomb Calorimeter.
2. Study of Pressure Gauge and its use.
3. Calculation of Characteristic Gas Constant of air based on some practical data.
4. Study and Measurement of Dryness Fraction of Steam by Dryness Fraction Measuring Instrument.
5. Calculation of thermal conductivity of a solid metallic rod.
6. Verification of Stefan-Boltzman's law.
7. Study and compare various Heat Exchangers such as Radiators, Condensers, Evaporators (Shell and Tube Heat Exchanger), Plate Type Heat Exchangers.

Note: At least FIVE (05) no. of Practical/Study are to be conducted.

Text Books

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Domkundwar V. M.	A Course in Thermal Engineering.		Dhanpat Rai & Co.
Dr. D.S.Kumar	Engineering Thermodynamics (Principles & Practices)		S.K. Kataria & Sons
P. L. Ballaney	A Course in Thermal Engineering.		Khanna Publishers
R. S. Khurmi	A text book of Thermal Engineering.		S. Chand & co. Ltd.
R. K. Rajput	A Course in Thermal Engineering.		Laxmi Publication, Delhi
Patel and Karmchandani	Heat Engine Vol. - I & II		Acharya Publication
P. K. Nag	Engineering Thermodynamics		Tata McGraw Hill
B. K. Sarkar	Thermal Engineering		Tata McGraw Hill
A.R. Basu	Thermal Engineering (Heat Power)		Dhanpat Rai & Co.

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

1. **Draw P-V, T-S & H-S plane of steam and display saturated liquid line, dry saturated vapour line, wet saturated steam zone, critical point, triple point, superheated zone& under cooled liquid zone.**

2. Draw P-V, T-S, H-S & P-T plane of steam and show constant pressure, constant temperature, constant volume & constant entropy line.

EXAMINATION SCHEME: END SEMESTER EXAMINATION

GROUP	MODULE OR CHAPTER	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTION			
		) BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2,	8	ANY 20	1	20	4	FIVE, (AT LEAST TWO FROM EACH GROUP)	10	50
B	3,4,5	12				6			

EXAMINATION SCHEME FOR PRACTICAL SESSIONAL

Internal Examination: Examiner- Lecturer in Mechanical Engg. / Jr. Lecturer/ Demonstrator			
Five No. of Experiments / Study attended & respective lab note submitted in due time	5*3 = 15		
VIVA VOCE	10		
TOTAL	25		

EXTERNAL Examination: Examiner- Lecturer in Mechanical Engg. / Jr. Lecturer/ Demonstrator			
Submission of Signed Lab Note Book (for five experiments/study)	5*2 = 10		
On spot experiment (one for each group consisting 15 students / explanation of study item)	10		
VIVA VOCE	5		
TOTAL	25		

Name of the Course : Diploma in Mechanical Engineering (Production) **Subject**: Casting and Forming Processes		
Course code: MEP		**Semester :** Fourth
Duration : 17 week		**Maximum Marks : 150**
Teaching Scheme		**Examination Scheme**
Theory : 3 hrs/week		Semester Exam: **70** Marks
Tutorial: hrs/week		Teacher's Assessment (Assignment & Quiz): **10** Marks
Practical : 2 hrs/week		Internal Assessment: **20** Marks
Credit: 4		Practical Sessional internal continuous evaluation: **25** Marks
		Practical Sessional external examination: **25** marks

Aim :-	
S.No	
1	The development in materials technology, computer technology and economics, coupled with knowledge about the requirements and demands of manufacturing, are the corner stones of the activities.
Objective :-	
S No	The student will able to
1	Know and identify basic manufacturing processes for manufacturing different components.
2	Know the principles of various casting and forming processes of metal and plastics.
3	Inspect the job for specified dimensions.
4	Produce jobs as per specified dimensions.
5	Select the specific manufacturing process for getting the desired type of output.
6	Adopt safety practices while working on various machines.
Pre-Requisite:-	
S.No	
1	Depending on the educational background of the student, the previous knowledge is examined in order to determine if any supplementary examination in relevant subjects may be necessary.

Contents		Hrs/week
Chapter	*Name of the Topic*	**Hours**
GROUP:A		
1.0 1.1 1.2 1.3 1.4 1.5 1.6	**Casting-** Definition, Advantages and Limitations. Patterns – Types of Pattern, Material used, Patterns allowances, Cores, Core allowances. Core prints. Riser & Gate design. Moulds - Mould materials, Types of sand, Mounding processes: Sand molding, Pit molding, machine molding. Shell molding. Melting practice. Types of furnaces with specific application Cupola furnace, Electric arc furnace. Casting principle and operation Special casting processes. viz die casting, centrifugal casting, Investment casting. Casting defects & Remedies.	10
2.0 2.1 2.2	**Plastic Moulding** Type of plastic & application of plastic moulding Compression moulding, transfer moulding, injection moulding, blow moulding, vacuum forming, extrusion, calendaring, rotational moulding	06

3.0 3.1 3.2 3.3 3.4	**Forging** Introduction of Hot Working & Cold Working. Examples Forging Processes – Drop forging, Upset forging, Die forging or press forging. Types of dies - Open Die, Closed Die(Single Impression and Multi-impression) Closed die Forging operations - Fullering, Edging, Bending, Blocking, Finishing Forgeable material and forgeability, Forging temperature, Grain flow inforged parts **,** Types of Presses and hammers. Advantages & Limitations.	06
GROUP:B		
4.0 4.1 4.2 4.3 4.4 4.5 4.6	**Rolling** Principle of Rolling Hot Rolling and Cold Rolling Types of Rolling Mills. rolling stand arrangement-2-High, 3 high, 4-high, cluster, planetary rolling mill (simple sketch for illustration). Roll Mill Stiffness. Different sections of rolled parts. Field of Application. Advantages , disadvantages of rolling.	07
5.0 5.1 5.2 5.3 5.4	**Extrusion** Principles of extrusion. Hot Extrusion and Cold extrusion Types-direct or forward extrusion and indirect extrusion, tube extrusion (simple sketch for illustration) Advantages , disadvantages & applications of Extrusion.	07
6.0 6.1 6.2 6.3 6.4	**Press working** Types of presses and Specifications. Press working operations - Cutting, bending, drawing, punching, blanking, Notching, lancing, piercing, coining, embossing. Die set components.- punch and die shoe, guide pin, bolster plate, stripper, stock guide, feed stock, pilot, knockout. Punch and die Clearances for blanking and piercing, effect of clearance .	06
7.0 7.1 7.2	**Super Finishing Processes** 6.1 Necessity of super finishing process & application 6.2 Honing, Lapping, Burnishing. Buffing & polishing, plating & chrome plating.	03
	Sub Total:	45
	Internal Assessment Examination & Preparation of Semester Examination	6
	Total	51

Practical:

Skills to be developed:

Intellectual Skills:

1. Identify basic manufacturing processes.
2. Understand the various method of operations of forming processes
3. Understand the various method of forging

4. Understand the various method of extrusion and press working

Motor Skills:

1. Use smithy/forging equipments
2. Inspect dimensions of jobs using measuring instruments

LIST OF PRACTICALS,

1) Study of different types of Casting Processes
2) Study of different moulding process, tools & equipments used , types of sands , preparation of sand & making a green sand mould
3) Study of different types of cold & hot working process (Cold Working: shearing, bending, Hot working: Drawing Down, Upsetting, Punching, and Flattening),
4) Study of tools & machines used in Smithy/Forging Shop.
5) Practice on different operations in smithy. (Any **three** from shearing, bending, drawing down, upsetting, punching, flattening).

Examination Schedule Internal practical Sessional:

Making job (4 task) & submitting job sheet in scheduled time		4X5 = 20	
Viva - voce		4X2.5 = 10	
Attending classes for studying different machines and submitting respective assignment		3X4 = 12	
Viva voce & skill in operating machine		8	
Total:		50	

Examination Schedule: External practical Sessional examination Examiner : Lecturer in Mechanical Engineering & Foreman (Work Shop).			
For Making job (4 task) & submitting signed job sheet in scheduled time		4X2.5 = 10	
On spot job		20	
viva voce on study		20	
		50	

End Semester EXAMINATION SCHEME

GROUP	MODULE	OBJECTIVE QUESTIONS				SUBJECTIVE QUESTION			
		TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS	TO BE SET	TO BE ANSWERED	MARKS PER QUESTION	TOTAL MARKS
A	1,2,3	10	ANY 20	1	20	5	FIVE (AT LEAST	10	50
B	4,5,6,7	10				5			

							TWO FROM EACH GROUP)		

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Name of Authors	Titles of the Book	Edition	Name of the Publisher
S. K. Hajra Chaudary, Bose, Roy	Elements of workshop Technology – Volume I & II		Media Promoters and Publishers limited
B.S.Raghuwanshi	A Course in Workshop Technology Vol I & II		Dhanpat Rai & Co
D. L. Wakyl	Processes and design for manufacturing		Prentice Hall
KALPAKJIAN & SCHMID	Manufacturing Processes		Pearson Education, New Delhi
Amitabh Ghosh Mallik	Manufacturing Science		East-West Press Pvt. Ltd.
HMT, Banglore	Production Technology		Tata Mc-Graw Hill
O. P. Khanna and Lal	Production Technology - Volume I & II		Dhanpat Rai Publications.
P. N. Rao	Manufacturing Technology Metal Cutting & Machine tools		Tata McGraw-Hill
Girling	All about Machine Tools		New age international limited.
R.B. Gupta	Production Technology		Satya Prakashan New Delhi
W.A.J. Chapman	Workshop Technology - Volume I , II & III		Viva Books (p) Ltd.
Jhon A Schey	Introduction to Manufacturing Processes		McGraw Hills International
M. Aduthan and A. B. Gupta	Manufacturing Technology		New Age International

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- Nil

Name of the Course : Diploma in Mechanical Engineering (Production) Subject Title: Theory of Machines and Mechanism(Same with Mechanical engg).		
Course code: MEP		**Semester :** Fourth
Duration : 17 weeks		**Maximum Marks : 150**
Teaching Scheme:		**Examination Scheme:**
Theory : **3** hrs/week		**Internal Assessment**:20 Marks
Tutorial: hrs/week		**Teacher's assessment (Assignment & Quiz)**: 10 Marks
Practical : **2** hrs/week		**End Semester Exam**: 70 Marks
Credit: **4**		**Practical: Internal Sessional continuous evaluation**:25 Marks
		Practical: External Sessional Examination:25 Marks
Aim :-		
S.No		
1	To focus on understanding the concept of machines, mechanisms and their elements. Also study kinematics aspects of various links in mechanisms.	
S No	The student will able to	
1	Know different machine elements and mechanisms.	
2	Understand Kinematics and Dynamics of different machines and mechanisms.	
3	Select Suitable Drives and Mechanisms for a particular application.	
	Appreciate concept of balancing and Vibration.	
	Develop ability to come up with innovative ideas	
Pre-Requisite:-		
S.No		
1		
Contents		Hrs/week
Chapter	*Name of the Topic*	**Hours**
01	**Fundamentals and types of Mechanisms and velocity in Mechanism:** 1.1 Kinematics of Machines: - Definition of Statics, Dynamics, Kinematics, Kinetics, Kinematic link, Kinematic Pair and its types, constrained motion and its types, Kinematic chain and its types, Mechanism, machine and structure, inversion of mechanism. 1.2 **Inversions of Kinematic Chain:** 1.2.1 Inversion of four bar chain- four bar chain mechanism, coupled wheels of Locomotive & Pantograph. 1.2.2 Inversion of Single Slider Crank chain- Slider Crank mechanism, Rotary I.C. Engines mechanism, Whitworth quick - return mechanism, Crank, Slotted lever quick return mechanism, hand- pump. 1.2.3 Inversion of double slider crank chain- double slider crank mechanism, Scotch Yoke mechanism & Oldham's coupling 1.3 **Velocity of a point in mechanism:** Determining the velocity of a point in 4-bar chain mechanism & slider-Crank mechanism by relative velocity method and instantaneous centre method (use graphical method only).	**10**
02	**Cams and Followers:** 2.1 Concept, definition and application of Cams and Followers. 2.2 Classification of Cams and Followers.	**06**

	2.3 Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation. 2.4 Drawing of profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (graphical method).	
03	**Power Transmission:** 3.1 Types of Drives – Belt, Chain, Rope, Gear drives & their comparison. 3.2 Belt Drives - flat belt, V– belt & its applications, material for flat and V-belt, angle of lap, belt length. Slip and creep. Determination of velocity ratio, ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission(Simple numerical on flat belt drive) 3.3 Gear Drives – Spur gear terminology, types of gears and gear trains, their selection for different application, train value & Velocity ratio for compound, reverted and simple epicyclic gear train, methods of lubrication, Law of gearing. (simple problems on gear train)	**08**
04	**Flywheel and Governors:** 4.1 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.(simple problems on determination of mass of fly wheel using crank effort diagram) 4.2 Governors - Types, concept, function and application & Terminology of Governors. (simple problems on watt & porter governor) 4.3 Comparison between Flywheel and Governor.	**08**
05	**Brakes, Dynamometers, Clutches & Bearings:** 5.1 Function of brakes and dynamometer, types of brakes and Dynamometers, comparison between brakes and dynamometer. 5.2 Construction and working of i) shoe brake, ii) Band Brake, iii) Internal expanding shoe brake iv) Disc Brake. 5.3 Concept of Self Locking & Self energizing brakes. 5.4 Numerical problems to find braking force and braking torque for shoe & band brake. 5.5 Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer, iii) Eddy current Dynamometer. 5.6 Clutches- Uniform pressure and Uniform Wear theories. 5.7 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 numerical on single and Multiplate clutch). 5.8 Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lost in friction (no derivation). Simple numerical.	**10**
	Balancing & Vibrations: 6.1 Concept of balancing. Balancing of single rotating mass. Graphical method for balancing of several masses revolving in same plane & different plane. 6.2 Concept and terminology used in vibration, causes of vibrations in machines, their harmful effects and remedies.	**03**

	Total	**45**

Practical:

Skills to be developed:

Intellectual Skills:

1. Understand working of different mechanism.
2. Determine velocity of link in a given mechanism.
3. Analyse balancing of rotating masses in a single plane.
4. Interpret interrelationship between components of various braking mechanisms.
5. Understand concepts of vibrations in various machineries, their harmful effects and remedies.
6. Compare various power transmission devices.

Motor Skills:

1. Drawing of velocity diagrams of four bar mechanism & slider crank mechanism.
2. Assembly and dismantling of brakes and clutches.
3. Drawing of cam profiles from a given data for i. C. Engine.
4. Drawing of velocity diagram.

LIST OF PRACTICALS

List of Practical:

1) Find the ratio of time of cutting stroke to the time of return stroke for quick return mechanism of a shaper machine.
2) Sketch & describe working of Oldham's coupling.
3) Determination of velocity by relative velocity method (four problems) (use graphical method).
4) Determination of velocity by instantaneous centre method (four problems) (use graphical method).
5) Draw the profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (At least six problems)
6) Determine the radius of rotation of fly ball (porter governor) for different speed of governor and draw a graph between radius of rotation versus speed.
7) Dismantling and assembly of mechanically operated braking mechanism for two wheelers.
8) Determination of power transmitted by any belt drive using any one dynamometer.
9) Dismantling and assembly of m20ultiplate clutch of two-wheeler.
10) Determine graphically balancing of several masses rotating in a single plane/ several planes (use graphical method – 4 problems).
11) Numerical problems to find braking force and braking torque for shoe & band brake.
12) Determine torque & power lost in friction for i) Simple Pivot, ii) Collar Bearing & iii) Conical pivot.
13) Determine of mass of fly wheel using crank effort diagram.

Examination Schedule Internal practical Sessional:

Attending classes, practicing problems & submitting respective assignment in time		20	
Viva – voce		5	
Total:		25	
Examination Schedule: External practical Sessional examination Examiner: **Lecturer**			
For submission of assignment in scheduled time		15	

viva voce		10	
Total		25	

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Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :- as mentioned in list of practical

List of Books:

Author	Title	Publication
Khurmi & Gupta	Theory of machines	S. Chand & Co
S. S. Rattan	Theory of Machine	McGraw Hill companies
P.L. Ballaney	Theory of machines	Khanna Publication
Dr. R. K. Bansal Dr. J.S. Brar	Theory of machines	Laxmi Publications
V.P. Singh	Theory of machines	Dhanpat Rai & Co
TimoShenko & Young	Theory of machines	Wiley Eastern
Jagdishlal	Theory of machines	Bombay Metro – Politan book ltd.
Ghosh - Mallik	Theory of machines	Affilated East west press
Beven T	. Theory of machines	CBS Publication
J.E.Shigley	Theory of machines	Mc Graw Hill
Abdulla sharif	Theory of machines	Dhanpat Rai & Co

Name of the Course : Mechanical Engineering (Production) **Subject Title: Professional Practices-II**		
Course code: MEP	**Semester : Fourth**	
Duration :	**Maximum Marks : 50**	
Teaching Scheme	**Examination Scheme**	
Theory : hrs/week	Mid Semester Exam: Marks	
Tutorial: hrs/week	Assignment & Quiz: Marks	
Practical : 3 hrs/week	End Semester Exam: Marks	
Credit: 2	**Practical: Internal Sessional continuous evaluation**:25 Marks	
	Practical: External Sessional Examination:25 Marks	
Aim :-		
S.No		
1	To develop general confidence, ability to communicate and attitude, in addition to basic technological concepts through Industrial visits, expert lectures, seminars on technical topics and group discussion.	
Objective :-		
S No	The student will able to	
1	Acquire information from different sources.	
2	Prepare notes for given topic.	
3	Present given topic in a seminar.	
4	Interact with peers to share thoughts.	
5	Prepare a report on industrial visit, expert lecture	
Pre-Requisite:-Nil		
Contents		Hrs/week
Chapter	**Name of the Topic**	
01	**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. **ONE** industrial visits may be arranged in the following areas / industries : The industrial visits may be arranged in the following areas / industries : Sugar Factory / Dairy / Chemical Industry / Thermal Power Plant . vi) Machine shop having CNC machines. vii) State Transport workshop / Auto service station viii) City water supply pumping station ix) Manufacturing unit to observe finishing and super finishing processes	
02	**Information Search :** Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report any one topic. Following topics are suggested : v) Engine lubricants & additives vi) Automotive gaskets and sealants vii) Engine coolants and additives viii) Two and Four wheeler carburetor.	

	ix) Power steering x) Filters xi) Different drives/Transmission systems in two wheelers. xii) Types of bearings – applications and suppliers. xiii) Heat Exchangers xiv) Maintenance procedure for solar equipment. **Tools holder on general purpose machines and drilling machines.**	
03	**Mini Project / Activities** : (any one) a) Prepare one model out of card board paper / acrylic / wood / thermocol / metal such as : i) Elliptical Trammel ii) Pantograph iii) Coupling iv) Cams and Followers b) Dismantling of assembly (e.g. jig / fixtures , tool post , valves etc.) Take measurement and prepare drawings / sketches of different parts. c) Make a small decorative water fountain unit. d) Toy making with simple operating mechanisms.	
04	Using any CADD related software following topics are to be practiced • **Common 2D command for drawing simple sketch:**- Creation of work plane, Line, Circle, Rectangle, arc, Ellipse, curve, Move, Copy, Trim, Fillet, Chamfer, Extend, offset, Array, break,; Practice on 2D Drawing. • **Generation of 3 D surface & solid model**: Primitive surface & solid (plane, block, sphere, cone, torus, spring, spiral). • **3D operation**: Extrude, fill in, revolve, drive surface, networking surface, surface from separate curves, extension of surface, fillet, editing of surface, blend, Pocket, shaft, Groove, Hole, Slot, Stiffener, Draft, trim, curve wrapping & unwrapping; Boolean Operations: Add, Remove, Intersection; Transformation features: Translation, Rotation, mirror; Generation of 3 D Model Practice. • **Extraction of 2D from 3D model**: Front View, Side view, Top View, Isometric view, sectional view, limited view (broken view), Dimensioning, Inserting frame and Title Block; Practice. **Exercise:** Rigid flange coupling, knuckle joint, tray, bracket, cylinder-cylinder intersection model, BOM.	
	Total	

Text Books

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Robert M. Thomas	Advanced AutoCAD		Sybex BPD
R Cheryl	Beginning AutoCAD 2011-Exercise Book (W/2 DVDs)		BPB Publication
D Raker & H.Rice	Inside Autocad		BPB Publication
P.Radhakrishnan,S.Subramaniyan & V.Raju	CAD/CAM/CIM		New Age International

			Publication
Sham Tickoo	Autocad 2002 with Applications		Tata Mcgraw Hill
George Omura	Mastering Autocad 2010 & Autocad LT 2010		
David Frey	AutoCAD 2007 and AutoCAD LT 2007: No Experience Required		
Reference books :- Nil			
Suggested List of Laboratory Experiments :- Nil			
Suggested List of Assignments/Tutorial :- Nil			

	Internal Practical Sessional Examination	
Chapter	**Topic**	
1	**Submission of project Report on industrial visit by scheduled date**	**5**
2 & 3	**submission of assignment & project report by scheduled date**	**5**
4	**Practice of CADD software**	**10**
	Viva - voce	**5**
	Total:	**25**
	External Practical Sessional Examination Examiner: Lecturer/ Jr. Lecturer	
	Submission of signed report & assignment	**5**
	On spot CADD Drawing	**15**
	Viva voce	**5**
	Total:	**25**