MECHANICAL ENGINEERING(PRODUCTION) DICIPLINE

SUBJECT TITLE: DIGITAL LOGIC DESIGN

3rd Semester

Allotment of periods & evaluation scheme:

Subject: Digital Electronics
Code:
Hours/week: 03 Total Hours: 51 Total marks: 75

Group	Chapters	Topics	Hours allotted	Objective questions				Subjective questions			
				To be set	To be answered	Marks for each	Total	To be set	To be answered	Marks for each	Total
A	1	Number system	**11**	6	Any 25	25x1 =25	25	4	Any five taking 1 from each group	5x10	50
	2	Boolean algebra & Logic gates	**13**	5							
B	3	Combinational Logic circuits	**12**	7				3			
	4	Multiplexers & Demultiplexer	**04**	7							
C	5	Sequential logic circuits	**05**	7				2			

Total : 45 Internal Assessment : 6 Total : 51

REFERENCE BOOKS

1. Digital Principles / R.P. Jain / TMG Pub. Co.
2. Digital Principles & Applications / Malvino & Leach / TMG Pub. Co.
3. Digital System Design / Morris Mano / PHI Pub. Co.
4. Digital Circuits & Systems / Hall / McGraw Hill Pub. Co.

DETAIL COURSE CONTENT

Group -A

1. Number systems:
   - (1.1) Decimal, binary & hexadecimal number systems, conversion from one system to another system.
   - (1.2) Binary arithmetic, signed numbers, subtraction using 1's & 2's complement representation, concept of over flow.
   - (1.3) Addition and subtraction in different number system.

2. Boolean algebra & Logic gates:
   - (2.1) Boolean algebra law postulates, Theorems, Boolean functions & standard canonical forms, simplification using Boolean algebra & Karnaugh map.
   - (2.2) Logic gates-AND, OR, NOT, NAND, XOR, use of NAND & NOR gates as universal gates, implementation of Boolean functions using logic gates, circuit of logic gates using discrete components.
   - (2.3) De-Morgans theorem.

Group -B

3. Combinational Logic circuits:
   - (3.1) Arithmetic circuits- half adder, full adder, half & full sub tractor.
   - (3.2) Decoders: Basic decoders (2 to 4, 3 to 8, 4 to 16), Implementation of higher order decoder to lower order decoder, Implementation of lower order decoder to higher order decoder.
4. Multiplexers & De-multiplexers:
   - (4.1) Multiplexing & de-multiplexing, differences between them.
   - (4.2) Design & development of 4:1, 8:1 MUX circuit.
   - (4.3) Implementation of Boolean expression using MUX.
   - (4.4) Design & development of 4:1, 8:1 D-MUX circuit.

Group -C

5. Sequential Logic circuits:
   - (5.1) Various Flip-Flops- S-R, J-K, D, T,
   - (5.2) Master-slave configuration.

PRACTICAL

Contact hours/week: 4 Total contact periods: 64 **Marks: 100**

Experiments: -

1. Familiarization of 7400, 7402, 7404, 7408, 7432 & 7486.
2. Verification of truth tables of AND, OR, NOT, NOR, NAND, XOR, XNOR gates.
3. Implementation of various logic gates using NAND & NOR gates (Truth table verification).
4. Verification of De'Morgans theorem.
5. Implementation of Adder using minimum number of gates.
6. Implementation Sub tractor using minimum number of gates.
7. Study of S-R flip-flop.
8. Study of J-K flip-flop.

Name of the Course : Mechanical Engineering (Production) **Subject: Engineering Materials (Same with Mechanical engg.)**		
Course code: MEP		**Semester : Third**
Duration : 17 weeks		**Maximum Marks : 100**
Teaching Scheme		**Examination Scheme**
Theory : **3** hrs/week		Internal Assessment: **20** Marks
Tutorial: hrs/week		Teacher's Assessment (Assignment & Quiz): **10** Marks
Practical : hrs/week		End Semester Exam: **70** Marks
Credit: **3**		
Aim :-		
S.No		
1	To provide students with a specialist education and training in the area of metals, ceramics, polymers and composites for industrial engineering applications from biomedical device manufacture to future energy solutions.	
Objective :-		
S No	The student will able to	
1	know the properties of Engineering Materials like Metals, non-metals, ferrous metals and non-ferrous metals	
2	Interpret Iron –Iron Carbide phase equilibrium diagram to find temperatures for heat treatment processes.	
3	Select the proper materials for different applications like cutting tools, dies, gears & other applications.	
4	Understand various heat treatment processes & its applications for various components to improve its mechanical properties.	
5	Understand powder metallurgy process and its applications.	
6	Understand Non Destructive testing methods & its applications	
Pre-Requisite:-Nil		
Contents		Hrs/week

Chapter	Name of the Topic	Hours	Marks
GROUP-A			
01	**Mechanical Engineering Materials and their Properties** 1.1 Introduction, Classification and Application of Engineering materials I.S. specification of materials like plain carbon steel, Grey Cast iron, low alloy steels & bearing Materials. 1.2 Properties of metals- Physical Properties – Structure, Density, Melting point. Mechanical Properties –hardness, hardenability, brittleness, fatigue, thermal conductivity, electrical conductivity, thermal coefficient of linear expansion 1.3 Introduction to Corrosion, types of Corrosion, Corrosion resisting materials	05	05
02	**Ferrous Metals and Alloys** 2.1 Characteristics and application of ferrous metals 2.2 Phase equilibrium diagram for Iron and Iron Carbide. 2.3 Flow diagram for production of Iron and Steel, Classification, composition and uses of cast iron 2.4 Classification, composition and application of low carbon steel, medium carbon steel and high carbon steel with their chemical composition. Effect of sulphur, silicon and phosphorous on plain carbon steel. 2.5 Alloy Steels: - Low alloy steel, high alloy steel, tools steel & stainless steel. Effect of various alloying elements such as – Chromium, nickel, manganese, molybdenum, tungsten, vanadium. 2.6 Tool Steels (properties & applications): - High speed Steels (HSS), Hot & cold Working dies, shear, punches. 2.7 Magnetic materials: - Properties & Applications of commonly used magnetic materials (Permanent magnets and temporary magnets). 2.8 Special Cutting Tool Materials (Properties & Applications): Diamond, Stelites , Tungsten Carbide & Ceramics.	10	18
GROUP-B			
	Non Ferrous Metals and Alloys		

03	3.1 Properties, applications of Copper alloys (naval brass, muntz metal, Gun metal & bronzes), Aluminium alloys (Y-alloy & duralumin) & bearing materials like white metals, leaded bronzes & copper lead alloys. 3.2 Desired properties of bearing materials.	06	12
04	**Heat Treatment of Steels** 4.1 TTT Diagram 4.2 Introduction to Heat treatment processes such as Annealing, subcritical annealing, Normalizing, Hardening, Tempering (Austempering & Martempering) - Principle, Advantages, limitations and applications. 4.3 Surface Hardening - Methods of surface hardening, i) case hardening ii) Flame Hardening, iii) Induction Hardening, iv) Nitriding, v) Carburizing Principle, advantages, limitations and applications.	8	15
GROUP-C			
05	**Non Metallic Materials** 5.1 Polymeric Materials – Introduction to Polymers- types, characteristics, properties and uses of Thermoplastics, Thermosetting Plastics & Rubbers. 5.2 Thermoplastic Plastics – Uses of ABS, Acrylics, Nylons and Vinyls. 5.3 Thermosetting Plastics – Characteristics and uses of polyesters, Epoxies, Melamines & Bakelites. 5.4 Rubbers – Neoprene, Butadiene, Buna & Silicons – Properties & applications. 5.5 Properties and applications of following Engineering Materials – Ceramics, Abrasive, Adhesive and Insulating materials such as Cork, Asbestos, Thermocole and Glass Wool. 5.6 Introduction to Composite Materials – Properties & Applications of Laminated & Fiber reinforced materials.	08	10
	Powder Metallurgy 6.1 Advantages, limitations and applications of Powder Metallurgy for engineering products. 6.2 Brief Description of Process of Powder Metallurgy – Powder making, blending,	04	05

06	compacting, sintering, infiltration & impregnation. 6.3 Applications of Powder metallurgy for tungsten carbide tip tools & porous bearing.		
07	**Nondestructive Testing** 7.1 Importance of Non-destructive testing, Difference between Destructive and Nondestructive testing. 7.2 Nondestructive testing methods – Radiography (X-Ray & Gamma Ray), Ultrasonic crack detection, Dye penetrant test, Magnaflux test – Comparison & applications.	04	05
	Sub Total	45	70
	Internal Assessment Examination & Preparation of Semester Examination	06	
	Total:	51	

Text Books

Name of Authors	Titles of the Book	Edition	Name of the Publisher
O.P.Khanna	A Text Book of Material Science and Metallurgy		Dhanpat Rai and Sons [1999]
Dr.V.D. Kodgire	Material Science and Metallurgy		Everest Publishing House [1990]
R.K.Rajput	Material Science and Engineering		S.K.Katari and Sons [2002 reprint 2003]
S.K.Hazra and Choudhari	Material Science and Processes		Indian Book Distribution Co. [1982]

Kenneth G. Budinski and Micheal K. Budinski	Engineering Materials Properties and Selection		Pearson Education, New Delhi
ASME	ASME Material Manuals		ASME
Sidney H. Avner	Introduction to Physical metallurgy		Tata Mc Graw Hill edition (2nd)
P. C. Sharma	A Text Book of Production Technology.		S. Chand & Co.
Rajan Sharma & Sharma	Heat Treatment		PHI
Rghavan	Material Science & Engineering		PHI

Reference books :- Nil

Suggested List of Laboratory Experiments :- Nil

Suggested List of Assignments/Tutorial :-

1. **Flow diagram of steel making processes.**
2. **Flow diagram of production of pig iron.**
3. **Iron & iron carbide equilibrium diagram**
4. **T T T diagram**

EXAMINATION SCHEME

GROUP	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	06	20	1	20	3	FIVE (AT LEAST ONE FROM EACH GROUP)	10	50
B	3,4	06				3			
C	5,6,7	8				4			

Name of the Course : Mechanical Engineering (Production) **Subject: Advanced Strength of Materials (Same with Mechanical enggg.)**	
Course code: MEP	**Semester : Third**
Duration : 17 Weeks	**Maximum Marks : 100**
Teaching Scheme	**Examination Scheme**
Theory : **2** hrs/week	End Semester Exam: **35** Marks
Tutorial: hrs/week	Teacher's Assessment (Assignment & Quiz): **5** Marks
Practical : **2** hrs/week	Internal Assessment: **10** Marks
Credit: **3**	Practical Sessional internal continuous evaluation: **25** Marks
	Practical Sessional external examination: **25** marks

Aim :-	
SL No	
1.	To understand & analyze various types of stresses & strains along with main causes of failure of machine parts.
2.	To study the effect of combined stress on different machine parts.
3.	To understand principles of machine design.

Objective :-	
S No	**The student will able to**
1	Calculate bending stress and prepare shear stress distribution diagram at different cross section in a beam
2	Calculate maximum & minimum stresses for different machine elements under combined bending & direct stress.
3	Understand & analyze the basic principles involved in the behavior of machine parts under load in the context of designing it.
4	Calculate strain energy for spring and axially loaded members
5	Estimate principal stresses and maximum shear stress for a given combined loading by analytical &

	Mohr's circle method.		
6	Calculate the power transmitted by the solid & hollow shafts.		
7	Understand & analyze different parameters of closed coil helical spring.		
Pre-Requisite:-			
Sl. No	Elementary knowledge on engineering mechanics		
1.	Differential and integral calculus		
2.	Elementary knowledge on strength of materials		
Contents		Hrs/week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**1.0 Strain Energy** 1.1 Concept, derivation & use of expression for Strain energy of axially loaded members of uniform cross section under gradual, sudden / impact load (simple problems). 1.2 Strain energy due to self-weight for uniform cross section member (simple problems).	**03**	**05**
02	**2.0 Bending & Shear stresses** 2.1 Theory of pure bending, equation of bending. 2.2 Assumptions in the theory of bending, moment of resistance, section modulus & neutral axis (simple problems on bending stress having rectangular, circular & I section beam) 2.3 Shear stresses in beam & its distribution diagram over various cross section of beam under point load/udl (No problem)	**06**	**08**
03	**3.0 Combination of Bending & Direct stresses** 3.1 Determination of maximum & minimum stresses for members under axial load, eccentric load along one principal axis, bending stresses. 3.2 Application of the above concepts for machine parts such as offset links, C-clamp, Bench vice, Drilling machine frame, stresses at base of a short column, total stress	**06**	**06**

	variation diagrams. (Simple problems on above applications)		
04	**4.0 Principal Planes & Principal Stresses** 4.1 Definition of principal plane & principal stresses. 4.2 Expression for normal and tangential stress, maximum shear stress. 4.3 Stresses on inclined planes. 4.4 Position of principal planes & planes of maximum shear. 4.5 Graphical solution using Mohr's circle of Stresses	**06**	**06**
05	**5.0 Torsion of solids and hollow circular shafts:** 5.1 Concept of Pure Torsion, Torsion equation for solid and hollow circular shafts, Assumptions in theory of pure Torsion. 5.2 Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non homogeneous shaft)	**05**	**05**
06	**6.0 Springs:** 6.1 Types of spring, uses 6.2 Determination of shear stress & its distribution, deflection, stiffness, solid length, concept of mean radius of coil & spring index (simple problem) 6.3 Spring in series & parallel.	**04**	**05**
	Sub Total:	30	35
	Internal Assessment Examination & Preparation of Semester Examination	4	
	Total:	34	

Practical:

Skills to be developed:

Intellectual skills:

1. Calculate coefficient of friction for available pair of surface and angle of repose.
2. Establish law of simple machine
3. Identification of different parts of machine and their function.
4. Interpretation failure patterns of different metal under different action.
5. Extrapolating test result or observation during test.

Motor Skills:

1. Study and demonstration of Testing Machine & its attachments (if any).
2. Sketch of standard specimen, arrangement for test on respective machines.
3. Measurement of different parameters.
4. Testing different metals and comparison of experimental result.
5. Handling Instrument.
6. Observing behavior of different metal during test.
7. Plotting graph

List of Practical: (sl. No. 1 & 2 compulsory & at least three from the rest)

1. To determine coefficient of friction of any pair of surfaces and determination of angle of repose.
2. To find MA, VR, Efficiency, Ideal Effort, Effort & Load lost in friction for various loads and establish law of machine and calculate maximum efficiency and Also check the reversibility of a machine (any two) 1) Differential axle and wheel, 2) Weston's differential pulley block, 3) Geared pulley block, 4) Single purchase crab, 5) Double purchase crab, 6) Worm and worm wheel, 7) Two sheave and three sheave pulley block
3. Tension Test on mild steel/ Aluminium & compression test on cast iron on Universal Testing Machine.
4. Direct Shear Test of mild steel on Universal Testing Machine.
5. Brinell Hardness Test on Mild Steel / Aluminium.
6. Rockwell hardness Test on Hardened Steel.
7. Izod & Charpy - Impact tests of a standard specimen.
8. Torsion Test on Mild steel bar.

Assignments:

1. Estimation of principal stresses and maximum shear strain for a given combined loading by analytical & Mohr's circle method. (At least two problems.)
2. Estimate cross section of machine parts under combined bending and direct stress considering respective mechanical properties.

Note: Total students have to be divided into 10 groups. Each group shall be allotted two different problems on above mentioned areas as home assignment. Problems have to be submitted by each student separately.

List of Books:

Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
R S Khurmi	Strength of Materials		S.Chand & Co
S. Ramamurtham & R Narayanan	Strength of Materials		Dhanpat Rai & Publication

R.K. Bansal	Strength of Materials		Laxmi Publication Pvt. Ltd
B.K. Sarkar	Strength of Materials		Tata McGraw-Hill
S.S.Bhavikatti	Strength of Materials		Vikas Publishing House Pvt. Ltd
R.K. Rajput	Strength of Materials		S.Chand & Co
M. Chakraborty	Strength of Materials		S.K.Kataria
Bhandari	Design of Machine Elements		McGraw-Hill
R.S. Khurmi & J. K. Gupta	A Text Book of Machine Design		S.Chand & Co

Reference books :-

R. Subramanian	Strength of Materials		Oxford Press
S.P. Timoshenko, D.H. Young	Elements of Strength of Materials		West Press Pvt. Ltd
D. S. Prakash Rao	Strength of Materials – A Practical Approach		Universities Press
Egor P Popov	Engineering Mechanics of Solid		Prentice Hall of India

Examination Scheme for end semester examination:

Group	**Chapter**	**Marks of each question**	**Question to be set**	**Question to be answered**
A	1, 2 & 3	5	5	At least 2
B	4, 5 & 6	5	5	At least 2
From above mentioned groups total 5 questions to be attempted				5*5 = 25
A	1, 2 & 3	1	5	5*1 =5
B	4, 5 & 6	1	5	5*1 =5
			Total:	**35**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination: Examiner- Lecturer in Mechanical Engg. / Jr. Lecturer.			
Five No. of Experiments 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.			
Signed Lab Note Book (for five experiments)		**5*2 = 10**	
On spot experiment(one for each group consisting 5 students)		**10**	
Viva voce		**5**	
		Total: 25	

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Name of the Course : Mechanical Engineering (Production) Subject: **MACHINE TOOLS**				
Course code: ME (P)		Semester : **Third**		
Duration : 17 weeks		Maximum Marks : 300		
Teaching Scheme		Examination Scheme:		
Theory : **4** hrs/week		Internal Assessment: **30** Marks		
Tutorial: NIL		Teacher's Assessment (Assignment & Quiz): **10** Marks		
Practical : **3** hrs/week		End Semester Exam: **70** Marks		
Credit: **4**		Practical: Internal Sessional continuous evaluation: **50**Marks		
		Practical: External Sessional examination: **50**marks		
Aim				
S. No.				
1	To study Definition & Classification of M/c Tools.			
2	To Study of Lathe, its elements & operation in detail.			
3	To Study Shaping Machine, Planning Machine, Milling Machine & their Operation			
4	To Study Drilling, Boring & Broaching Machines & their Operation.			
5	To Study Gear & Gear Cutting.			
Objective :-				
S. No.	The Students should be able to:			
1.	• Define & Classify Different types of Machine tools			
3.	• Understand Lathe, specifically Centre Lathe & its operation.			
4.	• Understand Shaping, Planning & Milling machine operation.			
4.	• Understand Drilling, Boring & Broaching Machine operation.			
5.	• Classify Gears, Understand proportions of Spur gear and Gear Cutting Operations.			
Pre-Requisite: Elementary knowledge				
Contents			Hrs/week	
MACHINE TOOLS				
Chapter		Name of the Topic	Hours	Marks
GROUP-A				
1	1.0 1.1 1.2 1.3	**Introduction** Definition and classification of machine tool. Idea of Directrix & Generatrix. Basic Elements of construction of a M/c Tool.	**03**	

	1.4 1.5 1.6	Drive System Power Transmission Purpose & Accuracy of M/c Tools.		
2	2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.10 2.11	**Lathe & Lathe Work** Classification of lathe Centre Lathe – Working Principle Specification & Function of Various Parts Spindle Drive & Power Transmission in Lathe. Lathe accessories and attachments Feed drive – apron mechanism Different lathe operations – turning, facing, drilling, boring, reaming, grooving, knurling, parting off Taper and taper turning – standard tapers, different methods of taper turning with calculation Thread cutting in lathe – concept of right and left hand thread, odd and even thread, arrangement and calculation of change gears for metric thread, use of thread chasing dial Different types of lathe tools Cutting speed, feed and depth of cut – machining time estimation in lathe (turning and facing) Accuracy in lathe operations.	**06**	
3	3.0 3.1 3.2 3.3 3.4	**Capstan & Turret Lathe** Principal Parts of Capstan & Turret Lathe. Mechanism of Capstan & Turret Lathe. Difference between capstan & Turret Lathe Capstan & Turret Lathe Tools	**03**	
GROUP-B				
4	4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8	**Shaping Machine** Classification and specification of shaper Different parts of shaper and their functions – work holding devices Quick-return mechanism – adjustment of stroke length and stroke position, feed mechanism Hydraulic shaper – comparison between mechanical and hydraulic mechanism Shaping machine operations and tool used for – flat surface machining, V-groove, keyway, dovetail grooves, T-slot, formed surface Cutting speed, feed and depth of cut, machining time calculation Accuracy obtained in shaping operation Simple problem of machining time calculation	**04**	

5	5.0 5.1 5.2 5.3 5.4 5.5 5.6 5.7	**Planning Machine** Classification and specification of planning machine Different parts of planer and their functions – work holding devices Quick-return mechanism of planer Planing machine operations and tool used Comparison between shaper and planer Accuracy obtained in planning operation Simple problem of machining time calculation	**03**	
6	6.0 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8	**Slotting Machine** Principle of slotting operation Constructional features of a slotting machine Cutting tools for slotting (Geometry of cutting tool) Specification of slotting machine Work holding devices Operations and tool used Machining time calculation Accuracy obtained	**03**	
7	7.0 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9	**Grinding Machine** Different parts and function of a cylindrical grinding machine Grinding wheel – composition Abrasive-types properties and uses Bonds - types and uses Grit size, grade, structure of wheels Coding system for grinding wheel (nomenclature) Selection of grinding wheel and its mounting Dressing – truing and balancing of grinding wheel Cylindrical grinding: Principle, Job-tool movement and use only — (i)External Grinding: Centre type (traverse, plunged-cut and full-depth grinding), centre less grinding; (ii) Internal Grinding.	**04**	
GROUP-C				
8	8.0 8.1 8.2 8.3	**Drilling, Boring & Reaming Machine** Drilling Machine – classification and specification Construction, uses of different types of drilling machine Drilling spindle assembly	**05**	

	8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13	Geometry of twist drill-nomenclature Principle of Boring Operation Constructional features of a Horizontal Boring Machine. Operations and performance of Boring Machine. Reaming- different types of reamer Different operation in drilling and tool used – Drilling, reaming, boring, counter boring, counter sinking, spot facing and tapping Work holding devices in drilling machine Cutting speed, feed, machining time estimation Comparison between drilling, boring and reaming Accuracy obtained		
9	9.0 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9	**Milling Machine** Classification of Milling Machine (no detail) Different parts and their function of Plain, Horizontal and Vertical Milling Machine, Arbour assembly – Accessories and attachment (Name and function only), Specification of Milling Machine (Plain, Universal and Vertical), Milling Operations: (i) Peripheral milling – Up milling and down milling comparison, (ii) Face milling and end milling. Milling Machine Operations: Straddle milling, Gang milling keyway tool set up, cutter used (application only) Milling cutter classification Cutting speed, feed, depth of cut-estimation of time for plain and face milling operations Accuracy obtained.	**05**	
10	10.0 10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 10.10	**Gears & Gear Cutting** Type of Gears – Spur Gear, Helical Gear, Bevel Gear, Hypoid Gear, Harringbone Gear, Rack & Pinion, Worm & Worm Wheel, Internal Gear. Spur Gear – main elements, proportions, module. Gear Manufacturing Methods – Casting, Rolling, Extrusion, Stamping, Powder Metallurgy. Gear Machining Methods – generating methods, form cutting method, Formed disc cutting method. Gear Shaper Process. Indexing & Dividing Head. Indexing Method. Spur Gear Milling Operation. Gear Hobbing Processes. Gear Finishing, Grinding, Lapping, Honing methods. Selection of Gear materials.	**06**	

11	11.0 11.1 11.2 11.3 11.4 11.5 11.6	**Broaching Machine** Types of Broaches. Details of Broach Construction. Broaching Machines & its classification. Horizontal Pull Type, Vertical Pull Type, Duplex Head Broaching Machines. Continuous Broaching Machine – Horizontal & Rotary Type Broaching Fixtures Broaching Operation – Methods of Broaching. Application, Advantage & limitation of Broaching.	**03**	
		Sub Total:	**45**	
		Internal Assessment Examination & Preparation of Semester Examination	**6**	
		Total	**51**	

Machine Tools –Practical.

Mechanical Engg (Production)	**Course offered in Third Semester**	**Course Duration** **17 weeks**	**2 Hrs per week**	**Full Marks** **100**

Module 1 LATHE OPERATIONS

1.1 Making simple jobs in lathe having operations like facing, Centering, plain turning, taper turning, chamfering, grooving, knurling, drilling, boring, threading and parting off (preparation of operation charts)

1.2 Tool grinding practices for H.S.S lathe tools

1.3 Use of brazed carbide and carbide insert type tools for lathe operations

1.4 Use of Vernier callipers, Micrometer, Thread pitch gauge etc.

Module 2 SHAPING OPERATIONS

Production of horizontal, vertical, angular surfaces using shaping machine – making a V-block

Module 3 PLANING OPERATIONS

3.1 Production of horizontal flat surface, vertical flat surface, angular surface including dovetails using planning machine.
3.2 Production of different types of slot and grooves, curved surface using Planing Machine.

Module 4 Milling operations

4.1 Production of rectangular slots by milling keyway machining,
4.2 Spur gear machining by involute gear milling cutter using index head,
4.3 Production of helical tooth spur gear by milling using form milling cutter.

Module 5 Drilling and Tapping operation

5.1 Making holes with help of pillar and radial drilling machine,
5.2 Making simple jobs having operations like – Boring, counter boring, counter sinking, spot facing and tapping.

Module 6 Grinding operation

6.1 Flat surface grinding in a surface grinder,
6.2 Cylindrical grinding of external surface (with center less grinding),
6.3 Cylindrical grinding of internal surface.

List Of Books

Name of Authors	**Titles of the Book**	**Name of the Publisher**
S. K. Hajra Chaudary, Bose, Roy	Elements of workshop Technology – Volume I & II	Media Promoters and Publishers limited
O. P. Khanna and Lal	Production Technology Vol I & II	Dhanpat Rai & Publication
W.A.J. Chapman, S.J.Martin	Workshop Technology Vol I & II	Viva Books (p) Ltd.
O.P. Khanna	A text book of Foundry Tech	Dhanpat Rai Publications.
R.B. Gupta	Production Technology -	Satya Prakashan New Delhi

H.S.Bawa	Volume I & II	S.Chand & Co
		S.K.Kataria
W.A.J. Chapman,	Workshop Technology -	McGraw-Hill
S.J.Martin	Volume I , II & III	S.Chand & Co

EXAMINATION SCHEME

Group	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	05	20	1	20	3	FIVE (AT LEAST ONE FROM EACH GROUP)	10	50
B	4,5,6,7	07				3			
C	8,9,10,11	08				4			

ENGINEERING GRAPHICS

Course	Course offered in	Course	Hrs/ Week	Full
Mechanical Engg. (Production)	Third	Duration 17 weeks	3	Marks 50

EXAMINATION SCHEME

1. **Continuous Internal Assessment of 50 marks** is to be carried out by the teachers throughout the Part – II First Semester. **Distribution of marks: Drawing sheets – 50.**
2. **External Assessment of 50 marks** shall be held at the end of the Part – II First Semester on the entire syllabus. One job per student from any one of the jobs done is to be performed. Job is to be set by lottery system. **Distribution of marks: On spot job – 25, Viva-voce – 25.**

DETAIL COURSE CONTENT

(At least any six jobs are to be undertaken during the Semester)

1. Select drafting problem involving consideration of machining allowance (symbol), surface texture (symbol) and Geometrical tolerances.
2. Line diagrams and symbolic representation of engineering system**:** (a) Electrical and Electronic system, (b) Welding system, (c) Piping system.
3. Design shaft which are supported on bearings and carrying pulley / spur gear (with drawing)
4. Design of a riveted joint (lap and butt) for a pressure vessel and drawing of top and sectional front view of the joint with proper dimensioning.
5. Design of a Welded support structure and representing the joint through dimensional drawing giving all details.
6. Calculation of the size and number of bolts for the end cover joint of a pressure vessel and to draw the arrangement of bolts along with the sectional view.
7. Design of a knuckle joint along with dimensioned drawing.
8. Design of a cotter joint giving component details through dimensioned drawings.
9. Design of a journal and bush used for supporting a rotating system.
10. Calculation of load capacity for a specified life period and selection of anti-friction bearing along with detailed drawing showing mounting of the bearings.

Reference Books:

Name of the Course : Mechanical Engineering (Production) **Subject: Professional Practices-I** **Course)**	
Course code: MEP	**Semester : Third**
Duration : 17 weeks	**Maximum Marks : 50**
Teaching Scheme	**Examination Scheme**
Theory : hrs/week	Internal Assessment: Marks
Tutorial: hrs/week	Teacher's Assessment (Assignment & Quiz): Marks
Practical : **2** hrs/week	End Semester Exam: Marks
Credit: **1**	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 : i) Manufacturing organizations for observing various manufacturing processes including heat treatment ii) Material testing laboratories in industries or reputed organizations iii) Auto workshop / Garage iv) Plastic material processing unit	5 hours
02	**Individual Assignments :** **Any two** from the list suggested a) Process sequence of any two machine components. b) Write material specifications for any two composite jobs. c) Collection of samples of different plastic material or cutting tools with properties, specifications and applications. d) Preparing models using development of surfaces. e) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable.	5 hours

	f) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. g) List the various properties and applications of following materials – a). Ceramics b). fiber reinforcement plastics c). thermo plastic plastics d). thermo setting plastics e). rubbers.	
03	**Computer Aided Mechanical Engineering Drawing using CADD software:** **Basic screen components** – Starting a drawing: Open drawings, Create drawings– Co-ordinate systems: Absolute co-ordinate system, Relative co-ordinate system – Direct distance method – Saving a drawing: Opening an existing file **– Concept of Object – Object selection methods: Pick by box, Window selection, Crossing Selection, All, Fence, Last, Previous, Add, Remove – Erasing objects: OOPS command, UNDO / REDO commands – ZOOM command – PAN command, Panning in real time – Setting units – Object snap, running object snap mode – Drawing circles** **Module 1 DRAW COMMANDS** **Drawing of LINE, CIRCLE, ARC RECTANGLE,ELLIPSE, POLYGON, POLYLINE ,DONUT, MULTILINE etc.** **Module 2 EDITING COMMANDS** **MOVE ,COPY , OFFSET , ROTATE , SCALE , STRETCH , LENGTHEN ,TRIM , EXTEND , BREAK , CHAMFER , FILLET , ARRAY , MIRROR ,MEASURE , DIVIDE , EXPLODE , MATCHPROP , Editing with grips: PEDIT.** **Module 3 DRAWING AIDS** **Layers – Layer Properties Manager dialog box – Object Properties LTSCALE Factor , Auto Tracking ,REDRAW ,REGEN .** **Module 4 CREATING TEXT** Creating single line text – Drawing special characters – Creating multiline text – Editing text – Text style **Module 5 BASIC DIMENSIONING**	24 hrs

	Fundamental dimensioning terms: Dimension lines, dimension text, arrowheads, extension lines, leaders, centre marks and centrelines, alternate units – Associative dimensions – Dimensioning methods – Drawing leader **Editing dimensions by stretching – Editing dimensions by trimming & extending – Editing dimensions, Editing dimension text: , Updating dimensions ,Creating and restoring Dimension styles.** **Module 6 HATCHING** **Basics of HATCHING – Boundary Hatch Options: Quick tab, Advance tab – Hatching around Text, Traces, Attributes, Shapes and Solids – Editing Hatch Boundary.** **Module 7 PLOTTING OF DRAWINGS** **Plot Configuration – Pen Assignments – Paper Size & Orientation Area – Plot Rotation & Origin – Plotting Area – Scale** **Module 8 PRACTICE WITH COMPLETE DRAWING** **Each student is required to prepare a set of 2D drawing (handle, Hooke, wrench, gasket, orthographic projections of 1st, 2nd & 3rd Semester drawing) to practice above CADD commands and any other drawings approved by the teacher-in-charge.** Any two assembly drawing of the following**:** **1] Cotter Joint.** **2] Knuckle Joint** **3] Screw Jack.** **4] Foot step bearing.** **5] Universal Coupling** **6] Flange Coupling** **7] Tail stock** **8] Piston of SI engine.**	
	Total	34 hours

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
Sham Tickoo	Autocad 2002 with Applications		Tata Mcgraw Hill
George Omura	Mastering Autocad 2010 & Autocad LT 2010		BPB Publication
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

Examination Scheme:

Internal Practical Sessional Examination

Chapter	
1 – Submission of project Report on industrial visit on scheduled date	**5**
2 - submission of two assignment on scheduled date	**5**

3 – Practice of CADD software	**10**
Viva - voce	**5**
Total:	**25**
External Practical Sessional Examination	
Submission of signed report & assignment	**5**
On spot CAD Drawing	**15**
Viva voce	**5**
Total:	**25**