DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO. ACAD / NP /S.Y. B.Tech. /Syllabi/87/2012

It is hereby notified for the information of all concerned that, the Academic Council at its meeting held on 06-07-2012 **has accepted the** following **syllabi in all Braches of S. Y. B.TECH.** under the Faculty of Engineering & Technology **as appended herewith** :-

Sr. No.	Revised Syllabi
[1]	Second Year B.Tech. [CIVIL ENGINEERING],
[2]	Second Year B.Tech. [MECHANICAL / PRODUCTION ENGINEERING],
[3]	Second Year B.Tech. [ELECTRONICS & TELECOMMUNICATION ENGINEERING],
[4]	Second Year B.Tech. [COMPUTER SCIENCE & ENGINEERING],
[5]	Second Year B.Tech. [AGRICULTURAL ENGINEERING],
[6]	Second Year B.Tech. [PLASTICS AND POLYMER ENGINEERING],
[7]	Second Year B.Tech. [INSTRUMENTATION & CONTROL ENGINEERING],

This is effective from the academic year 2012-2013 and onwards.

All concerned are requested to note the contents of this circular for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. ACAD/ NP/ S.Y.B.TECH./
2012/19011-33
A.C.S.S. I.No.82

Date:- 31-07-2012.

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Director,
Board of College and
University Development.

Copy forwarded with compliments to :-

1] The Principals, affiliated concerned Colleges,
Dr. Babasaheb Ambedkar Marathwada University.

Copy to :-

1] The Controller of Examinations,
2] The Superintendent, [Engineering Unit],
3] The Superintendent, [Eligibility Unit] ,
4] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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Dr BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

Revised Syllabus of Second Year

B.TECH. MECHANICAL/PRODUCTION

EFECTIVE FROM - 2012-13 & ONWARDS

FACULTY OF ENGINEERING AND TECHNOLOGY
Revised Structure w.e.f.2012-2013
S.Y. B.Tech. (Mechanical/Production)

Sub Code	SEMESTER-III	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TA	P	Total	Credits	Duration of Theory Exam
BSH-201	Engineering Mathematics-III	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-202	Fluid Mechanics	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-203	Strength of Materials	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-204	Machine Drawing	3	1	-	4	20	80	-	-	100	4	4 Hrs
MED-205	Manufacturing Processes-I	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-206	Engineering Thermodynamics	2	-	-	2	10	40	-	-	50	2	2 Hrs
MED-221	Lab I-Fluid Mechanics	-	-	2	2	-	-	25	25	50	1	
MED-222	Lab II-Strength of Materials	-	-	2	2	-	-	25	25	50	1	
MED-223	Lab III-Machine Drawing	-	-	2	2	-	-	25	25	50	1	
MED-224	Lab IV-Work Shop-II			2	2			25	25	50	1	
BSH-225	Lab V- Development of Skills-II	-	-	2	2	-	-	50	-	50	1	
	Total of semester-III	**17**	**5**	**10**	**32**	**110**	**440**	**150**	**100**	**800**	**27**	

Sub Code	SEMESTER-IV	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TA	P	Total	Credits	Duration of Theory Exam
BSH-251	Engineering Mathematics-IV	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-252	Applied Thermodynamics	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-253	Theory of Machines-I	3	1	-	4	20	80	-	-	100	4	4 Hrs
MED-254	Metrology & Mechanical Measurements	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-255	Manufacturing Processes-II	3	1	-	4	20	80	-	-	100	4	3 Hrs
MED-256	Electrical Technology	2	-	-	2	10	40	-	-	50	2	2 Hrs
MED-271	Lab VI- Applied Thermodynamics	-	-	2	2	-	-	25	25	50	1	
MED-272	Lab VII- Theory of Machines-I	-	-	2	2	-	-	25	25	50	1	
MED-273	Lab VIII- Metrology & Mechanical Measurements / Elect Technology	-	-	2	2	-	-	25	25	50	1	
MED-274	Lab IX - Work Shop-III	-	-	2	2	-	-	25	25	50	1	
MED-275	Lab X - Development of Skills-III	-	-	2	2	-	-	50	-	50	1	
	Total of semester-IV	**17**	**5**	**10**	**32**	**110**	**440**	**150**	**100**	**800**	27	
	Grand Total of III& IV	**34**	**10**	**20**	**64**	**220**	**880**	**300**	**200**	**1600**	54	

L: Lecture hours per week T: Tutorial hours per week P: Practical hours per week CT: Class Test
TH: University Theory Examination TA: Teacher's Assessment P: Practical/Oral Examination

HEAD OF DEPARTMENT
Mechanical / Production Engineering
MIT Aurangabad.

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-III

Code No.: BSH201 | **Title: Engineering Mathematics –III**
Teaching Scheme: 04Hrs/week | **Class Test: 20**
Theory: 03Hrs/week | **Theory Examination (Duration): 03 Hrs**
Tutorial: 01Hr/week | **Theory Examination (Marks): 80**
Credits:04

Objectives	:	The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology related to differential equation, Fourier Transforms, Statistical techniques Vectors and Probability.
Unit-I	:	**Linear Differential Equation**: Solution of linear differential equation of order n with constant coefficients: The complementary function, Method of finding particular integral: Short method, General method, Method of variation of parameters Equations reducible to linear form: i) The Cauchy's linear equation. ii) The Legendre's linear equation. Simultaneous differential equations. Application of linear differential equations to: i). Mechanical system. ii). Electrical System iii). Beam and Shafts **(12+3 Hrs)** Tutorials: Additional Practice Problems on each type of Application
Unit-II	:	**Vector Differentiation:** Differentiation of vectors, Radial, Transverse, Normal And tangential components of velocity and acceleration, Scalar and vector point function , Gradient of scalar point function , Divergence and curl of vector point function , Second order differentiation operator , Irrotational and solenoid fields. **(7+3 Hrs)** Tutorials: Additional Practice Problems on Irrotational and solenoid fields.
Unit-III	:	**Statistics:** Measures of central tendency: Mean Median, Quartiles and Mode. Measures of dispersion: Quartile deviation, Mean deviation, Standard deviation, coefficient of variation, Moments, Skewness, Kurtosis. **(3+2 Hrs)** Tutorials: Additional Practice Problems on coefficient of variation,Moments
Unit-IV	:	**Laplace Transform:** Definition, Laplace Transform of elementary function and its table, Theorem and properties of Laplace Transform: First shifting theorem, Second Shifting Theorem, Multiplication by t^n, Division by t, Change of scale property, Laplace Transform of integral, Laplace Transform of Derivative. Laplace Transform of some special functions: Bessel's function, Periodic function, Error Function, Heaviside Unit Step Function, Displaced Heaviside Unit Step Function Laplace Transform using Heaviside Unit function, Dirac delta function. Method to find inverse Laplace Transform: i. Use of Laplace Transform table ii. Use of Theorem and properties of Laplace

		iii. Use of partial fraction iv. Convolution theorem v. Use of development of Heaviside Unit Step Function Application of Laplace Transform to solve linear differential equation ,Simultaneous differential equation. **(13+2 Hrs)** Tutorial: Additional Practice Problems on Solution of Linear Differential Equation, Simultaneous differential equation.
Unit-V	:	**Fourier Transform:** Fourier integral: Complex form of Fourier integral, sine and cosine integral, Fourier transform and inverse transform. D.U.I.S. rule (only statement), Fourier transform and inverse transform for even and odd function, Fourier sine and cosine transform and inverse transform. **(7+3 Hrs)** Tutorials: Additional Practice Problems Fourier sine and cosine transform
Unit-VI	:	**Probability:** Introduction, Probability Distribution: Binomial Distribution, Poisson Distribution, Normal Distribution **(3+2 Hrs)** Tutorials: Additional Practice Problems on each type of Distribution
Reference Books:	:	1. A Text Book Of Applied Mathematics Volume-III BY P.N. Wartikar J.N.Wartikar, Pune Vidyaryhi Griha Prakashan, Ninth edition. 2. Advanced Engineering Mathematics BY H.K.Dass, S.Chand and Co.Ltd, Eighteenth edition. 3. Higher Engineering Mathematics BY Dr.B.S.Grewal, Khanna Publishers, 46th edition. 4. Higher Engineering Mathematics BY B.V.Ramana, Tata McGraw-Hill Publishing Co.Ltd., First edition. 5. Solution to Higher Engineering Mathematics Volume –III BY C.P.Gandhi

Section A: Includes Unit I, II and III; Section **B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-III

Code No.: MED-202	**Title: FLUID MECHANICS**
Teaching Scheme: 04Hrs/week	**Class Test: 20**
Theory: 03Hrs/week	**Theory Examination (Duration): 03hrs.**
Tutorial: 01Hrs/week	**Theory Examination (Marks): 80.**
Credits:04	

Objectives	:	• To understand properties of fluid and study different pressure measuring devices. • To study the behaviour of fluid when fluid is in rest. • To understand and study the behaviour of fluid when the fluid is in motion by Considering the forces and without considering the forces on fluid. • To understand the concept of boundary layer thickness and displacement • To study the major and minor losses in the pipes.
Unit-I	:	**Introduction**: Scope, Relevance of Fluid Mechanics, Types of Fluids, Density and Specific Weight, Pressure, Properties of Fluids, Viscosity, Surface Tension, Capillarity, Compressibility. Vapour pressure. **(08Hrs)**
Unit-II	:	**Fluid Statics**: Pressure of fluid at a point, PASCAL's Law, hydrostatics law, Fluid Pressure Measurements, different gauges, types of pressure, pressure measuring instruments like manometers, mechanical gauges. Total Pressure, centre of pressure on vertical plane, inclined plane and curved surfaces, Concept of Buoyancy, Archimedes' Principle, Metacentre, Met centric Height, Equilibrium of floating bodies. **(12 Hrs)**
Unit-III	:	**Fluid flow Kinematics**: Introduction, Classification of flow, continuity equation, Cartesian coordinates, types of flow line, Velocity acceleration, Velocity Potential, Stream Function, Flow net, Applications of flow net, free and forced vortex flow, radial flow. **(10 Hrs)**
Unit-IV	:	**Energy Equation and its applications**: Forces acting on fluids in motion, Euler's equation of motion, Bernoulli's equation, Practical application of Bernoulli's equation such as Venturimeter, Orifice meter, pitot tube. The Momentum equation, Force exerted by flowing fluid on a pipe-bend. **(12 Hrs)**
Unit-V	:	**Boundary Layer Theory**: Concept of Boundary Layer, Thickness of Boundary Layer, Displacement thickness, Momentum thickness, Energy thickness, Separation of boundary layer, Forces on immersed bodies in flowing fluids **(08 Hrs)**
Unit-VI	:	**Flow through Pipes**:

		Major losses, Minor Losses, Darcy's Equation ,Hydraulic Gradient Line, Total Energy Line, Flow through pipes in series and parallel, Equivalent pipes, Branched pipes, Flow through nozzle, Power transmission through pipes **(10 Hrs)**
Reference Books:	:	1) Fluid mechanics by K.Subramanya, TATA McGraw Hill Publications. 2) Fluid mechanics and Hydraulics by Dr.R.K.Bansal. Laxmi Publications (P) LTD. 3) Fluid mechanics and Hydraulic machines by Dr. S.K.Agrawal, TMH, 2nd edition 4) Hydraulics and Fluid Mechanics, Modi & Seth, Standard Book House, 14th edition. 5) Fluid Mechanics and Hydraulic Machines, S. Ramamrutham, Dhanpatrai Publications, 8thedition.
Additional Reference Books	:	Fluid Mechanics, V.L. Streeter &E.B. Wylie, TMH, 3rd edition.

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

5. Minimum ten questions
6. Five questions in each section
7. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
8. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical/Production) - Semester III

Code No: MED-221
Teaching Scheme: 02 Hrs/week
Credits: 01

Title: Lab I - Fluid Mechanics.
Practical : 25 marks
Teacher's Assessment:25 marks

Course Objectives	:	• To understand various concepts, theorems in fluid mechanics by performing following experiments.
List of Practical's (Not Less than 10)	:	1. Assignment on properties of fluids. 2. Study of pressure measuring devices. 3. Determination of Kinematic Viscosity using Redwood Viscometer. 4. Determination of metacentric height. 5. Verification of Bernoulli's equation. 6. Demonstration of Reynolds experiment. 7. Determination of coefficient of discharge of Venturimeter. 8. Determination of coefficient of discharge of Orifice meter. 9. Determination of coefficient of friction in pipe. 10. Determination of minor losses.
List of Reference Books	:	1) Fluid mechanics by K.Subramanya, TATA McGraw Hill Publications. 2) Fluid mechanics and Hydraulics by Dr.R.K.Bansal. Laxmi Publications (P) LTD. 3) Fluid mechanics and Hydraulic machines by Dr. S.K.Agrawal, TMH, 2nd edition 4) Hydraulics and Fluid Mechanics, Modi & Seth, Standard Book House, 14th edition. 5) Fluid Mechanics and Hydraulic Machines, S. Ramamrutham, Dhanpatrai Publications, 8thedition.
List of Equipments /Instruments	:	**Set up** for various Pressure Measuring devices, verification of Bernoulli's Equation,Reynold's Equation,Venturimeter,Orifice meter, Metacentric height of floating vessel, Major and Minor losses in pipes

The assessment of term work shall be done on the basis of the following.

- Continuous assessment.
- Performing the experiments in the laboratory.
- Oral examination conducted on the syllabus and term work mentioned above.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S.Y. B. Tech (Mechanical Engg/ Production Engineering) Semester III

Code No: MED-203
Teaching Scheme:04Hrs/week
Theory:03 Hrs/ week
Tutorial:01Hr/ week
Credits: 4

Title: Strength of Materials
Class Test: 20 Marks
Theory Examination (Duration): 3 Hrs
Theory Examination (Marks): 80 Marks

Objective	:	The purpose of the subject of Strength of Materials is to make the students aware of the stresses & strains in different materials & composite materials under various loads, limiting values of strengths, safe carrying stresses and various mechanical properties of materials.
Unit I	:	Simple Stresses and Strains: Simple stress and strain due to axial tension, compression, shear; Temperature stresses for simple and composite sections; Elongation of uniform and tapering sections, Lateral strains and linear strains, Poisson's Ratio; Elastic constants & their inter-relations. Shear Force and Bending Moment: Concepts; Relation between load intensity, shear force and bending moments; BM & SF diagrams for various types of loadings like udl, uvl, bracket loads, point loads, moments etc. **(14 Hrs)**
Unit II	:	Theory of Pure Bending: Pure bending; Assumptions made in theory of pure bending; Neutral Axis, Moment of Resistance, Section Modulus; Bending Stress Distribution diagrams for various cross sections, end conditions and loading conditions of beams. Shear Stress Distribution : Shear stresses in beams, complimentary shear, Shear Stress Distribution diagrams for various cross sections, end conditions and loading conditions of beams. **(14 Hrs)**
Unit III	:	Direct and bending stresses: Bending combined with Axial Loads; Core of a Section; Eccentrically loaded short struts; chimneys. **(04 Hrs)**
Unit IV	:	Principal stresses and strains: Concept; Stress on oblique plane in a Two Dimensional stress system; Planes of maximum shear stress, Mohr's circle diagram for Principal Stresses. Theory of Torsion: Concepts; Assumptions; Theory of Pure Torsion, Circular shafts subjected to Torsion; Torsional stresses, Power Transmission, Torsion combined with Bending and Axial forces. **(12 Hrs)**

Unit V	:	Thin Cylindrical and Spherical Shells: **Thin pressure vessels; Circumferential and Longitudinal stresses; Cylindrical and Spherical objects subjected to internal fluid pressure; Volumetric Strains.** **(04 Hrs)**
Unit VI	:	Strain Energy: **Strain energy due to gradually applied loads; Suddenly applied loads and Impact loads.** **Deflection of beams:** **Deflection of beams, statically determinate and indeterminate, double integration method, various types of loads and beams, slope and deflection equations.** **(12 Hrs)**
Reference Books:	:	**1.** Strength of Materials by Ramamrutham. Dhanpatrai and Sons Publications 2. Strength of Materials by R. K. Bansal. Laxmi Prakashan 3. Strength of Materials by R.S. Khurmi. S.Chand 4. Mechanics of structure by Junnarkar. Charotar Publications 5. Strength of Materials by Ratan. Tata Mc-Graw Hill Publications

Section A-Unit I, II, III & **Section B**-Unit IV, V, VI

Pattern of Question Paper:-

The six/four units in syllabus shall be divide in two equal parts i.e.3 units respectively. Question paper shall be set having two sections A & B. Section A question shall be on first part & section question on second part. Question paper should cover entire syllabus.

For 80 marks paper:-

1. Minimum ten questions.

2. Five question in each section.

3. Question No1 from section A & Question No 6 from section B made compulsory & should cover complete syllabus of the respective section & should be set for ten marks each. The question no.1 & 6 should be of objective nature.

4. Two question of 15 marks from each remaining question, from each section A & B asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S.Y. B. Tech (Mechanical Engg/ Production Engineering) Semester III

Code No: MED-222
Teaching Scheme:
Practical : 02 Hrs / week
Credits: 1

Title: Lab-II Strength of Materials
Teacher's Assessment: 25 Marks
Practical: 25

Objective	:	The objective of this subject is student should understand behavior of different materials under action of various types of loadings.
List of Practical	:	1. Tension Test on the Ductile Materials like Mild steel and TOR steel 2. Flexural Test on Timber Beam 3. Shear Test on Metals (Single & Double Shear) 4. Impact Tests on Metals- (Izod and Charpy) 5. Torsion Test on Mild Steel 6. Hardness Test on Metals (Rockwell & Brinell)
Assignments	:	Assignments shall consist of Numerical Example at least two on each unit of the Syllabus.

The assessment of term work shall be done on the basis of the following:

- Continuous Assessment
- Performing the experiments given in Laboratory
- Submission of Assignments in stipulated period.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-III

Code No.: MED-204
Teaching Scheme: 04Hrs/week
Theory: 03Hrs/week
Tutorial: 01Hr/week
Credits:04

Title: Machine Drawing
Class Test: 20
Theory Examination (Duration): 04hrs.
Theory Examination (Marks): 80.

Objectives	:	• Mechanical Engineering Students should be able to interpret industrial drawings. • Interpret instructions related to manufacturing components. • Use IS convention of representing various machine components. • Visualize the assembly of given set of details.
Unit-I	:	**Revision of Orthographic and Sectional Views:** Types of section, conversion of pictorial view into sectional views **(08Hrs)**
Unit-II	:	**Engineering Curves:** To draw Ellipse, Parabola, Hyperbola, Involute, Cycloid, Epicycloid, Hypocycloid, Helix, Archmedian Spiral etc. **(10Hrs)**
Unit-III	:	**Interpenetration of Solids:** Curves of interpenetration of the surfaces of the solids such as Cylinder, Prism, Pyramid, Cone and Sphere. **(12Hrs)**
Unit-IV	:	**Auxiliary Views:** Study of auxiliary planes, projection of objects on auxiliary planes, completing the regular views with the help of given auxiliary views. **(10Hrs)**
Unit-V	:	**Conventional Representation:** Standard convention using SP-46 (1988) , Shaft couplings, different types of welding, locking arrangements of Nuts and Bolts, Riveted Joints, Different types of Pulleys, Screws, Nuts, Bolts and Studs in engineering practices. types of threads: V-thread, Square thread, single start, multiple start, Right hand and left hand threads, External and Internal threads, Geometrical Tolerancing, Surface texture. **(10 Hrs)**
Unit-VI	:	**Preparing Assembly from Given Data:** Assemblies like Plummer Block, Foot Step Bearing, J-hanger Bearing, Steam Stop Valve, Hydraulic Non-return Valve, Ram's Bottom Safety Valve, Cross Head, Piston and Connecting Rod, Lathe Tail Stock, Drill jig etc. **(10 Hrs)**
Reference Books:	:	1) Machine Drawing by N. D. Bhat, Chartor Publication, 39th Edition. 2) Machine Drawing by R.K.Dhawan, S.Chand and co., Ist Edition. 3) Machine Drawing by P.S.Gill, S.K.Kataria & sons, 7th Edition. 4) Engineering Drawing by N.D.Bhat Chartor Publication 46th Edition. 5) Engg. Drawing practice for schools and colleges, IS Code SP 46 (1988)

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

9. Minimum ten questions
10. Five questions in each section
11. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
12. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

5. Minimum eight questions
6. Four questions in each section
7. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
8. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical/Production) - Semester III

Code No: MED-223
Teaching Scheme: 02 Hrs/week
Credits: 01

Title: Lab – III Machine Drawing
Practical : 25 marks
Teacher's Assessment:25 marks

Course Objectives	:	• Mechanical Engineering Students should be able to interpret industrial drawings. • Interpret instructions related to manufacturing components. • Use IS convention of representing various machine components.
List of Practical's (Not Less than 10)	:	1. To draw full size sheet (A-1) Four problems on each chapters 1,2,3 & 4, two sheets on chapter 5 2. One assembly to details on one sheet and details to assembly on one sheet. 3. Study of one working drawing of component 4. Computer Aided Drafting:- Introduction to AutoCAD. To know & use the various commands. 5. To draw two problems of orthographic views (one problem with section) , 6. To draw two Isometric views
List of Reference Books	:	1) Machine Drawing by N. D. Bhat, Charottar Publication, 39th Edition. 2) Machine Drawing by R.K.Dhawan, S.Chand and co., Ist Edition. 3) Machine Drawing by P.S.Gill, S.K.Kataria & sons, 7th Edition. 4) Engineering Drawing by N.D.Bhat Chartor Publication 46th Edition. 5) Engg. Drawing practice for schools and colleges, IS Code SP 46 (1988)

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-III

Code No.: MED-205
Teaching Scheme: 04Hrs/week
Theory: 03Hrs/week
Tutorial: 01Hr/week
Credits:04

Title: Manufacturing Processes-I
Class Test: 20
Theory Examination (Duration): 03hrs.
Theory Examination (Marks): 80.

Objectives	:	After successful completion of the course the student should be conversant with the primary and secondary manufacturing processes and their application in real time.
Unit-I	:	**Introduction:** To introduce to the concepts of some basic manufacturing processes and fabrication techniques, such as metal casting, metal joining, metal forming and plastics component manufacture. Importance of manufacturing. Economic & technological considerations in manufacturing. Materials & manufacturing processes for common items. **(2Hrs)** **Case Study:** "Recent Trends in Manufacturing" Submit a report or PPT Presentation to each group on Literature survey.
Unit-II	:	**Casting:** Basic principle & survey of casting processes. **Introduction to pattern and Pattern making:** Pattern materials, pattern making, allowances, Types of patterns, **Moulding Sand:** General properties of moulding sands, Mold hardness. Preparation of sand moulds of different types, Moulding processes, core making. **Sand casting Processes** - Basic principle and Terminology of sand casting, gating system, types of gates , Risers design, Risering aids, (Elements of mould and design considerations, Gating, Riser, Runners, Core. Solidification of casting) **Technology of melting and casting** - Melting furnaces pit, open hearth, gas fired cupola and electric hearth furnaces, cupola operation, development in cupola melting, Electric furnaces - Direct Arc, Indirect arc and electric induction furnace. Modernization & Mechanization of Foundries, **Defects in castings**-Origin and classification of defects, shaping faults, Inclusions and sand defects, Gas defects, shrinkage defects, contraction defects, dimensional errors. Casting defects and Inspection of castings. **Case Study:** Visit to foundry – study of processes, Layout, Casting Patterns (Design), Cores, Sand Preparation, Gating & Riser system, Material handling equipment & other processes with preparation of report. **(16Hrs)**
Unit-III	:	**Metal Forming Process:** classification of metal forming processes, Introduction to cold/hot forming processes, Metallurgical aspects of metal forming, Stress-strain relations in elastic and plastic deformation; concept of flow stress, deformation mechanisms. Forging principle, classification, equipment, tooling-processes, parameters and calculation of forces and power requirements during forging, embossing and coining, squeezing and bending operations. Principles of rolling processes, classification, types of rolling mills, analysis of rolling load, torque and power, rolling mill control, , effects of friction. Form rolling, rolling defects, causes and remedies. Classification of extrusion processes-tool, equipment, and principle of these processes. Wire drawing-tool, equipment and principle of processes.

		Tube drawing and sinking processes-Mannesmann processes of seamless pipe manufacturing. **(12Hrs)**
Unit-IV	:	**Metal Joining (Welding) Process:** Survey of welding and allied processes, Mechanical joining processes riveting, soldering, brazing (introductory), Types of Gas welding, Flame characteristics , Filler and Flux materials Types of welding processes-Arc welding: arc initiation, arc maintenance, and arc control, Electrodes –Coating and specifications. Gas metal arc welding – Flux cored, Submerged arc welding, Electro slag welding, TIG & MIG welding etc. Principles of Resistance welding – Spot/butt, seam welding, Percussion welding, flash welding etc. **Principle and application of special welding processes** - Plasma arc welding, Thermit welding, Electron beam welding, Friction welding, Diffusion welding, forge welding, plasma arc, Ultrasonic, Electroslag, laser welding. Weldability of cast iron, steel, stainless steel, aluminium alloys. Thermodynamic and Metallurgical aspects in welding and weld, Shrinkage/residual stress in welds, HAZ. **Inspection of welds** – destructive and non-destructive testing methods, Defects in welding-causes and remedies **Case Study:** Visit to welding facility preferably for automated welding, preparation of report. **(12Hrs)**
Unit-V	:	Processing of plastics: Types of plastics, Characteristics of the forming and shaping processes, Moulding of Thermoplastics, Working principles and typical applications of, Injection moulding, Plunger and screw machines, Compression moulding, Transfer moulding, Introduction to Blow moulding – Rotational moulding, Film blowing, Extrusion. Thermoforming, calendaring, Extrusion, Bonding of Thermoplastics. **(6Hrs)**
Unit-VI	:	**Sheet metal working operations :** Cutting (cut off, blanking ,piercing, perforating, notching and lancing) Forming (bending, flanging, curling, ribbing, corrugating, hemming, crimping. Drawing (drawing, redrawing deep drawing) Spinning. Conventional and HERF processes-presses-types and selection of presses used in sheet metal working. Classification: hand and power presses, working principle of ram driving mechanism (crank, eccentric, cam toggle, knuckle, rack and pinion, screw, hydraulic), capacity and use. **Powder Metallurgy :** Powder metallurgy manufacturing process. The need, process, advantage and applications. **Surface Treatment-** Electroplating, electroforming, and iodising, metal spraying, shot peening, polishing, mechanical cleaning. **(10Hrs)**
Reference Books:	:	1. Manufacturing Science by Amitabh Ghosh. East-west Press 2. Processes and Materials of Manufacture by Roy A. Lindberg. Prentice Hall 3. Materials and Processes in Manufacturing by E.Paul Degarmo, J.T. Black, R.A. Kohser. Prentice Hall India 4. Production Technology by R.K.Jain Khanna Publishers

		5. Principles of Foundry Technology by P.L.Jain. Tata Mcgraw Hill 6. Manufacturing Technology Foundry, Forming and Welding by P.N. Rao. TMH
Additional Reference Books	:	1. ASM Handbooks by ASM international a. Welding Brazing & Soldering b. Forming and Forging c. Casting 2. Principles of Metal casting by Richard W. Heine, C.R. Loper & P.C. Rosenthal. TMH 3. Manufacturing Processes Materials and Production by S.E. Rusinoff. The Times of India Press Bombay 4. Mechanical Metallurgy by George E. Dieter TMH 5. Metals Handbook by Howard E. Boyer & Timothy L.Gall ASM 6. Welding Processes and Technology by Dr.R.S.Parmar. Khanna Publishers 7. Metal forming by William F.Hosford & Robert M.Caddel. 8. Metal Working Technology by Narayanaswamy. R. PHI (1997) 9. Theory of Metal Forming and Metal Cutting by Sinha and Prasad. Dhanpat Rai Publication 1999

D. Digital References

Sr. No.	Website / Links / e-journals
1	www.efunda.com
2	www.bpf.co.uk
3	www.sciencedirect.com
4	ESDU
5	www.asminternational.org

E. Journals/Magazines

Sr	Titles
1	Mechanical Engineering
2	Engineering Advances
3	Institute of Engineers Journal-Mechanical Engineering
4	Indian Journal of Engineering and Material science

***Note: Report should be submitted as per given format.**
Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section

3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-III

Code No.: MED-206
Teaching Scheme:02 Hrs/week
Theory: 02 Hrs/week
Tutorial:
Credits:02

Title: Engineering Thermodynamics
Class Test: 10
Theory Examination (Duration): 02hrs.
Theory Examination (Marks): 40

Objective	:	To understand the basic terms and laws governing energy transformation.
Unit-I	:	**Properties of steam:** Phase; Phase Properties, Phase Diagrams. Formation of Steam; Temperature-Entropy Diagrams; Triple Point; properties of steam - Pressure, temperature, internal energy, Specific volume, Enthalpy and Entropy. Use of Steam Tables and Enthalpy-Entropy (Mollier) Diagrams; Non-flow Processes with Steam. (Problems on non-flow processes of steam.) **(08Hrs)**
Unit-II	:	**Ideal gas:** Characteristic equation of state for a Perfect Gas; P-V and T-s Diagrams for Work transfer and Heat transfer in Reversible Processes; Equation of state for Real Gas; Internal energy of a gas and Joule's Law; Specific Heats of a Gas and relation between them. Different Gas Processes and Heat & Work Transfer in various Gas Processes; Concept of Entropy; Change of Entropy in different Gas Processes; (Problems on above). **(08Hrs)**
Unit-III	:	**First Law of Thermodynamics:** First Law of Thermodynamics and its application to various Processes; Non-Flow ; Steady-Flow process; SFEEquation and its engineering application- nozzle, turbine, air blower, compressor and heat exchanger only..(problems) **(06Hrs)**
Unit-IV	:	**Second law of Thermodynamics:** Limitations of first law of thermodynamic . Heat engine and reversed heat engine, Different statements of second law of Thermodynamics, Equivalence of KP and Clasius statement, Carnot cycle, Thermodynamic Reversibility, Carnot's Principle, and Carnot's Cycle for a gas. Thermodynamic Temperatures scale, Entropy, entropy is property, Entropy change in reversible and Irreversible process. entropy principle. **(08Hrs)**

Suggested Reference Books	:	1. Engineering Thermodynamics by P.K. Nag: TMH 2. Engineering Thermodynamics by C.P. Arora TMH 3. Thermal Engineering by P.L.Ballany Khanna Publishers 4. Thermal Engineering by R.K.Rajput Laxmi Publication 5.Thermal Engineering Vol-II by H.R. Kapoor TMH 6.Thermodynamics by Y.A. Cengel & M.A.Bole TMH 7. Engineering Thermodynamics by Francis F Huang Macmillan Publishing company

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

5. Minimum eight questions
6. Four questions in each section
7. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
8. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical/Production) - Semester III

Code No: MED-224 — **Title: Lab IV Workshop Practice-II**
Teaching Scheme: 02 Hrs/week — **Practical : 25 marks**
Credits: 01 — **Teacher's Assessment:25 marks**

Objective	:	The subject intends to make aware and understand the hardship involved in engineering fields. Also to develop work culture and ability to work in a team and as individual to acquire skills. The subjects aims to make an engineer to do minor repairs on their own by making them tough (physically and mentally) to face the real world .
Unit-I	:	**Plumbing:** Study of plumbing tools and their uses, standards accessories used in plumbing .Workshop diary – Sketch of job, List of various operations and tools. Practical: one job of thread cutting on G.I. Pipe
Unit-II	:	**Pattern Making:** Study of pattern making tools. Workshop diary – Sketch of job, List of various operations and tools. Practical: one job of pattern making.
Unit-III	:	**Foundry:** Study of sand moulding, Types of sands and moulding equipments. Workshop diary – Sketch of job, List of various operations and tools Practical: One job of moulding (Single or multi-piece pattern)
Unit-IV	:	**Welding:** Study of arc welding machines welding equipments. Workshop diary – Sketch of job, List of various operations and tools Practical: One job of welding individually or in group of students of any useful item of daily use using various welding operations.
Term work	:	Term work will consist of submitting a file for all shops with neatly written records of the study and diagrams. A workshop diary should be maintained by students to record the progress of the jobs done.
Practical Examination	:	The Practical Examination will comprise of two Jobs out of pattern making, foundry and welding. The job will be assessed by two examiners, One will be the internal and other will be external examiner appointed by university.

D. Digital References

Sr. No.	Website / Links / e-journals
1	www.cyberwalker.net
2	www.pcguide.com
3	www.buildasvpc.com
4	www.ictp.it
5	www.howstuffworks.com

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical/Production-)Semester- III

Code No.: BSH225
Teaching Scheme:(02) Hours per week
Practical: 02 Hours per week
Credits:01

Title: Lab X: DOS- II
Termwork :50 marks
Practical :--
Total Examination (Marks): 50 marks

Course Objectives	:	Students should adequately equip to face the highly competitive and very demanding corporate world of today.Soft skills encompass personal, social, communication, and self-management behaviors. They cover a wide spectrum of abilities and traits: being self-aware, trustworthiness, conscientiousness, adaptability, critical thinking, attitude, initiative, empathy, confidence, integrity, self-control, organizational awareness.
Unit-I		**Soft skills and Functional English.** Basic of soft skills Dimensions of soft skills, Misconception of soft skills. The changing business environment and its impact on soft skills, Presentation: Preparation, delivery, etc.Interview technique ,Group Discussion and Debate **5 hrs**
Unit-II		**Nonverbal Communication.** **And Corporate etiquettes.** Body Language and its different aspects, Voice dynamics and voice modulation, Professional Appearance, Clothing etiquettes and Corporate dressing, Dinning table etiquettes. etc. **06 hrs**
Unit-III		**Business Correspondence** Official Drafting:Letter writing, Inquiry, Request, Complain, Sales, Follow-up. etc. Office documents like circulars, notices, minutes, agenda and memos. Report Writings: Types of reports, Data Interpretation: Compréhension of data, Analyses and Interprétations of data **06 hrs**
Unit-IV		**E-communication** Email communication and Email etiquettes ,Video Conferencing, and other e- communication **04 hrs**
Unit-V		**Team work and team building** The elements of teamwork. The changing nature of team .The basics of team intelligence, Diversity awareness, Gender issues, what is an effective team? Essential building blocks of essential team. **04hrs**
Unit-VI		**Problem-Solving and self confidence** Collaborative problem-solving, Benefits of collaboration, Effective Conflict Communication, Conflict resolution styles, Defusing conflict, Evaluating the conflict, How to build confidence, How confident are you? Thinking like a confident person. **5Hrs**

List of Reference Books	1. Gopalaswamy Ramesh, Mahadevan Ramesh, "The Ace of soft skills"Pearson publications. 2. Jerry Weissman ,"Presenting to Win", Prentice Hall publications. 3. William Sanborn Pfeiffer,T.V.S.Padmaja, "Technical communication" Pearson publications. 4. "Presentation Skills for Managers"Mcgraw Hills brief case books. 5 .Personality Development and soft skills,Oxferd University Press 6 Technical Report Writing Today: Daniel G. Riordan, Steven E. Pauley 7 Technical Writing: B. N. Basu 8 David Lawrence Preston,"365 steps of self confidence", Published by How To Books Ltd,

The term work shall be done on the ten assignments based on the topics mentioned above .And oral examination would be conducted internally on the syllabus mentioned.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical / Production) Semester- IV

Code No.: BSH251 | **Title: Engineering Mathematics –IV**
Teaching Scheme: 04Hrs/week | **Class Test: 20 M**
Theory: 03Hrs/week | **Theory Examination (Duration): 03 Hrs**
Tutorial: 01Hr/week | **Theory Examination (Marks): 80**
Credits:04

Objectives	:	The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology related to Function of complex variable, transforms, Numerical Methods, Vectors.
Unit-I	:	**Function of complex variable :** Introduction , Analytic function ,Cauchy-Riemann equation in Cartesian and polar coordinates ,Harmonic function, orthogonal system , Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem , Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region Taylor's and Laurent's series(without proof), Singularities, Residues, Cauchy's residue theorem. **(12+3 Hrs)** Tutorials: Additional Practice Problems on Singularities, Residues, Cauchy's residue theorem.
Unit-II	:	**Application of Complex Variable:** Evaluation of real integrals: Integration along unit circle and along the upper half semi circle, Conformal Transformation, Bilinear transformation. **(3+2 Hrs)** Tutorials: Additional Practice Problems on Bilinear transformation and Integration
Unit-III	:	**Vector Integration:** Line integral, Surface integral, Gauss divergent theorem, Stoke's theorem, Green's theorem, Curvilinear coordinates: Cylindrical and Spherical polar coordinates. **(7+3 Hrs)** Tutorials: Additional Practice Problems Gauss divergent theorem, Stoke's theorem, Green's theorem.
Unit-IV	:	**Application of partial differential equation :** Solution of partial differential equation by method of separation variable Application to i. Vibration of a string (The wave equation), ii. One dimensional heat flow (The diffusion equation) iii. Two dimensional heat flow.(The Laplace equation) **(8+2 Hrs)** Tutorials: Additional Practice Problems on Wave, Heat and Laplace equation
Unit-V	:	**Z- transform :** Definition, Z-transform of elementary function , properties of Z-transform , Inverse Z-transform :Partial fraction method, inversion integral method(Residue method),Solution of Difference equation by using Z-transform. **(6+2 Hrs)** Tutorials: Additional Practice Problems on Solution of Difference equation by using Z-transform

Unit-VI	:	**Numerical Method:** Solution of algebraic and transcendental equation, Newton Raphson method, Lagrange's interpolation, Solution of linear simultaneous equation; by Gauss elimination method, The Guass-seidal method,Solution of ordinary differential equations: Taylor series method, Fourth order Runge-Kutta method. **(9+3 Hrs)** Tutorials: Additional Practice Problems on Solution of ordinary differential equations: Taylor series method, Fourth order Runge-Kutta method.
Reference Books:	:	1. A Text Book of Applied Mathematics Volume-II –by P.N. Wartikar and J.N.Wartikar. 2. A Text Book Of Applied Mathematics Volume-III-by P.N. Wartikar and J.N.Wartikar. 3. Advanced Engineering Mathematics-by H.K.Dass. 4. Higher Engineering Mathematics- by Khanna Publishers. 5. Higher Engineering Mathematics- by B.V.Ramana.
Additional Reference Books	:	1. Solution to Higher Engineering Mathematics Volume –III -by C.P.Gandhi

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-IV

Code No.: MED-252
Teaching Scheme:04Hrs/week
Theory: 03Hrs/week
Tutorial: 01Hr/week
Credits:04

Title: Applied Thermodynamics
Class Test: 20
Theory Examination (Duration): 03hrs.
Theory Examination (Marks): 80.

Objective	:	To understand working principle and thermodynamic analysis of some important thermodynamic systems.
Unit-I	:	**Fuels, Combustion and Dissociation:** Definition of Fuel, Classification of fuel, Calorific Value, combustion, Combustion Equation, Analysis of the Products of Combustion, Stoichiometric air required for complete combustion, Actual combustion, Excess Air, Conversion of mass basis analysis to volume basis and volume basis to mass basis. Flue gas analysis. **(08Hrs)**
Unit-II	:	**Boiler draught and Performance:** Boiler draught: Definition, classification Natural draught calculation, artificial draught and its types. Boiler Performance: Evaporative capacity, Equivalent Evaporation and Boiler Thermal Efficiency ; Heat loss in boiler plant, boiler trial and heat balance sheet. **(08Hrs)**
Unit-III	:	**Steam nozzles and condensers:** steam nozzle, its types, flow and velocity of steam through nozzle, discharge and condition for maximum discharge through nozzle, critical pressure ratio and its significance, effect of friction on steam flow ,nozzle efficiency, supersaturated flow through nozzle, relationship between area, velocity and Pressure in nozzle flow, steam injector. Condenser: its types, sources of air in condenser and its effect, vacuum in condenser and its measurement, vacuum efficiency, condenser efficiency, mass of cooling water circulated in condenser, cooling towers **(14Hrs)**
Unit-IV	:	**Steam Power Cycle:** Carnot steam cycle, Rankin cycle and its efficiency, Isentropic Efficiency, work Ratio, Reheat, Regenerative, and Reheat Regenerative Feed Heating and their effect on Thermal Efficiency (Problems on these cycles) Binary vapor cycle. **(10Hrs)**
Unit-V	:	**Air standard cycles:** Constant volume Cycle (Otto cycle); Constant Pressure Cycle (Diesel Cycle); Dual Combustion Cycle-introduction; expression of efficiency and Mean Effective pressure of cycles, Comparison between the cycles on P-v and T-s diagram(Problems on these cycles). Introduction to Bray ton(Joule)and stirling cycle **(10Hrs)**
Unit-VI	:	**Reciprocating Air Compressors:** Introduction, The Reciprocating air Compressor, Mechanical details, Single Stage Compressor Equation of work- with Clearance and without Clearance volume, , Efficiencies, Multistage Reciprocating air Compressor, Equation of work- with perfect and imperfect cooling,(Problems on above).

		Description of Air engines (Air Motors), Rotary positive Displacement types of compressors, (10Hrs)
Suggested Reference Books	:	**1. Engineering Thermodynamics by P.K. Nag. TMH** 2. Engineering Thermodynamics by C.P. Arora TMH 3. Thermal Engineering by P.L.Ballany Khanna Publishers 4. Thermal Engineering by R.K.Rajput Laxmi Publication 5.Thermal Engineering Vol-II by H.R. Kapoor TMH 6.Thermodynamics by Y.A. Cengel & M.A.Bole TMH 7. Engineering Thermodynamics by Francis F Huang Macmillan Publishing company

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

5. Minimum ten questions
6. Five questions in each section
7. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
8. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

5. Minimum eight questions
6. Four questions in each section
7. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
8. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical/Production) - Semester IV

Code No: MED-271 | **Title: Lab VI-Applied Thermodynamics**
Teaching Scheme: 02 hrs | **Practical : 25 marks**
Credits: 01 | **Teacher's Assessment:25 marks**

List of Practicles	:	Term work shall Consists of record book on laboratory experiments studies on the following 1. Determination of C. V. of fuel by Bomb Calorimeter 2. Study and demonstration of Orsat Apparatus. 3. Study of Simple Carburetor 4. Study of Fuel Pump and Injector 5. Study of Ignition system of I.C. Engine 6. Study of Lubrication system of I.C. engine 7. Study of Governing system of I.C. Engine 8. Study of Cooling system of I.C. Engine 9. Actual demonstration of I. C. Engine 10. Trial on Reciprocating Air compressor Visit to Non conventional Power plant and Report on the same Visit to Thermal Power Plant and Report on the same

The assessment of term work shall be on the following criteria:

- Continuous Assessment
- Performing the experiments in the laboratory

Oral examination conducted (internally) on the syllabus and the term work mentioned above

Practical Examination:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and Viva-voce based on the syllabus

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical/Production) Semester-IV

Code No.: MED-253
Teaching Scheme:
Theory: 03
Tutorial: 01
Credits: 4

Title: Theory of Machines -I
Class Test: 20 Marks.
Theory Examination: (Duration): 03 Hrs
Theory Examination: (Marks): 80 Marks.

Objective	:	Student will be 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. 4. Appreciate concept of balancing. 5. Develop ability to come up with innovative ideas.
Unit-I	:	**Introduction and Definitions :** Scope of the subject, kinematics and dynamics. Statics and kinetics. Definitions: Kinematic link or element; Kinematic pair; Classification of Kinematic Pairs and their types; Kinematic chain; degree of freedom, relation between no. of links & joints. Basic Kinematic chains: single slider crank chain, Double slider crank chain and four bar chains of class I & class II type. Mechanisms, Inversions of Basic Kinematic chains, & their applications, variants, structures, machines. **(04Hrs)**
Unit-II	:	**Velocity Analysis :** Velocity analysis of mechanisms (having maximum six links) using Relative velocity method, Instantaneous centre method and relative centre method (using Kennedy's theorem). Determination of linear and angular velocities and their directions. . **(08Hrs)**
Unit-III	:	**Acceleration Analysis :** Acceleration analysis of mechanisms (having maximum six links) using relative acceleration method. Problems involving Coriolis component of acceleration. Determination of linear and angular acceleration for mechanisms having maximum four links. Ritterhaus construction method and Klein's construction method for simple engine mechanisms and offset engine mechanisms. Modified Klein's construction method for four bar mechanisms. Analytical method for acceleration analysis for engine mechanisms . **(14Hrs)**
Unit-IV	:	**Dynamics of Engine Mechanisms :** Dynamically Equivalent systems, centre of percussion, application of dynamically equivalent system for connecting rod of the engine, determination of inertia and static torques on the crank shaft of horizontal and vertical engine mechanisms. . **(06Hrs)**
Unit-V	:	**Brakes and Dynamometers :** Function of Brakes and Dynamometers, Different types of brakes such as Short shoe brakes, Band brakes and Band & block brakes. Types of Dynamometers: Absorption type and Transmission type. Absorption type dynamometers such as Prony brake, Rope brake

		dynamometers. Transmission type dynamometers such as Belt transmission, Epicyclic gear train dynamometers, Torsion dynamometers. Cams Types of Cams and Followers, types of specified motions such as uniform velocity, uniform and equal/ unequal acceleration and retardation, simple harmonic motion and cycloidal motion, drawing radial cam profiles using these motions, analysis of tangent cam using roller follower, circular arc cam using roller or flat faced followers. . **(14Hrs)**
Unit-VI	:	**Balancing:** Balancing of revolving masses when they are acting in one or more planes. Static and dynamic balancing. ii) Balancing of reciprocating engines. Primary and secondary forces and couples acting on single cylinder two cylinder engines. Balancing of non-identical and identical in-line engines. Balancing of radial engines, V-Engines. Balancing of engines such as V-8 & W-12 engines. . **(14Hrs)**
Tutorials	:	1. Demonstration of a Mechanism to understand, i. Kinematic pairs, ii. Conversion of one type of motion into the other. 2. Solution for problem on topic Velocity Analysis, using Relative velocity, Instantaneous centre method 3. Solution for problem on topic Velocity Analysis, using Short cut methods 4. Solution for problem on topic Acceleration analysis, using Relative acceleration method 5. Solution for problem on topic Acceleration analysis, Short cut methods. 6. Solution for problem on topic Dynamics of Engine Mechanisms, determination of inertia force and inertia torque. 7. Solution for problem on topic Cams 8. Demonstration of Brakes 9. Solution for problem on topic balancing of rotating and reciprocating masses in engine.
Reference Books:	:	1.Theory of Machines by T. Beven. Pearson Education India-III rd Edition Pub. 2.Theory of Machines by S.S. Rattan.Tata McGraw-Hill Education 3.Theory of Machines by Joseph E. Shigley, John J. Uicker. McGraw-Hill Companies 4.Theory of Machines by Balaney. Khanna Publishers 5.Text Book Of Theory Of Machines by R K Bansal. Laxmi Publications Pvt Ltd 6. Theory of Machines and Mechanisms by John J Uicker,Gordon R Pennock,Joseph E Shigley. Oxford University Press

Section A: **1, 2, 3, 4, & Section B: 5, 6,**

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Mechanical/Production) - Semester IV

Code No: MED-272
Teaching Scheme: 02 Hrs/week
Credits: 01

Title: Lab VII-Theory of Machines-I
Practical : 25 marks
Teacher's Assessment:25 marks

List of Practicles	:	1. Study of Kinematics and Definition 2. Solution of min.2 problem on topic Velocity Analysis, using Relative velocity method 3. Solution of min.2 problem on topic Velocity Analysis, using Instantaneous centre method 4. Solution of min.2 problem on topic Acceleration analysis, using Relative acceleration method 5. Solution of min.2 problem on topic Acceleration analysis, using Short cut methods. 6. Solution of min.2 problem on topic Dynamics of Engine Mechanisms, determination of inertia force and inertia torque. 7. Solution of min.2 problem on topic Cams 8. Study of Brakes 9. study of dynamometers 10. Study of Kinematics and Definition 11. Solution of min.2 problem on topic Velocity Analysis, using Relative velocity method 12. Solution of min.2 problem on topic Velocity Analysis, using Instantaneous centre method 13. Solution of min.2 problem on topic Acceleration analysis, using Relative acceleration method 14. Solution of min.2 problem on topic Acceleration analysis, using Short cut methods. 15. Solution of min.2 problem on topic Dynamics of Engine Mechanisms, determination of inertia force and inertia torque. 16. Solution of min.2 problem on topic Cams 17. Study of Brakes 18. study of dynamometers

The assessment of term work shall be on the following criteria:

- Continuous Assessment
- Performing the experiments in the laboratory

Oral examination conducted (internally) on the syllabus and the term work mentioned above

Practical Examination:

The practical examination shall consist of performing an experiment based on the practical work done during the course, the record of the experiments submitted by the candidate and Viva-voce based on the syllabus

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Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-IV

Code No.: MED-254
Teaching Scheme:
Theory: 03
Tutorial: 01
Credits:04

Title: Metrology & Mechanical Measurement
Class Test: 20
Theory Examination (Duration): 03hrs.
Theory Examination (Marks): 80.

Objectives	:	Study, use and analyses of various measuring systems and instruments for measurement of different quantities in practical situations
Unit-I	:	**Mechanical Measurements** **Introduction:** Introduction to measurement and measuring instruments, Generalized measuring system and functional elements, units of measurement, static and dynamic performance characteristics of measurement devices, calibration, concept of error, sources of error, statistical analysis of errors. General mathematical of zero order, first order, second order instrument, response of first and second order instrument to ramp, impulse and frequency inputs **Sensors and Transducers:** Types of sensors, types of transducers and their characteristics. **Signal transmission and processing:** Devices and systems, Signal Display & Recording Devices **(12 Hrs)**
Unit-II	:	**Measurements of force and torque:** Different types of load cells, elastic transducers, pneumatic & hydraulic systems. **Measurement of pressure:** Gravitational, directing acting, elastic and indirect type pressure transducers. Measurement of low and high pressure with different gauges. **Strain measurement:** Types of strain gauges and their working, strain gauge circuits, temperature compensation. Strain rosettes, calibration. **(12 Hrs)**
Unit-III	:	**Time related measurements:** Counters, stroboscope, frequency measurement by direct comparison. Measurement of displacement **Temperature measurement:** Thermometers, bimetallic thermocouples, thermistors and pyrometers. **(08 Hrs)**
Unit-IV	:	**Introduction to Metrology:** Meaning of Metrology, Definition, Scope, Objective, Need of Inspection. Precision, accuracy, sources of errors, Calibration of instruments, concept of Repeatability, Sensitivity, Readability & Reliability, Factors affecting accuracy, Selection of instrument. Definition and introduction to line standard, end standard, Wavelength standard.**(08 Hrs)**
Unit-V	:	**Linear Measurement:** Construction and working of simple instruments like Surface plate, angle plate, spirit level, vernier caliper, vernier height gauge &depth gauge, slip gauges **Angular measurement:** Combination protractor, universal bevel protractor, sine bar, sine center, angle gauge block, clinometers, auto-collimator, angle décor, roller and cylindrical method, optical

		prism method. **Screw thread measurement:** **External screw threads terminologies, ISO grade and fits of thread, Errors in threads,** Pitch errors, Measurement of different elements such as major diameter, minor diameter, effective diameter, pitch , Two & Three wire method, Thread gauge micrometer, Working principle of floating carriage dial micrometer. **(12 Hrs)**
Unit-VI	:	**Comparators** Characteristics of Comparators, Uses of Comparators, Classification of Comparators. Advantages and disadvantages of mechanical, optical, electrical and pneumatic comparators, Working Principle of optical and pneumatic comparators. **Surface finish measurement and Interferometry** Surface finish/texture measurement- methods and equipments of measurement, Meaning of RMS and CLA values, grades of roughness, specifications. Interferometry: Principle and Application of Interferometry for analysis of surface texture. Study of tool maker microscope, profile projector, three coordinates measurement. **(12 Hrs)**
Reference Books:	:	1. Beckwith Thomas G., Mechanical Measurements, Pearson Education. 2. Doeblein E.O., "Measurement Systems, Application Design", McGraw Hill, 1990. 3. Kumar D.S., "Mechanical Measurements and Control", Metropolitan, N. Delhi. 4. Hume K.J., "Engineering Metrology", MacDonald and Co. 1963 5. Gupta, I.C., "Engineering Metrology", Dhanpat Rai & Sons, New Delhi, 1994 6. Sirohi, "Mechanical Measurement" New Age Publishers 7. Jain, R.K., "Engineering Metrology" Khanna Publishers 8. Jain, R.K., "Mechanical Measurement" Khanna Publishers

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

9. Minimum ten questions
10. Five questions in each section
11. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
12. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

9. Minimum eight questions
10. Four questions in each section

11. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
12. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

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Code No: MED-273
Teaching Scheme: 02 hr
Credits: 01

Title: Lab VIII-Metrology & Mechanical Measurement / Electrical Technology
Practical : 25 marks
Teacher's Assessment :25 marks

Course Objectives	:	After successful completion of the course the student should be conversant with the measuring instruments and measurement systems..
List of Practical's (Not Less than 10)	:	**Part-I –Metrology & Mechanical Measurement** **Experiment** **A.** 1. Study & working of simple measuring instruments- Vernier calipers, micrometers & slip gauges. 2. Study and demonstration of comparator of different types. (dial indicator, bore gauges & its constructional details) 3. Study of generalized measurement system with a typical instrument, Pressure & Temperature measuring equipment. 4. Study and demonstration of strain gauge / LVDT 5. Study and demonstration of: 1. Thermocouple 2. Resistance thermometer **Part-II – Electrical Technology** B. 1) No Load characteristics of separately and shunt excited DC Generator. 2) To perform speed control of DC motor and reversal of direction 3) Load test on DC shunt motor (To study DC motor starters T/Ia, T/N, N/Ia) Characteristics 4) To study DC Shunt motor -3 Point starters 5) Speed control of Three phase Induction motor

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned as above

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Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-IV

Code No.: MED-255
Teaching Scheme:
Theory: 03
Tutorial: 01
Credits:04

Title: Manufacturing Processes-II
Class Test: 20
Theory Examination (Duration): 03hrs.
Theory Examination (Marks): 80.

Objectives	:	After successful completion of the course the student should be conversant with the use of conventional and non conventional machining processes.
Unit-I	:	**Metal Cutting and Machine Tools** **Metal Cutting-** Mechanics of metal cutting. Geometry of tool and nomenclature .ASA system Orthogonal vs. oblique cutting. Mechanics of chip formation, types of chips. Shear angle relationship. Merchant's force circle diagram. Cutting forces, power required. Cutting fluids/lubricants. Tool materials. Tool wear and tool life. Machineability. Cutting parameters, Machine Tool classification. Brief introduction to machine tool vibration and surface finish. Economics of metal cutting. **(08 Hrs)**
Unit-II	:	**Machine Tools** **Lathe:** Principle, construction, types, operations, Turret/capstan, semi/Automatic, Tool layout. Indexing mechanism, bar feeding mechanism, introduction to Automatic screw machines & Single spindle and multi-spindle automat. Machining time calculations on Centre lathe. **(10 Hrs)**
Unit-III	:	**Drilling and boring :** Drilling, boring, reaming tools. Geometry of twist drills. General purpose, Mass production and special purpose drilling. Machining time calculations. **Boring Machine:** Construction, operations and accessories of Horizontal, Vertical and jig Boring Machine. **(08 Hrs)**
Unit-IV	:	**Milling Machine:** Types, Construction, operations and specifications of each type, Types of Milling Cutters, Dividing head, Compound and differential indexing, indexing calculations, Machining time calculations. **(08 Hrs)**
Unit-V	:	**Shaper, slotter, planer:** Construction, operations & drives, Study of various parts & Operations of Shaper, Planer, slotter; machining time calculations on each. **Grinding & Super finishing:** Grinding: Grinding wheels, abrasive & bonds, cutting action. Grinding wheel specification. Grinding wheel wear - attritions wear, fracture wears. Dressing and Truing. Max chip thickness and Guest criteria. Surface and Cylindrical grinding. Centerless grinding. Super finishing: Honing, lapping, polishing **(16 Hrs)**
Unit-VI	:	**Introduction to Un-conventional Machining and Welding**

		Need & benefits, Classification, Mechanism of metal removal, parameters involved, advantages, limitations and applications of each process, application and working principle of EDM, ECM, LBM, EBM, USM. AJM, WJM. Non-conventional welding applications such as LBW, USW, EBW, Plasma-arc welding, Diffusion welding, Explosive welding/cladding. **(10 Hrs)**
Reference Books:	:	1. Manufacturing science by Ghosh and Mallik 2. Fundamentals of Metal Cutting and Machine tools by Boothroyd 3. Production Technology by R.K. Jain 4. Production Technology - H.M.T. 5. Production Engineering Science by P.C. Pandey 6. Modern Machining Processes by P.C. Pandey & H.S. Shan 7. Manufacturing science by Degarmo 8. Fundamentals of metal cutting & machine tools - Juneja & Shekhon 9. Process & materials of manufacturing - Lindburg. 10. Advanced Machining Process - VK Jain

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

13. Minimum ten questions
14. Five questions in each section
15. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
16. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

13. Minimum eight questions
14. Four questions in each section
15. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
16. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad
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Syllabus of S. Y. B. Tech. (MECHANICAL/PRODUCTION) Semester-IV

Code No.:MED-256
Teaching Scheme: L-2, [redacted]/Week
Theory: Electrical Technology
Tutorial:
Credits: (1)

Title: Electrical Technology
Class Test: (10) Marks
Theory Examination (Dur)**:** (2) Hours
Theory Examination (Marks): (40)

Objectives	:	For Electric Machines---To study various basic AC and DC machines: construction, operation, characteristics, losses and advantages disadvantages
Unit-I	:	**D.C Generator :** Operating principal, Construction, EMF equation, Methods of excitation, Armature reaction and Commutation, Characteristics, Losses, application, Numericals
Unit-II	:	**D.C Motor:** Torque equation, Characteristics, Starting and Speed control, application, Numericals
Unit-III	:	**Induction Motor**: Three phase Induction Motor-Operating principle, Construction, Squirrel cage and Slip ring type, Torque equation, Torque-slip Characteristics, Power stages, Speed control, efficiency,
Unit-IV	:	**Single phase Induction Motor**: Construction, Double field revolving theory, Making Induction motor self starting, Types—Capacitor start ,Capacitor start & run ,shaded pole, Repulsion
Unit-V	:	**Special Machines**: Working principle and application of Servomotor (DC and AC), Stepper motor (Variable reluctance type, permanent magnet type and Hybrid type)
Unit-VI	:	**Transformers: Three phase Transformer- Various transformer connections(Y/Y, Y/Δ,Δ/Y, Δ/ Δ) (Only theoretical treatment)**
Reference Books:	:	1) Electrical Machines-- Nagrath Kothari--- TMH). 2) Electrical Technology Vol.I & II B.L.Theraja Vol.I&II-- S.Chand 3) ABC of electrical Engineering -- B.L.Theraja--- S.Chand 4) Electrical Technology--- H.Cotton---Pitman & Sons London) 6)Principles of Electrical Machines—V.K.Mehta,Rohit Mehta—S. Chand
Additional Reference Books	:	Elecrical Engineering---Mittal

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.
All units carry equal weightage

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

For 40 marks Paper:

1. Minimum eight questions
2. Four questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 7 marks each from remaining questions from each section A and B be asked to solve.

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Code No: MED-274 | **Title: Lab IX -Workshop-III**
Teaching Scheme: 02 hrs | **Practical : 25 marks**
Credits: 01 | **Teacher's Assesment: 25 marks**

Objective	:	The subject intends to make aware and understand the hardship involved in engineering fields. Also to develop work culture and ability to work in a team and as individual to acquire skills. The subjects aims to make an engineer to do minor repairs on their own by making them tough (physically and mentally) to face the real world .
Turning Shop	:	Study of Different operations to be carried on lathe machine using tail stock, taper turning methods (Calculations), internal and external threading ,facing finishing cuts. Workshop diary – Sketch of job, List of various operations and tools Practical: Preparing two jobs on lathe machine performing all above operations.
Milling	:	Study of vertical and horizontal milling machines, milling cutters and different operations to be carried on milling machine. Workshop diary – Sketch of job, List of various operations and tools Practical: Preparing a job individually or in a group of students i.e. Gear blank by turning, External milling of gear teeth involving calculations for indexing.
Drilling or Boring	:	Study of different types of drilling machines, Drill and single point boring tool, Workshop diary – Sketch of job, List of various operations and tools. Practical: Preparing a job individually or in a group of students based on drilling, boring internal splines cuts on slotting machine and surface grinding for surface finishing.
Term work	:	Term work will consist of submitting a file for all shops with neatly written records of the study and diagrams. A workshop diary should be maintained by students to record the progress of the jobs done.
Practical Examination	:	The Practical Examination will comprise of one Job. The job should involve all the operations studied during the semester. Duration will be six hours. The job will be assed by two examiners, One will be the internal and other will be external examiner appointed by university.

Sr. No.	Website / Links / e-journals
1	www.cyberwalker.net
2	www.pcguide.com
3	www.buildasvpc.com
4	www.howstuffworks.com
5	www.ictp.it

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Code No.: MED-275 | **Title: Lab X -Development of Skills-III**
Teaching Scheme:02Hrs/week | **Teacher's Assessment : 50 Marks**
Practical: 02 Hrs
Credits: 01

Objective	:	• Understanding the concept of quality and applications of quality tools. • Understanding the Entrepreneurship Skills. • Understanding the Technical writing skills
Unit-I	:	**Quality:** Definitions of Quality, Quality control, Quality Assurance, Quality mindedness, Quality circle. **(04Hrs)**
Unit-II	:	**Problem Solving techniques-(Old tools)** Tally Sheet/Check Sheet, Pareto Diagram, Cause & Effect Diagram, Graphs/Histogram/Run Chart, Stratification, Scatter Diagram, Control Chart **(05 Hrs)**
Unit-III		**Problem Solving techniques-(New tools)** Affinity Diagram, Relation Diagram, Tree Diagram Process Decision Program Chart, Arrow diagram, Matrix Data Analysis Diagram Helpful Techniques:- Brainstorming, Flow Chart: - Definition purpose, procedure & examples of all the above said tools. **(05 Hrs)**
Unit-IV	:	**Entrepreneurship:** Definitions, need, significance, success stories of few exceptional entrepreneurs. **(06Hrs)**
Unit-V	:	**Techniques to enhance personality** Memory building & concentration Positive attitude, will power , patience & creativity, Group Discussion and Personal Interviews **(06Hrs)**
Unit-VI	:	**Writing Skills:** Writing of Technical /Project reports, Writing Technical Research papers **(04Hrs)**
Assignments	:	Term work shall consist of ten assignments as follows: 1) Two assignments on any three old QC tools. 2) Two assignments on any three new QC tools. 3) One assignment each on Entrepreneurship, Marketing Management, Writing Skills & Quality. 4) Brief project report on a product by an entrepreneur
Reference Books:		1.Quality Planning and Analysis by Juran 2. Handbook of Effective Technical Communications by Tyler G. Hicks, Carl, M. Valorie Sr. McGraw Hill Book Company 3. Technical Writing Process and Product by Saron J. Gerson / M.Gerson. Prentice Hall 4. Thesis and Assignment Writing by Anderson, Dustan, Poole. Wiley Eastern Limited.