

S-25 March, 2013 AC after Circulars from Circular No.153 &amp; onwards

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**DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**  
**CIRCULAR NO. ACAD / NP / T.Y. B.Tech. / Syllabi / 184 / 2013**

It is hereby informed to all concerned that, the syllabus prepared by the Boards of Studies, Committee and recommended by the Faculty of Engineering and Technology, the Hon'ble Vice-Chancellor has accepted the following **REVISED SYLLABI in all Braches of T.Y. B.TECH.** on behalf of the **Academic Council Under Section-14(7) of the Maharashtra Universities Act, 1994** as appended herewith :-

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

This is effective from the Academic Year 2013-2014 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,  
 Aurangabad-431 004.  
 REF.NO. ACAD/ NP/ T.Y.B.TECH./  
 2013/14059-67

Date:- 15-06-2013.

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*A. Kamban*  
 Director, 15-06-2013

**Board of College and  
 University Development.**

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**Copy forwarded with compliments to :-**

- 1] The Principals, affiliated concerned Colleges,  
 Dr. Babasaheb Ambedkar Marathwada University.
- 2] The Director, University Network & Information Centre, UNIC, with a **request to upload the above all syllabi on University Website [www.bamu.net].**

**Copy to :-**

- 1] The Controller of Examinations,
- 2] The Superintendent, [ Engineering Unit ],
- 3] The Programmer [Computer Unit-1] Examinations,
- 4] The Programmer [Computer Unit-2] Examinations,
- 5] The Superintendent, [ Eligibility Unit ],
- 6] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,  
 Dr. Babasaheb Ambedkar Marathwada University,
- 7] The Record Keeper,  
 Dr. Babasaheb Ambedkar Marathwada University.

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**DR. BABASAHEB AMBEDKAR  
MARATHWADA UNIVERSITY,  
AURANGABAD.**



**Revised Syllabus of**

**THIRD YEAR**

**B.TECH.**

**PRODUCTION**

***[ Effective from the Academic Year 2013-14 & onwards ]***

**Dr. BABASAHEB AMBEDKAR  
MARATHAWADA UNIVERSITY,  
AURANGABAD**



**FACULTY OF ENGINEERING AND TECHNOLOGY**

**Proposed Revised Syllabus of**

**T.Y. B. Tech. (Production)**

**Effective from - 2013-2014 and Onwards**

## Index

Structure of Syllabus	1
Pattern of Question Paper	2
Format of Question Paper	3
<b>SEMESTER-V</b>	
Design of Machine Elements-I	5
Theory of Machines-II	7
Hydraulic Machines & Heat Transfer	9
CAD/CAM/CIM	11
Process Planning & Statistical Process Control	13
Industrial Management	16
Laboratory I - Design of Machine Elements-I	18
Laboratory II - Theory of Machines-II	19
Laboratory III - Hydraulic Machines & Heat Transfer	20
Laboratory IV - CAD/CAM/CIM	21
Laboratory V - Seminar	22
<b>SEMESTER-VI</b>	
Design of Machine Elements-II	26
Engineering Metallurgy	28
Tool Design	30
Robotics and Automations	32
Elective-I	
Non Conventional Machining Processes	34
Supply Chain & Logistic Management.	36
Reliability & Maintenance Engineering.	38
Computational Techniques	40
Laboratory VI - Design of Machine Elements-II	42
Laboratory VII - Engineering Metallurgy	43
Laboratory VIII - Tool Design	44
Laboratory IX - Computational Techniques	45
Laboratory X - Project-I	46

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**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**Proposed Revised Structure w.e.f.2013-2014**  
**T.Y. B.Tech. (Production)**

Sub Code (Course Code)	SEMESTER-V	Contact Hrs / Week				Examination Scheme						
	Subject / Course	L	T	P	Total	CT	TH	TA	PR	Total	Credits	Duration of Theory Exam
PED-301	Design of Machine Elements-I	3	1	-	4	20	80	-	-	100	4	3 Hrs
PED-302	Theory of Machines-II	3	1	-	4	20	80	-	-	100	4	3Hrs
PED-303	Hydraulic Machines & Heat Transfer	3	1	-	4	20	80	-	-	100	4	3 Hrs
PED-304	CAD/CAM/CIM	4	-	-	4	20	80	-	-	100	4	3 Hrs
PED-305	Process Planning & Statistical Process Control	4	-	-	4	20	80	-	-	100	4	3 Hrs
PED-306	Industrial Management	2	-	-	2	10	40	-	-	50	2	2Hrs
PED-321	Laboratory I- Design of Machine Elements-I	-	-	2	2	-	-	25	25	50	1	
PED-322	Laboratory II - Theory of Machines-II	-	-	2	2	-	-	25	25	50	1	
PED-323	Laboratory III - Hydraulic Machines & Heat Transfer	-	-	2	2	-	-	25	25	50	1	
PED-324	Laboratory IV - CAD/CAM/CIM	-	-	2	2	-	-	50	-	50	1	
PED-325	Laboratory V - Seminar	-	-	2	2	-	-	50	-	50	1	
	<b>Total of semester-III</b>	<b>19</b>	<b>3</b>	<b>10</b>	<b>32</b>	<b>110</b>	<b>440</b>	<b>175</b>	<b>75</b>	<b>800</b>	<b>27</b>	
Sub Code (Course Code)	SEMESTER-VI	Contact Hrs / Week				Examination Scheme						
	Subject / Course	L	T	P	Total	CT	TH	TA	PR	Total	Credits	Duration of Theory Exam
PED-351	Design of Machine Elements-II	3	1	-	4	20	80	-	-	100	4	3 Hrs
PED-352	Engineering Metallurgy	3	1	-	4	20	80	-	-	100	4	3Hrs
PED-353	Tool Design	3	1	-	4	20	80	-	-	100	4	4 Hrs
PED-354	Robotics and Automations	4	-	-	4	20	80	-	-	100	4	3 Hrs
PED *	Elective-I	4	-	-	4	20	80	-	-	100	4	3 Hrs
PED-355	Computational Techniques	2	-	-	2	10	40	-	-	50	2	2Hrs
PED-371	Laboratory VI - Design of Machine Elements-II	-	-	2	2	-	-	25	25	50	1	
PED-372	Laboratory VII - Engineering Metallurgy	-	-	2	2	-	-	25	25	50	1	
PED-373	Laboratory VIII - Tool Design	-	-	2	2	-	-	25	25	50	1	
PED-374	Laboratory IX - Computational Techniques	-	-	2	2	-	-	50	-	50	1	
PED-375	Laboratory X - Project-I	-	-	2	2	-	-	50	-	50	1	
	<b>Total of semester-IV</b>	<b>19</b>	<b>3</b>	<b>10</b>	<b>32</b>	<b>110</b>	<b>440</b>	<b>175</b>	<b>75</b>	<b>800</b>	<b>27</b>	
	<b>Grand Total of III&amp; IV</b>	<b>38</b>	<b>6</b>	<b>20</b>	<b>64</b>	<b>220</b>	<b>880</b>	<b>350</b>	<b>150</b>	<b>1600</b>	<b>54</b>	

L: Lecture hours per week

T: Tutorial hours per week

P: Practical hours per week

CT: Class Test

TH: University Theory Examination

TA: Teachers assessment

PR: Practical/Oral Examination

**\*Elective-I**

1. PED- 391 - Non Conventional Machining Processes.
2. PED- 392 - Supply Chain & Logistic Management.
3. PED- 393 -Reliability & Maintenance Engineering.

### **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 5** 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 5** 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.

**Pattern of Question Paper**  
**Faculty of Engineering and Technology**  
**Third year (B Tech) Production Engineering (Revised Course) Examination**  
**November / December, May/June 200\_**

Name of Subject with code

**Time: 3 Hrs.**

**Max Marks: 80**

'Please check whether you have got the right question paper'

N.B:

- i. **Question no 1 from section A and Question no 6 from section B** be made compulsory.
- ii. \_\_\_\_\_

**Section A**

Question No. 1	10Marks
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This Question will consist of questions from the entire Units under **section A** mentioned in the syllabus.

Question No.2	15Marks
Question No.3	15 Marks
Question No.4	15Marks
Question No.5	15 Marks

**Section B**

Question No. 6	10 Marks
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This Question will consist of questions from the entire Units under **section B** mentioned in the syllabus.

Question No.7	15 Marks
Question No.8	15 Marks
Question No.9	15 Marks
Question No.10	15 Marks

**Note:**

- 1 The topic may be intermingled in the questions
- 2 The questions will be memory based, application based and understanding type

**Pattern of Question Paper**  
**Faculty of Engineering and Technology**  
**Third year (B Tech) Production Engineering (Revised Course) Examination**  
**November / December, May/June 200\_**

Name of Subject with code

Time: 2 Hrs.

Max Marks: 40

'Please check whether you have got the right question paper'

N.B:

- i. **Question no 1** from **section A** and **Question no 5** from **section B** be made compulsory  
Use separate answer book for each section
- ii. ....

**Section A**

Question No. 1	6 Marks
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This Question will consist of questions from the entire Units under **section A** mentioned in the syllabus.

Question No.2	7Marks
Question No.3	7 Marks
Question No.4	7 Marks

**Section B**

Question No. 5	6 Marks
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This Question will consist of questions from the entire Units under **section B** mentioned in the syllabus.

Question No.6	7 Marks
Question No.7	7 Marks
Question No.8	7 Marks

**Note:**

1. The topic may be intermingled in the questions
2. The questions will be memory based, application based and understanding type

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

Code No.: PED-301

Teaching Scheme

Theory : 03 Hrs/week

Tutorial : 01 Hrs/week

Credits :04

Title: Design of Machine Elements - I

Class Test: 20 Marks

Theory Examination (Duration): 3Hrs

Theory Examination (Marks): 80

**Objectives**

- Understand the meaning of design and design process.
- Predict effectively and accurately the reasons of failure and then correlate it to the theoretical knowledge.
- Developing the capability to analyze and select the various criteria of design.
- Developing creativity for designing the various components such as pins, levers, keys shafts, Couplings, Cotter and Knuckle joint etc
- Developing creativity for designing the various types of fasteners including riveted joints and welding joints at various loading conditions.

**Theory**

Unit	Contents	Duration	Nature
1.	<b>Fundamental Aspect of Design</b> <b>(A)</b> The meaning of design, Engineering design, Phases of design, design classification, Aesthetic, Ergonomic & general design consideration, material properties & selection of materials, BIS designation. <b>(B)</b> Types of loads and stresses. Stress strain diagram, Factor of safety direct stresses, bending stresses, Necessity of Theories of failure, Two dimensional stress condition, Different theories of failure and combined stresses. Design of C- clamp & C-frame	12 h	Conceptual and Descriptive
2	<b>(A) Design against static loading:</b> Design of Cotter joint single and double cotter joint. Design of knuckle joint. Design of lever. <b>(B) Design of shaft, keys and coupling:</b> Shafts subjected to bending and torsion, types of keys and their design, design of rigid and flexible couplings.	10 h	Descriptive and Analytical
3.	<b>Design of screw and fasteners:</b> Design of bolted and threaded joints, design of power screws, introduction to re-circulating ball screw.	08 h	Descriptive and Analytical
4.	<b>Design against fluctuating load:</b> Stress concentration, fatigue failure, endurance limit, notch sensitivity, Goodman, Soderberg diagrams, and modified Goodman diagram, fatigue design under combined stresses	10 h	Descriptive and Analytical

5	<b>Design of welded and riveted joint:</b> (A) Types of welded joints, eccentrically loaded joints, and welded joints subjected to bending moment. (B) Types of riveted joints, Types of failure of riveted joints, Strength equation. Eccentrically loaded joints.	10 h	Descriptive and Analytical
6	<b>Design of spring :</b> Functions, types and spring rate, closed coil helical spring, design equation, Wahl's correction factor, springs in parallel and series, variable loading, effect of end turns, surging of compression springs, leaf springs design equation, construction, extra full length leaves, stress equations.	10 h	Descriptive and Analytical

	Sr. No.	Title	Author	Publication	Edition
<b>Reference Books, e- books, e- Journals</b>	1	Design of machine element	J .E Shigley	TMH Publication	
	2	Design of machine element	M.F. Spotts	Prentice hall	
	3	Machine Design	Shaum Series	TMH Publication	
	4	Machine Design	V.B Bhandari	TMH Publication	
	5	Machine Design	Pandya and Shah	Charotar Publication	
	6	Machine Design	S.G. Kulkarni	TMH Publication	
	7	Machine Design	U.C.Jindal	Pearson	
<b>Additional Reference Books, Digital References</b>	ASME Journal of Mechanical Design (JMD),NPTL				

**Section: A** - Unit 1, 2, 3, and **Section: B** - Unit 4,5, 6.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

**Code No.: PED - 302**  
**Teaching Scheme**  
**Theory : 03 Hrs/week**  
**Tutorial : 01 Hrs/week**  
**Credits :04**

**Title: Theory of Machine-II**  
**Class Test: 20 Marks**  
**Theory Examination (Duration) :3Hrs**  
**Theory Examination (Marks): 80**

**Objectives**

1. Develop ability to come up with innovative ideas.
2. To make the students aware of Governing system.
3. To make the students aware of Gyroscope.
4. To make the students aware of Gear drives used in engineering industry.
5. To make student able to select suitable gear drives for particular applications.
6. To make the students aware of Flywheel.
7. To prepare the students for studying machine design and allied subjects.

**Theory**

Unit	Contents	Duration	Nature
1	<b>Governor:</b> Principle and working of governors, types of governors such as Watt's, Porter, Proell governors of dead weight type and spring loaded governors of different types. Governor efforts and governor power. Types of governors i.e. stable, unstable, isochronous. Sensitivity of governor, insensitivity caused due to friction at the sleeve. Inertia governors.	12 h	Descriptive and Analytical
2.	<b>Toothed Gearing:</b> Gear terminology, Types of gears applications, condition of correct gearing, conjugate profiles. Interference & undercutting. Methods of eliminating interference. Path of approach, Path of recess, path of contact, arc of contact & contact ratio, helical gears, its advantages. Herringbone gear.	12 h	Descriptive and Analytical
3.	<b>Gyroscope:</b> Introduction, Axes and planes of spinning, precession & couple, gyroscopic couple, gyroscopic reactive couple, effect of gyroscopic action on ships, planes, two wheelers & four wheelers.	06 h	Descriptive and Analytical
4.	<b>Flywheel</b> Torque-crank angle or turning moment diagrams for different types steam and I.C. engines, fluctuation of energy, function of flywheel, coefficient of fluctuation of energy and coefficient of fluctuation of speed, determination of moment of inertia and/or mass of the flywheel for different applications.	8 h	Descriptive and Analytical
5.	<b>Friction</b> Sliding friction, laws of dry friction, limiting angle of friction, inclined plane, friction circle, friction axis, friction in screw threads.	8 h	Analytical and Graphical

6.	<p><b>Vibrations:</b> Introduction causes and effects, natural frequency of vibration of undamped systems having one degree of freedom. Determination of natural frequency of damped spring-mass system. Logarithmic decrement. Obtaining equation of motion for the system for given initial conditions.</p> <p><b>Forced Vibrations:</b> Forced vibration due to constant amplitude Harmonic Excitation, eccentric mass excitation and support excitation Transmissibility, measuring instruments, critical speed of shafts.</p>	14 h	Analytical and Graphical
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	Sr.No.	Title	Author	Publication	
Reference Books, e- books, e- Journals	1.	Theory of Machines	T. Beven	Pearson education India-IIIrd edition	
	2.	Theory of Machines	S.S. Ratan	Tata McGraw Hill Education	
	3.	Theory of Machines	Shigley	McGraw hill companies	
	4.	Theory of Machines	Balaney	Khanna publications	
Additional Reference Books					

Section: A - Unit 1, 2, 3, and Section: B - Unit 4, 5, 6.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester -V**

**Code No.:** PED-303  
**Teaching Scheme**  
**Theory :** 03 Hrs/week  
**Tutorial :** 01 Hrs/week  
**Credits :** 04

**Title:** Hydraulic Machines & Heat Transfer  
**Class Test:** 20 Marks  
**Theory Examination (Duration):** 3Hrs  
**Theory Examination (Marks):** 80

**Objectives**

1. This course aims at developing an understanding of hydraulic machines & analytical abilities for the same.
2. The objective is gaining the knowledge of basic concepts of heat transfer & analytical abilities for it.

**Theory**

Unit	Contents	Duration	Nature
1	<b>Dimensional Analysis and similarity:-</b> Dimensions of various physical quantities, Rayleigh's method, Buckingham's $\pi$ Theorem, Types of similarities, Distorted and non distorted models, Dimensionless numbers and their significance.	08 h	Descriptive & analytical
2	<b>Impact of Jet &amp; Jet Propulsion</b> Introduction, Force exerted by jet on stationary vertical plate, Force exerted by a jet on stationary inclined plate, Force exerted by a jet on stationary curved plate, Jet Propulsion of tank with orifice, Jet Propulsion of ships.	10 h	Descriptive and analytical
3	<b>Hydraulic Turbines:-</b> Introduction, Classification, Tangential flow impulse turbine, Construction & working of Pelton wheel, Work done & efficiency of a Pelton wheel, Definition of heads & efficiency of Pelton turbine, Design aspects of Pelton wheel, Radial flow Reaction Turbine, Construction & working of Francis turbine, Design of a Francis turbine runner, Axial flow reaction turbine, Propeller Turbine, Kaplan Turbine, Runway speed, Draft Tube, Draft tube Theory, Types of draft tubes, Specific Speed, Unit Quantities, Performance Characteristics of Hydraulic Turbines, Cavitation.	12 h	Descriptive and analytical
4	<b>Centrifugal Pump</b> Introduction, Construction & Working of C.P., Work done by the impeller on water, Definition of Heads & efficiencies of C.P., Losses in C.P., Minimum Speed for Starting a C.P., Effect of variation of Discharge on efficiency, Effect of no. of vanes of impeller on head & efficiency, Multistage C.P., Pumps in Series, Pumps in Parallel, Specific speed, Model testing & geometrically similar Pumps, Characteristics of C.P, NPSH, Cavitations, and Priming.	08 h	Descriptive and analytical

5	<p><b>Heat Transfer by Conduction</b></p> <p>Introduction, Different modes of heat transfer, Laws governing to heat transfer, Application of heat transfer, Steady state heat transfer, Thermal conductivity, General heat conduction equation in Cartesian co-ordinates, Unidirectional heat conduction without heat dissipation to surrounding fluid, Electrical analogy, Extended surfaces,</p>	10 h	Descriptive and analytical
6	<p><b>Heat Transfer by Convection &amp; Radiation</b></p> <p>Introduction to convection heat transfer, Determination of convective heat transfer coefficient using empirical relations &amp; hence evaluating heat transfer (for natural convection only). Definition of terms used in radiation, Laws of radiation, Shape factor, Concept of radiation &amp; irradiation, Electrical analogy, Radiation shields</p> <p><b>Heat Exchangers</b></p> <p>Introduction, Classification of heat exchanger, LMTD, Overall heat transfer coefficients, NTU, Fouling Factor</p>	12 h	Descriptive and analytical

	Sr.No.	Title	Author	Publication	
Reference Books, e- books, e- Journals	1	Fluid Mechanics & Hydraulic Machines	R.K.Bansal	Lakshmi Publication Pvt. Ltd. Co.	
	2	Fluid Mechanics & Hydraulic Machines	R.K.Rajput	S. Chand Publishing House	
	3	Fluid Mechanics & Fluid power Engineering	D.S. Kumar	S.K. Kataria & Sons Delhi.	
Reference Books, e- books, e- Journals	4	Hydraulic Machines	Jagdish Lal	Metropolitan Book Co.Pvt.Ltd.	
	5	Heat & Mass Transfer	R.K. Rajput	S. Chand co. Publications	
	6	Heat & Mass Trasfer	D. S. Kumar	S.K. Kataria & Sons Delhi.	3rd
	7	Heat Transfer	J. P.Holman		9th
	8	Heat Transfer	Dr.S.P.Sukhatme		
	9	Heat & Mass Transfer	P. K. Nag	Tata Mcgraw Hill Pub.	2nd
Additional Reference Books, Website	www.NPTEL.org.in				

Section: A - Unit 1, 2, 3, and Section: B - Unit 4, 5, 6.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

Code No.: PED-304

Title: Computer Aided Design/Computer aided Manufacturing/  
 Computer Integrated Manufacturing

Teaching Scheme

Theory : 03 Hrs/week

Tutorial : 01 Hrs/week

Class Test: 20 Marks

Theory Examination (Duration) : 3h

Theory Examination (Marks): 80

Credits :04

**Objectives**

- Understanding mathematics, computer representations and algorithms in geometric and solid modeling.
- Learning skills in developing fundamental geometric and solid modeling algorithms for CAD/CAM applications.
- To understand the principles of NC technology, problems with conventional NC, to study components of CNC and DNC, understanding the applications of CAD/CAM systems in generating parts programs  
 To study the scope of CAD/CAM and CIM.

**Theory**

Unit	Contents	Duration	Nature
1	<b>Fundamentals of CAD:</b> Introduction, Basic concepts of manufacturing system and CAD/CAM, Product Life Cycle, Automation and CAD/CAM, Design Process, Application of computers in design: Creating manufacturing database, benefits of CAD, Introduction to Concurrent Engineering. <b>Computer Hardware;</b> Graphics terminal, Operator input devices, Graphics output devices, Central processing unit (CPU). <b>CAD software and Database:</b> Software configuration of a graphics system: functions of a graphics package, geometric modeling, Database structure and control, Graphics standard: GKS and IGES, STEP.	12 h	Descriptive and Analytical
2.	<b>Geometric Transformations:</b> Mathematics preliminaries, matrix representation of 2 and 3 dimensional transformation for translation, rotation, scaling, reflection, shearing, Concatenation of transformation matrices, Homogeneous representation, Application of geometric transformations. <b>Geometric Modeling:</b> Wireframe model, solid modeling: solid representation, Boundary Representation (B-rep), Constructive Solid Geometry (CSG), Sweeps, volumetric properties, surface modeling, concepts of hidden-line removal and shading, Kinematics analysis and simulation.	10 h	Descriptive and Analytical
3.	<b>Robotics:</b> Physical configuration, basic robot motion, technical features of robot, methods of robot programming, introduction to direct and inverse kinematics, forward kinematics using transformation matrices, end effectors, Industrial applications. <b>Product Life Cycle Management</b> Introduction, PLM framework, Implementation, benefits, Product data Management	08 h	Descriptive and Analytical

4.	<b>NC/CNC Machine Tools:</b> NC machine tools- basic components, coordinate systems, features of NC machine tools, NC motion control system, NC Procedure, Manual part programming, fixed/floating zero. Block format and codes, Computer assisted part programming, problems with conventional NC, Computerized Numerical Control (CNC), DNC and Adaptive Control, Combined DNC/CNC system.	12 h	Descriptive and Analytical
5.	<b>Group Technology (GT) and CAPP:</b> Part families: parts classification and coding system, Group technology machine cells, Advantages of GT. Introduction and benefits of CAPP, CAPP Approaches: variant, generative and hybrid.	06h	Analytical and Graphical
6.	<b>Flexible Manufacturing System (FMS)</b> Scope of FMS, Types of flexibilities, components of a FMS system, FMS layout, advantages of FMS. <b>Computer integrated manufacturing system</b> Introduction, definition, evolution of CIM, Scope of CIM, computerized elements of a CIM system, CIM hardware and Software, Advantages of CIM. <b>Shop Floor Control</b> Shop floor control, phases, factory data collection system, automatic identification methods, Bar code technology, automated data collection system.	12 h	Analytical and Graphical

	Sr.No.	Title	Author	Publication
<b>Reference Books, e- books, e- Journals</b>	1.	CAD/CAM	M.P. Groover and E.W. Zimmers, Jr.,	M.P. Groover and E.W. Zimmers, Jr.,
	2.	CAD/CAM - Theory and Practice	Zeid Ibrahim, R. Sivasubramanian	Tata McGraw Hill Education
	3.	CAD/CAM Principles and Applications	P. N. Rao	Tata McGraw Hill Pub Co.
	4.	Mastering CAD/CAM	Zeid Ibrahim	Tata McGraw Hill Pub Co.
	5	CAD/CAM/CIM	P. Radhakrishnan, S. Subramanyan, V. Raju	New Age International Publishers
<b>Additional Reference Books</b>	1. nptel.iitm.ac.in/ 2. ocw.mit.edu/ 3. see.stanford.edu/ 4. Computer-Aided Design (Publisher: Elsevier) 5. Graphical Models (Publisher: Elsevier) 6. Computer Aided Geometric Design (Publisher: Elsevier) 7. Transactions of the Society of CAD/CAM Engineers (Publisher: Society of CAD/CAM Engineers) 8. International Journal of Computer Integrated Manufacturing (Publisher: Taylor and Francis )			

**Section: A** - Unit 1, 2, 3, and **Section: B** - Unit 4, 5, 6.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

**Code No.:** PED- 305  
**Teaching Scheme**  
**Theory : 04 Hrs/week**  
**Tutorial : 00**  
**Credits :04**

**Title:** Process planning & statistical process Control  
**Class Test: 20 Marks**  
**Theory Examination (Duration): 3Hrs**  
**Theory Examination (Marks): 80**

**Objectives**

- To equip the students with a strong foundation in logical thinking and thorough Knowledge in the field of production planning and control.
- To have thorough understanding about the use of different numerical techniques and to apply them in practical engineering applications

**Theory**

Unit	Contents	Duration	Nature
1	<p><b>Introduction:</b>            Definition of PPC, functions of PPC, Types of production job: Batch, Continuous, production consumption cycle, coordination of production decisions .Objectives and benefits of planning and control, Product development and design</p> <p><b>Product development and design:</b>            Effect of competition, product analysis, marketing aspects, product characteristics, economic analysis, simplification, standardization, specification, Break even analysis.</p>	10 h	Descriptive
2	<p><b>Forecasting:</b>            Importance , time – series analysis, forecasting methods, time series calculations, Casual Methods, least squares, sample and moving average, seasonal index, exponential smoothing, co-relation, coefficient of co-relation &amp; determination, Delphi method, nominal group techniques, selection of forecasting methods.</p> <p><b>Plant Layout:</b>            Flow system types of layout: product, process, Group Layout, static and combination layout, effect of automation on layout, symptoms of bad plant layout. Computerized Layout Planning</p>	10 h.	Descriptive
3	<p><b>Quantities in Batch Production:</b>            Quantities in batch production, criteria for batch size determination, minimum cost batch size, production range, maximum profit batch size, maximum return and maximum rate of return economic batch size</p> <p><b>Machine Output –</b>            Machine output, multi-machine supervision by one operator, machine interference, balancing of machine lines, analysis of process capacities in a multi-product system</p>	10 h	Descriptive

4	<p><b>Scheduling:</b> Basic scheduling problems: scheduling for fluctuating demand, assignment problems, sequencing problems, scheduling for orders with random arrivals, master schedule.</p> <p><b>Material Management</b> Definition, Objectives, Types, procurement orders, selective inventory analysis (ABC analysis), Classical Inventory Model, EOQ with quantity discounts, EOQ for multiple items with constraints on resources, Quantity discounts, classification and coding of material, MRP-I, MRP-II, Safety Stock, determining safety stock when usage and lead time vary, Fixed Order Period Inventory Control System.</p>	12 h.	Descriptive
5	<p><b>Statistical Process Control</b> Meaning and purpose of Statistical Process Control (SPC), quality of the product, need of process control, statistical process control, on line process control methods (control charts) and offline process control methods (Sampling schemes and plans) as lot control method.</p> <p><b>Control charts</b> Measuring Of statistical control variables and attributes. Measurement/inspection, different types of Control charts(X Bars, R, P. charts) and their constructions and their application</p>	12 h	Descriptive
6	<p><b>Sampling Inspection</b> Purpose of sampling inspection., Procedure of sampling inspection different types of sampling inspection. Advantages and Disadvantages of sampling. Application of sampling plan. Single sampling, Double sampling and Sequential sampling plan</p>	6 h	Descriptive

Reference Books, e-books, e-Journals	Sr. No.	Title	Author	Publication	Edition
	1	Elements of Production Planning and Control	Simuel Eilon	Macmillon Publications	
	2	Production Systems Planning and Analysis & Control	James L. Riggs		
	3	Production Planning & Inventory Control	Production Planning & Inventory Control	Prentice Hall of India	
	4	Theory and Problems in Production and Operation Management	Chary S.N.,	Tata McGraw Hill, Edition 1995	
	5	Production Planning Control and Industrial Management	K.C.Jain & L.N. Aggarwal	Khanna Publishers, 1990.	

	6	Theory and Problems in Production & Operations Management	S.N.Chary	Tata McGraw Hill, Edition 1995	
	7	Statistical Quality Control	E.L.Grant	Tata McGraw Hill Publishing company Limited;	Seventh Edition
	8	Quality control : TTTI,		Tata McGraw Hill Publishing company Limited;	First Edition
<b>Additional Reference Books</b>					

**Section: A** - Unit 1, 2, 3, and **Section: B** - Unit 4, 5,6

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester V**

**Code No.: PED-306**  
**Teaching Scheme**  
**Theory : 02 Hrs/week**  
**Tutorial : 00**  
**Credits :02**

**Title: Industrial Management**  
**Class Test: 10 Marks**  
**Theory Examination (Duration) :2Hrs**  
**Theory Examination (Marks): 40**

**Objectives**

- To understand concept of Management, Administration, Organization, Industrial Law, Financial Management.

**Theory**

Unit	Contents	Duration	Nature
1	<b>Introduction to Management:</b> Managing and manager, organizations and the need for management, the management process, types of managers, the challenge of management, the evolution of management theory	03 Hrs	Descriptive
2	<b>Management in the Twenty-First Century:</b> The importance of organizational and natural environment, elements of the direct action environment, managing multiple stock holder relationship, elements of the indirect action Environment, Natural environments, management 2000 and beyond, social responsibility and ethics, globalization and management. Evaluation of Case studies related to above concepts.	03 Hrs.	Descriptive
3	<b>Nature and Significance of Economics:</b> Science, Engineering and technology their relationship with economic development. Basic economic concepts, human wants-economic goods, utility, value, price, cost, wealth and capital. Demand, supply, Elasticity of demand and supply. Concept of profit and revenue.  <b>Financial Management:</b> Concept of management, accounting systems, financial accounting and cost accounting system, sources of industrial finance, sales organization of a firm, management of sales and advertisement, market research.	09 Hrs	Descriptive

<b>4</b>	<p><b>Business Organization:</b> Forms of business organization, individual proprietorship, joint stock company, co-operative enterprise and public sector undertakings. Organization structures in industries, line organization, functional organization, line and staff organization, committee organization, project organization, matrix organization.</p>	04 Hrs.	Descriptive
<b>5</b>	<p><b>Personnel Management:</b> Man power, sources of recruitment, selection and training, job evaluation, performance appraisals, wages and incentives, self and time management.</p>	04 Hrs.	Descriptive
<b>6</b>	<p><b>Industrial Act:</b> Industrial, Factory act, pollution control, industrial safety, introduction to causes of accidents, safety, accident prevention techniques and related legal provisions.</p> <p><b>Accidents and Safety</b> Classification of accidents; according to nature of injuries i.e. fatal, Temporary; according to event and according to place. Causes of accidents-psychological, physiological and other industrial hazards. Effects of accidents. Accidents-prone workers. Action to be taken in case of accident with machines, electric shock, road accident, fires and erection and construction accidents.</p>	07 Hrs.	Descriptive

	Sr. No.	Title	Author	Publication	Edition
<b>Reference Books, e-books, e-Journals</b>	1	Management	James A.F.Stoner	PHI	VI
	2	Management for Business and industry	C.s george jr		
	3	Economic principles, problems and polices	Mc Connel,Gupta	TMH	
	4	Industrial organization and Engineering Economic	T.R Bange,S.C.Sharma	Khanna publication	
	5	Industrial Management	O.P.Khanna		
	6	Principles of Management	Knootz & O'Donnell		
	7	Business organization & Management	M.C.Shukla		
	8	Engineering Economics	G.D.Stevens.		
<b>Additional Reference Books</b>					

**Section: A** - Unit 1, 2, 3,4 and **Section: B** - Unit 5,6,7,8.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

**Code No.: PED - 321**  
**Teaching Scheme**  
**Practical : 02 Hrs/week**  
**Credits :01**

**Title: Laboratory I - Design of Machine Elements - I**  
**Practical Marks : 25**  
**Teachers assessment (Marks): 25**

**Practical**

<b>Course Objective</b>	After successful completion of course students shall able to design mechanical joints, couplings, power screw and clamps	
<b>List of Practical</b>	<b>Practical</b>	
		<b>A. Three full imperial sheets on following:</b>
	1.	Design and Drawing sheet (Details and assembly) on any two of the following :
		Cotter Joint, Knuckle Joint, Lever loaded safety valve or spring loaded safety valve
	2.	Design and Drawing sheet(Details and assembly) on any one of the following :
		Rigid or Flexible coupling, Bolted or welded joint subjected to eccentric loading.
	3.	Design and Drawing sheet(Details and assembly) on any one of the following :
		Screw jack, C- Clamp
		<b>B. Assignments on following topics :</b>
	1	Design process, Aesthetic and Ergonomic Consideration in Design. Design considerations
2	Selection of Material, Theories of failure, Fatigue Loading, Design of Power Screw, Springs	

**Assessment of term work** shall be done on the basis of following

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

**Practical Examination:** The practical Examination shall consist of via-voce based on syllabus and term work. The assessment will be based on

- Record of term work submitted
- Via-voce on the syllabus

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

**Code No.: PED-322**  
**Teaching Scheme**  
**Practical : 02 Hrs/week**  
**Credits :01**

**Title: Laboratory II - Theory Of Machine -II**  
**Practical Marks : 25**  
**Teachers assessment (Marks): 25**

**Practical**

<b>Course Objective</b>	After successful completion of course students shall able to plot force diagrams, analyze the pendulum, determine the natural frequency of rotary system etc	
<b>List of Practical</b>	<b>Sr. No.</b>	<b>Practical</b>
	1.	Plotting controlling force diagram for porter governor
	2.	Plotting controlling force diagram for Hartnell governor
	3.	Study of gyroscopic effect and finding moment of inertia of the gyroscopic disc
	4	Study Interference and undercutting of gears and generating gear tooth profile.
	5	Determine the radius of gyration of a given compound pendulum.
	6	Determine the radius of gyration of a given bar using bifilar suspension.
	7	Determine the natural frequency of undamped vibrations of spring mass system.
	8	Finding natural frequency of single rotor system.
	9	Finding natural frequency of double rotor system.
	10	Determining the radius of gyration of a given bar using trifilar suspension.
11	Study of critical speed of shafts.	

**Assessment of term work** shall be done on the basis of following

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

**Practical Examination:** The practical Examination shall consist of via-voce based on syllabus and term work. The assessment will be based on

- Record of term work submitted
- Via-voce on the syllabus

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**

**Syllabus of T. Y. B. Tech. (Production) Semester- V**

Code No.: PED-323

Title: Laboratory III -Hydraulic Machines &amp; Heat Transfer

Teaching Scheme

Practical Marks : 25

Practical : 02

Teachers assessment (Marks): 25

Credits :01

**Practical**

<b>Course Objective</b>	After successful completion of course students shall able to understand working principle of different turbine and energy conversion in the turbine, also students shall understand the fundamental concepts of heat transfer like thermal conductivity, emissivity, film coefficient etc , along with application of heat transfer like heat exchanger.	
<b>List of Practical</b>	<b>Sr. No.</b>	<b>Practical</b>
	1.	Trial on Pelton wheel turbine test rig
	2.	Trial on Francis turbine test rig
	3.	Trial on Kaplan turbine test rig
	4.	Trial on Centrifugal pump test rig
	5	Trial on gear pump test rig
	6	To determine thermal resistance of composite wall
	7	To determine thermal conductivity of insulating powder
	8	To determine heat transfer coefficient in natural convection & comparing with empirical relations.
	9	To determine Emissivity of test plate
	10	To determine Stefan Boltzmann's constant
	11	To determine overall heat transfer coefficient in parallel flow heat exchanger
12	To determine thermal conductivity of metal rod	

**Assessment of term work** shall be done on the basis of following

- Continuous assessment
- Performing the experiment in the laboratory
- Oral examination conducted on syllabus and term work mention as above.

**Practical Examination:** The practical Examination shall consist of via-voce based on syllabus and term work. The assessment will be based on

- Record of term work submitted
- Via-voce on the syllabus

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

**Code No.: PED-324 Title: Laboratory IV - Computer Aided Design/Computer aided Manufacturing/  
 Computer Integrated Manufacturing**

**Teaching Scheme**  
**Practical : 02 Marks**

**Credits :01**  
**Practical Marks : 25 Marks**  
**Teachers assessment (Marks): 25**

**Practical**

<b>Course Objective</b>	<ul style="list-style-type: none"> <li>• To introduce to CAD software systems designed for geometric modeling of engineering components and systems.</li> <li>• To understand the basics of NC-machine tools, and manual and computerized part programming and to implement CNC programs for milling and turning machining operations.</li> </ul>	
<b>List of Practical</b>	<b>Sr. No.</b>	<b>Practical</b>
	1.	To study the input/output devices used in CAD workstation.
	2.	Part modeling using some of the modeling technique (2-D)
	3.	Part modeling using some of the modeling technique (3D)
	4	Component details and assembly in CAD using modeling software
	5	Part-programming on CNC Lathe machines
	6	Part-programming on CNC Milling machines
	7	Case study based on GT, CAPP and CIM
	8	Report based on industrial visit.

**Assessment of term work** shall be done on the basis of following

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

**Practical Examination:** The practical Examination shall consist of via-voce based on syllabus and term work. The assessment will be based on

- Record of term work submitted
- Via-voce on the syllabus

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-V**

**Code No.: PED-325**

**Teaching Scheme**

**Practical : 02 Hrs/ week**

**Credits :01**

**Title: Lab-V (Seminar)**

**Teachers Assessment : 50 Marks**

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**Objectives**

- To create awareness amongst pre final year students for latest technological Aspects.
- To improve presentation and communication skills.
- To inculcate qualities of team work and team spirit.
- To motivate for research work in the respective areas.
- To have common platform where interaction between various groups of students will take place on the various advanced and emerging topics of technology.
- To improve skills related to search on the internet.
- To realize importance of basic technological aspects

**Guidelines for students and faculty**

1. Seminar topics may be chosen by the students with advice from the guide/Industry persons, which shall be finalized by guide and approved by concerned head of the department. Students are to be exposed to the following aspects of the seminar presentation.
  - a. Literature Survey / Review
  - b. Organization of the material
  - c. Preparing for presentation
  - d. Technical writing
2. Each student is required to-
  - a. Submit one page synopsis before the seminar talk for display on the notice board and
  - b. Give a 20 minutes presentation through OHP, PC, and Slide projector followed by a 10 minute question answer session.
3. For award of Sessional marks:
  - a. 25 marks - based on the assessment done by internal guide during semester and the involvement of student in the work assigned related to the seminar topic
  - b. Remaining 25 marks based on the examination at final presentation. Student is to be examined on the basis of an oral and written presentation by at least two examiners, one of them shall be guide and other as an external examiner appointed by the principal of the institute.

***Seminar Report Format***

1. The Seminar Report shall be typed on A-4 size white bond paper.
2. Typing shall be with spacing of 1.5 using one side of the paper.
3. Margins :- (i) Left 37.5 mm.  
(ii) Right, top and bottom 25 mm.
4. Binding: - Hard with golden embossing on the front cover of brown colour
5. Front cover of hard bound report:- It should be identical to first title page.
6. Default font size TNR-12
7. Format for title page (First Page) (Centre justified)
8. The third page will be certificate issued by the industry regarding the completion of Seminar if applicable.
9. The fourth page would be for acknowledgement, which would be followed by index page (Fifth page).
10. Sketches should be drawn on separate sheet (minimum A4 size) and be inserted at proper places. The sketches should be drawn in black ink and be numbered.
11. Tables should preferably type in the text only.
12. The mathematical symbol should be typed or neatly written so as to match darkness of the text.
13. The last item on the index should be references.
14. Page number must appear on the right hand top corner of each page starting after index page.
15. The contents of the seminar can be decided by the internal guide / department and student.
16. Minimum number of copies = 5 Copies (Central Library + Department + Internal Guide + External Examiner + Student). The copy of External Examiner will be submitted by the student after completion of Seminar.

Report of Seminar (TNR-14, Bold)

In (TNR-12)

{Title}(TNR-18, Bold)

By (TNR-12)

{Name of student}(TNR-16, Bold)

(Roll No: ) (TNR-12)

Submitted in partial fulfillment of the requirement for (TNR-12)

Degree of Bachelor of Technology (Branch Name) (TNR-14, Bold)

of (TNR-12)

Dr. Babasaheb Ambedkar Marathwada University,

Aurangabad. (TNR-14, Bold)

Department of \_\_\_\_\_ Engineering, (TNR-14, Bold)

Maharashtra Institute of Technology, (TNR-16, Bold)

Aurangabad. (TNR-14, Bold)

200- 200 (Academic Year) (TNR 14)

**Format for Certification page (Second page)**

CERTIFICATE (TNR-16, Bold)

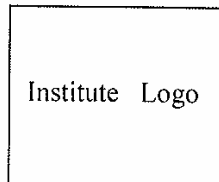
This is to certify that the Seminar Report (TNR-12)

Submitted by (TNR-12)

(Name of Student) (TNR-14, Bold)

(Roll No: \_\_) (TNR-12)

Is completed as per the requirement of the Dr. Babasaheb Ambedkar Marathwada University,  
Aurangabad in partial fulfillment of (TNR-12)



Degree of Bachelor of Technology (Branch Name) (TNR-14, Bold)

For the academic Year 20\_\_ - 20\_\_(TNR-12)

(Name)

(Name)

(Name)

Guide

Head of Department

Principal (TNR -12, Bold)

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester- VI**

**Code No.:** PED-351  
**Teaching Scheme**  
**Theory :** 03 Hrs/week  
**Tutorial :** 01 Hrs/week  
**Credits :**04

**Title:** Design of Machine Elements- II  
**Class Test:** 20 Marks  
**Theory Examination (Duration) :**3Hrs  
**Theory Examination (Marks):** 80

**Objectives**

- Understand the procedure of gear design and gear trains.
- Predict effectively and accurately the reasons of failure and then correlate it to the theoretical knowledge.
- Developing the capability to analyze and select the various criteria of design.
- Developing creativity for designing the various components such as bearing, Shaft, key, Brakes, clutches and Belt, rope Chain Drive.etc.
- Understand the basic concepts of Statistical Consideration, Optimum Design and Standardization.

**Theory**

Unit	Contents	Duration	Nature
1	<p><b>Introduction to Gears:</b>  Design considerations of gears, material selection, types of gear failure.</p> <p>a) <b>Spur Gear:</b>  Terminology, Gear tooth loads, force analysis, beam strength ( Lewis equation) equation, dynamic tooth load ( spot's &amp; Bucking ham's equation ) wear strength (Bucking ham's equation),</p> <p>b) <b>Helical Gears:</b>  Terminology, Force analysis, Formative number of teeth in helical gears, beams &amp; wear strength of helical gears, effective load &amp; design of helical gear.</p> <p>c) <b>Bevel Gear:</b>  Terminology, Force analysis, Formative number of teeth, Design of bevel gears based on beam and wear strength.</p> <p>d) <b>Worm Gears:</b>  Terminology. Standard dimensions and recommendation of worm gearing, Force analysis, Formative number of teeth, Design of worm drive as per AGMA Recommendation.</p>	18 h	Conceptual and Descriptive
2	<p><b>Gear train-</b>  Introduction, Types of gear train, simple, compound, reverted and Epicycle gear train.</p>	4 h	
3	<p><b>Design of friction clutch:</b>  Introduction, types &amp; friction materials. Design of single &amp; multi-plate clutch. Design of cone clutch. Design of centrifugal clutch.</p>	8 h	Descriptive and Analytical

4	<p><b>Design of belt: Introduction, types &amp; materials.</b></p> <p><b>a) Flat belt:</b> Length of belt (opens &amp; cross), slip &amp; creep belt, velocity ration, centrifugal tension. initial tension, ratio of limiting tension , stresses in belt, condition for maximum power</p> <p><b>b) V-belt :</b> Construction of V-belt , ratio of limiting tension, selection of V-belt from manufacture catalogue</p> <p><b>C) Chain &amp; rope drive: Introduction</b></p>	14 h	Descriptive and Analytical
5.	<p><b>Design of bearings :</b></p> <p><b>A) Introduction to Tribological consideration in design: Friction, Wear, Lubrication.</b></p> <p><b>B) Sliding contact bearing :</b> Basic theory, thick and thin film lubrication, Newton's law of viscosity, Petroff's equation , Sommerfield Number , Reynolds's equation, Raimondi and Boyd method relating bearing variables, Heat balance in journal bearings, Temperature rise. Introduction to hydro static bearings.</p> <p><b>C) Rolling Contact Bearing:</b> Types, static and dynamic load capacities, Stribeck's equation. Equivalent bearing load, load-life relationship, bearing life, load factor, Selection of bearing from manufactures catalogue. Design for variable load and speed, Bearings with probability of survival other than 90 %.</p>	14 h	Descriptive and Analytical
6	<p><b>Optimum Design &amp; Statistical Consideration: Only Introduction</b></p> <p><b>Standardization: Only Introduction</b></p>	02 h	Descriptive

	Sr. No.	Title	Author	Publication	Edition
Reference Books, e- books, e- Journals	1	Design of machine element	J .E Shigley	TMH Publication	
	2	Design of machine element	M.F. Spotts	Prentice hall	
	3	Machine Design	Shaum Series	TMH Publication	
	4	Machine Design	V.B Bhandari	TMH Publication	
	5	Machine Design	Pandya and Shah	Charotar Publication	
	6	Machine Design	U.C.Jindal	Pearson	
	7	Machine Design	S.G. Kulkarni	TMH Publication	
Additional Reference Books, Digital References	ASME Journal of Mechanical Design (JMD),NPTL				

Section: A - Unit 1, 2, 3, and Section: B - Unit 4, 5, 6

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
(Faculty of Engineering & Technology)

**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

**Code No.:** PED-352

**Teaching Scheme**

**Theory : 03 Hrs/week**

**Tutorial : 01Hrs/week**

**Credits :04**

**Title: Engineering Metallurgy**

**Class Test: 20 Marks**

**Theory Examination (Duration) :3Hr**

**Theory Examination (Marks): 80**

**Objectives**

- Introduce students to the field of materials science and materials testing.
- To study phase diagrams, application & effect of alloying elements on the microstructure and properties of different types of ferrous alloys.
- To understand principle of various Heat Treatments.
- To understand the Fundamentals of Alloy Steels.

**Theory**

Unit	Contents	Duration	Nature
1	<p><b>Mechanical Engineering properties and structure of metals</b></p> <p>Principle and measurement of Mechanical Engineering properties like hardness, Tensile strength, Impact strength, Creep, Toughness, Resilience, Ductility, Fatigue and Wear. Relevance of properties in selection of materials for Engineering applications. ASTM standards and their relevance.</p> <p><b>Crystallography and Microscopy</b></p> <p>System of crystal lattices, Space lattice, Unit cell, Coordination number, packing efficiency, Imperfections/Dislocations/ Defects in crystal structure and their significance. Material characterization and characterization methods using optical, X-ray and electron scanning method.</p>	12 h	(Descriptive)
2.	<p><b>Equilibrium Diagrams:</b></p> <p>Concept of solid solutions, Hume Rothery rules. Solidification of pure metals and an alloys, cooling curves, phase, Modified Gibbs phase rule, Construction of phase diagram, Study of Isomorphous, Eutectic, peritectic, Monotectic and Eutectoid systems. Lever rule and its use.</p>	12 h	Descriptive
3.	<p><b>Iron-Carbon phase Diagram</b></p> <p>Iron-Iron carbide equilibrium diagram, Phases in Fe-C diagram, Invariant reactions, Critical temperatures, Micro constituents and their definitions, microstructures of various alloys of iron and carbon. Plain carbon steels, structure properties co-relationship of PC steels, concept of equilibrium cooling rates, Lever rule and it's applications to steel portion of diagram. Classification of steels, Specification of steels.</p> <p><b>Non Equilibrium cooling</b></p> <p>Effect of Non Equilibrium cooling on Fe-C diagram, Construction of TTT diagram and labeling, Critical cooling rate, Transformation products of Austenite, Characteristic of Martensite and bainite.</p>	06 h	Descriptive

4.	<p><b>Heat Treatment of steels</b></p> <p>Necessity of Heat Treatment, Heat Treatment furnaces, Salt baths in Heat treatment, Heat treatment of plain carbon steels, Annealing and its types, Normalizing, Hardening, Tempering. Cooling media, Heat removal mechanism, Retained austenite and its effect, Cryogenic treatment, Polymer quenching. Hardenability, Jominy End Quench Test, Significance of Hardenability, Austempering, Martempering, Patenting and Ausforming of steels.</p> <p><b>Case Hardening methods-</b> Case hardening, Carburizing- solid, liquid and gas, Nitriding, carbonitriding, Defects in heat treatment and their remedies.</p>	8 h	Descriptive
5.	<p><b>Alloy Steels</b></p> <p>Classification of Alloying elements, effect of Alloying elements on Fe-C and TTT diagram, Classification of steels on the basis of composition and uses, Study of steels like Mild steels, Tool steels, HSS, HCHC, Micro-alloyed steels, Spring steels, Ball bearing steels, HSLA steels, Trip Steels, Free cutting steels, Stainless steels, Classification, Uses, Specifications – Need, Indian standards, AISI, En series, BS standards etc.</p>	8 h	Descriptive
6.	<p><b>Cast Irons</b></p> <p>White cast iron, effect of presence of silicon in cast irons, Maurers diagram, Classification of cast irons, Effect of shape, size and distribution of graphite on the properties of cast irons, Grey CI, Mehanite, Malleable CI, Nodular CI, their manufacture, properties and applications.</p> <p><b>Non –ferrous metals and alloys</b></p> <p>Study of phase diagrams, types, Application and heat treatment of the following important cast and wrought alloys-Aluminum alloys, copper alloys, bearing metals</p>	14 h	Descriptive

	Sr.No.	Title	Author	Publication	
Reference Books, e- books, e- Journals	1.	Introduction to Physical Metallurgy	Sydney H Avner	Tata McGraw – Hill	Second edition
	2.	Introduction to Engineering Metallurgy	B.K.Arawal	Tata McGraw-Hill	
	3.	Engineering Metallurgy	R. Higgins	McGraw hill companies	
	4.	Material Science and Engineering: An Introduction	William D.Callister	Wiley & Sons Inc	Sixth edition
	5.	Material science and Metallurgy	V.D.Kodgire	Everest Publishing House	
Additional Reference Books					

Section: A - Unit 1, 2, 3, and Section: B - Unit 4, 5, 6.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

**Code No.:** PED-353**Teaching Scheme****Theory :** 03 Hrs/ week**Tutorial :** 01**Credits :**04**Title:** Tool Design**Class Test:** 20 Marks**Theory Examination (Duration):** 3 Hrs**Theory Examination (Marks):** 80**Objectives**

1. To understand the cutting tools nomenclature and their real time usage in industries.
2. To understand the basic of jigs and fixtures used commonly in engineering industries
3. To understand the design procedure of dies used in sheet metal working operations

**Theory**

Unit	Contents	Duration	Nature
1	<p><b>Introduction:</b> Definition of tool, classification of tool materials and their properties.</p> <p><b>Elements of Machining Process</b> Basic requirements of machining process, single point cutting tool, tool signature, mechanics and geometry of chip formation, types of chips, effect of tool geometry and cutting conditions on machining processes, tool wear, tool life, forces on cutting tool, merchants force circle, power requirement, design and construction details of single point cutting tool for turning, boring and shaping and shaping operations, economics based on tool life, cutting fluids – types, properties required, applications, heat treatment of cutting tools.</p>	12 h	Descriptive and analytical
2	<p><b>Multipoint Cutting Tools</b></p> <p><b>Drills</b> – Classification and nomenclature, drill point geometry, thrust on drill and power calculations, selection of drills for various operations.</p> <p><b>Cutters</b> – Classification and nomenclature of end mill, plain milling cutter, force acting on milling cutter, power requirement in tapping operations.</p> <p><b>Broaches</b> – Classification and nomenclature, force acting on broach and power requirement.</p> <p><b>Hob</b> – nomenclature, setting of hob.</p>	06 h	Descriptive
3	<p><b>Limits, Fits and Gauges</b> Tolerances, functional and non functional dimensions, ways of expressing tolerances, specifying tolerances tolerance accumulation and compounding, interchangeability, selective assembly, Indian standards BIS-919-1963, Nominal and basic size; limits and fits, plain gauge, snap gauges, contour and profile gauges Gauge design-Taylor's principle, numerical on gauge design.</p>	12 h	Descriptive and Design base

4	<p><b>Jigs and Fixtures.</b> Principle of location, twelve degree of freedom, 3-2-1 method of location, 4-2-1 method of location, locating devices.</p> <p><b>Drill Jig</b> – Types of jig bushes, types of drill jigs, and design and development procedure of jig for different components.</p> <p><b>Fixtures</b> – Setting block, Tennon, clamping of fixtures, types of fixtures, design and development of milling, turning, and grinding, broaching, welding fixtures for different components.</p>	15 h	Descriptive and Design base
5	<p><b>Design of Dies</b> Power presses types and construction details, die cutting operation, cutting action in die and punch, centre of pressure, clearance and its significance, cutting forces, methods of reducing cutting forces, methods of punch support, strippers, stock stops, guide pilots, knockout, design of blanking and piercing dies.</p>	08 h	Descriptive and analytical
6.	<p><b>Drawing Dies.</b> Metal flow and factors affecting drawing, blank size calculations, drawing force, single and double acting drawing dies, design and development of drawing dies for different components.</p>	07 h	Descriptive and analytical

	Sr. No.	Title	Author	Publication	Edition
Reference Books, e- books, e- Journals	1	Tool Design	ASTME	Prentice-Hall, Inc	
	2	Production Technology.	HMT		
	3	Tool Design.	Donaldson.	McGraw-Hill Book Company, Inc	
	4	Jigs & Fixture.	P.H. Joshi.	McGraw-Hill Professional	
	5	Design of Jigs and Fixture	Kempster.		
	6	Jigs And Fixture Design Manual.	Harison.	McGraw-Hill	
	7	Tool Design	Pollack.	Prentice-Hall	
Additional Reference Books					

Section: A - Unit 1, 2, 3, and Section: B - Unit 4, 5, 6

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

**Code No.: PED-354**  
**Teaching Scheme**  
**Theory : 04 Hrs/week**  
**Tutorial : 00**  
**Credits :04**

**Title: Robotics and Automation**  
**Class Test: 20 Marks**  
**Theory Examination (Duration):3Hrs**  
**Theory Examination (Marks): 80**

**Objectives**

To foster skills of high level automation amongst students

**Theory**

Unit	Contents	Duration	Nature
1.	<b>Introduction</b> Definition, need of robotics, robot usage and condition for its applications, robot anatomy and characteristics: classification, point to point movement and continuous path system, control loops of robot system, work volume, speed of movement, accuracy and repeatability, drive system, sensors used in robot	10 Hrs.	Descriptive
2.	<b>Sensors and End effectors used in robot:</b> Tactile sensors, proximity & rear sensors, force and torque sensors in robotics, End effectors: functions, types, vacuum grippers, magnetic grippers, special gripper, Eagleburger's principles in selection and design of grippers	10 Hrs.	Descriptive and analytical
3.	<b>Robot programming:-</b> Robot language, features of different languages, introduction to robot language software, artificial intelligence, Robot cell design: Function, types, man-machine robot system, interlocking methods of robot programming, Methods of robot programming: lead through programming methods, a robot program for generating path space motion, interpolation wait signal and delay commands.	10 Hrs.	Descriptive and analytical
4.	<b>Robot applications:</b> Various applications of robot in foundry and precision casting, welding, spray coating, manufacturing by machining, assembly & inspection	10 Hrs.	Descriptive

5.	<p><b>Automation :</b></p> <p>Automation, Elements of automated systems, advanced automation functions, levels of automation, types of automation, Fixed, programmable, flexible, Hard &amp; soft automation, Fundamentals of automated production lines, analysis of transfer lines, material handling in automated systems, feeders, Group technology, Automated guided vehicle systems: types, guiding techniques, AGV system design.</p>	12 Hrs.	Descriptive and analytical
6.	<p><b>Controllers :</b></p> <p>Programming Logic Controllers; Architecture, Components, Ladder Programming, Problem solving using PLC's, servomotors, stepper motor,</p> <p><u>One Case Study</u></p>	08 Hrs.	Descriptive and analytical

	Sr. No.	Title	Author	Publication	Edition
<b>Reference Books, e- books, e- Journals</b>	1.	Industrial Robotics	Industrial Robotics	M.P. Groover, Willis	
	2.	Robotics applications and implications	Robotics applications and implications	Aures R.U. and S.M. Miller	
	4.	Computer aided design and manufacturing	Computer aided design and manufacturing	Groover M.P. and Zimmer E.W.	
	5.	Mechatronics		HMT Limited, tata McGraw Hill Publications, New Delhi.	
	6.	Handbook of Industrial Robotics			
	7.	Automation, Production systems, and computer integrated Manufacturing	Groover M.P.	PHI	
	<b>Additional Reference Books</b>				

**Section: A** - Unit 1, 2, 3 and **Section: B** - Unit 4, 5,6.

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester- VI**

Code No.: PED-391

Title: Non Conventional Machining Process EL-I

Teaching Scheme

Class Test: 20 Marks

Theory : 03 Hrs/week

Theory Examination (Duration):3Hrs

Tutorial : 01 Hrs/week

Theory Examination (Marks): 80

Credits :04

**Objectives**

To equip the students with a strong foundation in non conventional machining process have thorough understanding about the use of different numerical techniques and to apply them in practical engineering applications.

**Theory**

Unit	Contents	Duration	Nature
1	<b>Introduction:</b> Need for non conventional machining process, process selection, classification, comparative study of different processes, and Brief review of tool life, tool wear and failure.	7 h.	Descriptive
2	<b>Mechanical Processes:</b> USM- Definition, elements of the processes, mechanism of metal removal, tool feed mechanism, <b>two theories</b> of mechanism of <b>cutting</b> , effect of parameters, applications and advantages and disadvantages . <b>Abrasive Jet Machining:</b> Principle of operation, parameters of the process, applications.	13 h	Descriptive and analytical
3	<b>Electro Chemical Processes:</b> Introduction, classification of ECM processes, Principle of ECM processes chemistry of the ECM processes, Parameters of the process, determination of the MRR, Dynamics of ECM process, Polarization, tool design, advantages and disadvantages,application, <b>ECH,ECG. ECDe</b> <b>Chemical Machining-</b> Introduction, advantages and disadvantages, fundamental principle, types of chemical machining, maskants, etchants, advantages and disadvantages, applications.	10 h	Descriptive

4	<p><b>Thermal Metal Removal Process:</b></p> <p>EDM- Principle of operation, mechanism of MRR, Basic EDM circuitry, spark erosion generators, analysis of relaxation type circuit, MRR in relaxation circuit critical resistance, dielectric fluids, applications.</p> <p><b>Plasma Arc Machining:</b></p> <p>Introduction to Plasma, generation of Plasma and equipments, mechanism of MRR, PAM parameters, Process characteristics, Types of torches &amp; Applications.</p>	13 h	Conceptual & Descriptive & analytical
5	<p><b>Electron Beam Machining:</b></p> <p>EBM - Introduction, equipment for production of electron Beam, Thermal and non-thermal type, Process characteristics, Applications</p> <p><b>Laser Beam Machining :</b></p> <p>LBM-Introduction, Equipment and machining procedure, principle of generation of LASER, types of lasers, process characteristics, Applications.</p>	12 h	Descriptive and Design base
6	<p><b>Ion Beam Machining: Introduction,</b></p> <p>Mechanism of metal removal and associated equipments, Process characteristics and applications.</p>	05 h.	Descriptive and analytical

	Sr. No.	Title	Author	Publication	Edition
Reference Books, e- books, e- Journals	1	Production Technology		HMT publication	
	2	New Technology	Amitabha Bhattacharya		
	3	Modern machining Processes	P.C. Pandey and H.S. Shah.		
	4	Advanced machining process	V.K.Jain		
	5	Manufacturing Science	Ghosh, Malik	Everest Publications	
	6	Non-conventional machining	P.K. mishra	Narosa publications)	
Additional Reference Books					

Section: A - Unit 1, 2, 3, and Section: B - Unit 4, 5, 6

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

**Code No.:** PED-392  
**Teaching Scheme**  
**Theory :** 04 Hrs/week  
**Tutorial :** 00  
**Credits :** 04

**Title:** Supply chain & Logistic Management ( EL-I )  
**Class Test:** 20 Marks  
**Theory Examination (Duration):** 3Hrs  
**Theory Examination (Marks):** 80

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**Objectives**

Objective of SCLM is to maximize the overall value generated Reduce uncertainty & risks, inventory, cycle time also to Improve business processes, customer service Increased profits & competitiveness

**Theory**

Unit	Contents	Duration	Nature
1	Introduction To Logistic Management, Definition ,Scope, Functions, Objectives , Role Of Logistic In Supply Chain	08 h.	Descriptive
2	Inventory Control, Types, Demand Forecasting, Warehousing & Stores Management, Warehousing Functions, Warehouse Layout And Design Material Handling, Guidelines And Principles, Role Of Packaging, Packaging Materials	12 h.	Descriptive
3	Transportation Management, Transportation Selection Decision, Basic Modes Of Transportation, Containerization-Concept, Types ,Benefits, Types Of Carriers	10 h.	Descriptive
4	Supply Chain Management: The Need For Supply Chain, Understanding The Supply Chain Management, Levels Of Supply Chain	10 h.	Descriptive
5	Role Of Managers In Supply Chain, Supply, Decision Phases In Supply Chain, Process View Of Supply Chain	10 h.	Descriptive
6	Evaluation Of Supply Chain Management Role Of Information Technology In Supply Chain, Benchmarking The Supply Chain	10 h.	Descriptive

	Sr. No.	Title	Author	Publication	Edition
<b>Reference Books, e- books, e- Journals</b>	1	Logistic management	Ailawadi, C satish &Rakesh Singh	Prentice Hall,India,2005	
	2	Textbook of Logistic &supply chain management	Agrawal D.K	Macmillan India Ltd.	
	3	Logistic & supply chain Management: Creating Value-adding networks	Martin Christopher	FT Press	
	4	Supply Chain management: Text and cases,	Janat shah	Pearson	
	5	Supply chain management	Sunil chopra & Peter Meinden		
<b>Additional Reference Books</b>					

**Section: A** - Unit 1, 2, 3, and **Section: B** - Unit 4,5,6

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

**Code No.: PED-393****Title: Reliability and Maintenance Engineering ( EL-I )****Teaching Scheme****Class Test: 20 Marks****Theory : 04 Hrs/week****Theory Examination (Duration): 3Hrs****Tutorial : 00****Theory Examination (Marks): 80****Credits :04****Objectives**

To understand concept of Reliability and Maintenance management

**Theory**

Unit	Contents	Unit	Contents
1	<b>Introduction</b> Reliability concepts and patterns of failure, reliability Management, reliability for system effectiveness.	04 h	Descriptive
2	<b>Reliability Mathematics</b> Definition of probability, laws of probability, conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis Procedures, empirical reliability calculations	10 h.	Descriptive
3	<b>Reliability</b> Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.	12 h	Descriptive
4	<b>Reliability Improvements</b> Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series – parallel, stand by and hybrid, effect of maintenance <b>Reliability Testing</b> Life testing, requirements, methods, test planning, data reporting system, data reduction and analysis, reliability test standards	16 h	Descriptive
5	<b>Maintenance, Scope of Responsibilities</b> Types of maintenance, Maintenance planning & control, Maintainability & Availability , Failure modes and the Bath Tub Curve. Failure Data, Mean Failure rate, Mean time to failure (MTTF), Mean time between failures (MTBF).	08 h.	Descriptive

<b>6</b>	<b>Maintenance Strategies</b> Break down maintenance, planned maintenance, strategies, preventive maintenance, design out maintenance, planned lubrication, total productive maintenance, zero break down, preventive inspection of equipment used in emergency.	10 h.	Descriptive
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	Sr. No.	Title	Author	Publication	Sr. No.
<b>Reference Books, e- books, e- Journals</b>	1	Reliability Engineering	L.S. Srinath	Affiliated East-West Press	1
	2	Reliability Engineering	L.Balagurusamy	Tata Mc-Graw Hill	2
	3	“Terotechnology: Reliability Engineering and Maintenance Management	B Bhadury and S.K. Basu	Asian Books, New Delhi	3
	4	Maintenance Planning and Control	Kelly	A Buttersworth & Co	4
<b>Additional Reference Books</b>					

**Section: A** - Unit 1, 2, 3, and **Section: B** - Unit 4, 5, 6

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester VI**

**Code No.: PED-355**  
**Teaching Scheme**  
**Theory : 02 Hrs/week**  
**Tutorial : 00**

**Title: Computational Techniques**  
**Class Test: 10 Marks**  
**Theory Examination (Marks): 40**  
**Credits :02**

**Objectives**

- To equip the students with a strong foundation in logic building and fast problem solving skills
- To have thorough understanding about the use of different numerical techniques and to apply them in practical engineering applications

**Theory**

Unit	Contents	Duration	Nature
1	<b>Introduction to Numerical Methods:</b> Advantages of numerical iterative methods over exact or direct methods. Errors in Computation.	2 Hrs	Descriptive
2.	<b>Solutions of Non-Linear Equations:</b> Different methods used for obtaining roots of non-linear or transcendental equations such as Bisection Method, Regula -Falsi or False-position Method, Newton Raphson, Secant Method & successive approximation method, Order of convergence for Newton Raphson and secant methods, Comparison of different methods. Numerical based on Engineering applications.	6 Hrs	Descriptive and Analytical
3.	<b>Solutions of Linear Simultaneous Equations:</b> Solving linear simultaneous equations using Gauss Elimination, Gauss Jordan Method, Matrix inversion, Jacobi's Method, Gauss Seidel iterative method, Comparison of different methods. Numerical based on Engineering applications. Numerical based on Engineering applications.	6 Hrs	Descriptive and Analytical
4.	<b>Interpolation:</b> Langrangian and difference table interpolation, Forward and backward difference & their operators, Newton Gregory forward difference and backward difference formulae, Gauss Central difference formula, Errors in polynomial interpolation, Numerical based on Engineering applications.	6 Hrs	Descriptive and Analytical

5.	<b>Regression Analysis:</b> Least square approximation, Linear, Polynomial, Hyperbolic and Exponential Regression. Numerical based on Engineering applications.	6 Hrs	Descriptive and Analytical
6.	<b>Numerical Integration:</b> Newton-Cotes integration formulae such as Trapezoidal rule, Simpson's 1/3 <sup>rd</sup> rule, Simpson's 3/8 <sup>th</sup> Rule, Romberg's integration for obtaining precise results. Numerical based on Engineering applications.	6 Hrs	Descriptive and Analytical

	Sr. No.	Title	Author	Publication	
<b>Reference Books, e- books, e- Journals</b>	1.	Numerical Algorithms	E.V. Krishnamurthy and S.S.Sen	East West press	
	2.	Computer oriented Numerical Methods	V.Rajaraman	Prentice Hall	
	3.	Numerical Computational methods	Dr.S. S.Deo and P.P. Tawade	Technical Publications	
	4.	Inventory methods of Numerical Analysis	S.S.Shastry	PHI	
	5.	Numerical Methods in Engineering and Science	B.S.Grewal	Khanna Publishers	
	6.	Numerical Methods	Balaguruswamy		
<b>Additional Reference Books</b>					

**Section: A** - Unit 1, 2, 3 and **Section: B** - Unit 4,5,6

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester- VI**

**Code No.:** PED-371  
**Teaching Scheme**  
**Practical :** 02 Hrs/week  
**Credits :**01

**Title:** Laboratory VI - Design of Machine Elements - II  
**Practical Marks :** 25  
**Teachers assessment (Marks):** 25

**Practical**

<b>Course Objective</b>	After successful completion of course students shall able to design mechanical brake, gear box, belt drives.
<b>List of Practical</b>	<b>Practical</b>
	<b>A. Three full imperial sheets on following:</b>
	<b>Sheet No. I:</b> At least one problem on single plate, multi-plate, centrifugal clutch belt drive, band brake, short and long shoe brake and internal and external shoe brake.
	<b>Sheet No. II:</b> Gear box should be with minimum two pairs of gear and should include design of casing, bearing.
	<b>Sheet No III :</b> Problem on band brake , Belt Drives ( Any one)
	<b>B. Assignments on following topics :</b>
	<ol style="list-style-type: none"> <li>1. Gears &amp; gear trains</li> <li>2. Bearing</li> <li>3. Brakes and clutches</li> <li>4. Belt rope and Chain drive</li> <li>5. Optimum design &amp; statistical consideration</li> </ol>

**Assessment of term work** shall be done on the basis of following

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

**Practical Examination:** The practical Examination shall consist of via-voce based on syllabus and term work. The assessment will be based on

- Record of term work submitted
- Via-voce on the syllabus

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

Code No.: PED-372

Title: Laboratory VII – Engineering Metallurgy

Teaching Scheme

Practical Marks : 25

Practical : 02 Hrs/week

Teachers assessment (Marks): 25

Credits :01

**Practical**

<b>Course Objective</b>	<ul style="list-style-type: none"> <li>• To understand the principal of optical microscopy</li> <li>• To prepare specimen for metallographic</li> <li>• To study microstructures of steels and non ferrous materials</li> <li>• To study heat treatment and change in the properties of metals</li> <li>• To find properties like hardness, harden ability, wear of metals</li> </ul>	
<b>List of Practical</b>	<b>Sr. No</b>	<b>Practical</b>
	1.	Measurement of Hardness by Rockwell Hardness Test.
	2.	Study of Metallurgical Microscope.
	3.	Study of preparation of the specimen for microscopic examination.
	4	Observation of the microstructure of various types of Plain carbon steels.
	5	Observation of the microstructure of various types of cast irons.
	6	Observation of the microstructure of the Non-ferrous alloys.
	7	Study of changes in material properties and microstructures of various steel specimens after Heat treatments like Annealing, Normalizing and Hardening.
	8	Study of Jominey end quench test to study the concept of Hardenability.
	9	Study of properties after age hardening of Aluminum Alloys.
10	Study of change in wear resistance and other related properties of ferrous and non ferrous materials after heat treatment of steels.	

**Assessment of term work** shall be done on the basis of following

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

**Practical Examination:** The practical Examination shall consist of via-voce based on syllabus and term work. The assessment will be based on

- Record of term work submitted
- Via-voce on the syllabus

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

**Code No.: PED-373**  
**Teaching Scheme**  
**Practical : 02 Hrs/week**  
**Credits :01**

**Title: Laboratory VIII - Tool Design**  
**Practical Marks : 25**  
**Teachers assessment (Marks): 25**

**Practical**

<b>Course Objective</b>	After successful completion of course students shall able to prepare a single point cutting tool, Jig design, Fixture design, die design.	
<b>List Of Practical</b>	<b>Sr. No.</b>	<b>Practical</b>
	1.	Prepare a single point cutting tool in workshop made of a soft material.
	2.	Demonstration of formation of various types of chips. Effect of tool geometry and cutting condition on machining process.
	3.	Handling and study of various types of multipoint cutting tools.
	4	One sheet on multipoint tools.
	5	One sheet on locating devices.
	6	One sheet on clamping devices.
	7	One sheet on Jig design.
	8	One sheet on Fixture design.
	9	One sheet on die design.
10	Record of Assignments based on syllabus	

**Assessment of term work** shall be done on the basis of following

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

**Practical Examination:** The practical Examination shall consist of via-voce based on syllabus and term work. The assessment will be based on

- 1) Record of term work submitted
- 2) Via-voce on the syllabus

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester VI**

Code No.: PED-374

**Title: Lab IX - Computational Techniques**  
**Credits :01**

Teaching Scheme

Practical : 02 Hrs/week

**Teachers assessment (Marks): 50**

**Practical**

<b>Course Objective</b>	After successful completion of course students shall able to prepare write a basic C or C++ program of different Computational methods.	
<b>List of Practical not less than ten</b>	<b>Sr. No.</b>	<b>Practical</b>
	1.	It will consists of a record on Laboratory experiments/ Studies on the following: Development of algorithms and Writing programs in C or C++ at least two on each units( 2 to 6)..

Assessment of term work shall be done on the basis of following

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

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad**  
**(Faculty of Engineering & Technology)**  
**Syllabus of T. Y. B. Tech. (Production) Semester-VI**

**Code No.: PED-375**

**Title: Laboratory X- Project -I**  
**Teachers Assessment : 50 Marks**

**Teaching Scheme**

**Practical : 02 Hrs/week**

**Credits :01**

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**Objectives**

- The practical implementation of theoretical knowledge gained during your study to till date is important for Engineering Education. The student should be able implement their ideas/real time industrial problem/ current application of their engineering branch which they have studied in curriculum. This will definitely help in building the confidence in the student what he has learnt theoretically.

**Guidelines for students and faculty:**

1. Students have to finalize their project title based on Industrial Assignments.
2. The projects selected should be such so as to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The term work will consist of a report prepared by the student on the project allotted to them.
3. Project topics may be chosen by the student or group of students (maximum 3 students) with advice from the faculty members.
4. To design a project at adequate scale level for the following applications- It may be based (i) Entirely on study and analysis of a typical Mechanical and Production Process (System), (ii) Experimental verification, or (iii) Design, fabrication, testing of Mechanical system. The software based project can be considered based on its application for Production purpose. The students are required to submit the report based on project work done.
5. Use appropriate tools (Microsoft Word/Latex)for the preparation of the report.
6. Each student/group is required to-
  - c. Submit a one page synopsis before the project talk for display on the notice board in the first week of their academic semester.
  - d. Give a 10 minutes presentation through OHP, PC, and Slide projector followed by a 10 minute discussion in the second week of their academic semester.
  - e. Submit a report on the project topic with a list of required hardware, software or other equipment for executing the project in the third week of their academic semester.
  - f. Start working on the project and submit initial development and CPM/PERT planning drawing in the fourth week of their academic semester.
  - g. Project idea in rough draft should be submitted by student/s within next five/Six weeks and minimum one page report should be there for each major activity.
  - h. Overall assembling, testing, commissioning, should completed within next two weeks.
  - i. At the last but one week of end of academic semester the internal assessment of project will be done by panel of internal faculties and they will decide marks out 25 marks for term work (TA).
  - j. In the last week, student/group will submit final project report to guide and thereafter guide will finalize marks out of the remaining 25 marks for term work (TA).
7. Projects are to be scheduled in the weekly scheduled time-table during the semester and any change in schedule should be discouraged.
8. Every assigned faculty/s should maintain separate file for evaluating progress of each student or group.
9. Award 50 TA, Sessional marks based on the assessment done by internal guide and panel during semester and the involvement of student/group in the work assigned related to the topic and its application.

8. Every assigned faculty/s should maintain separate file for evaluating progress of each student or group.
9. Award 50 TA, Sessional marks based on the assessment done by internal guide and panel during semester and the involvement of student/group in the work assigned related to the topic and its application.
  
10. The format and other guidelines for the purpose of the Project Submission in hard bound copies should be as follows,

## Report Structure

Index/Contents/Intent

List of Abbreviations

List of Figures

List of Graphs

List of Tables

and List of if any other inclusion

1. Introduction

2. Literature survey

3. System development

4. Performance analysis

5. Conclusions

References

Appendices

Acknowledgement

## **1. INTRODUCTION**

- 1.1 Introduction
- 1.2 Necessity
- 1.3 Objectives
- 1.4 Theme
- 1.5 Organization

## **2. LITERATURE SURVEY**

Related information available in standard Books, Journals, Transactions, Internet Websites *etc.* till date  
(More emphasis on last three to five years)

## **3. SYSTEM DEVELOPMENT**

- Model Development
    - Analytical
    - Computational
    - Experimental
    - Mathematical
    - Statistical
- (Out of above methods at least one method is to be used for the model development)  
Some mathematical treatment or related information is required to be embodied

## **4. PERFORMANCE ANALYSIS**

Analysis of system developed either by at least two methods depending upon depth of standard  
These methods normally used are Analytical /Computational/Statistical/Experimental/ or  
Mathematical  
Results at various stages may be compared with various inputs  
Output at various stages with same waveforms or signals or related information/parameters  
Comparison of above results by at least two methods and justification for the differences or error  
in with theory or earlier published results

## **5. CONCLUSIONS**

- 5.1 Conclusions
- 5.2 Future Scope
- 5.3 Applications

### **Contributions (if any,)**

The innovative work/invention/new ideas generated from the analysis of the work which can be taken  
from the conclusions

### **References**

Author, "Title", Name of Journal/Transactions/ Book, Edition/Volume, Publisher, Year of  
Publication, page to page (pp.\_\_).

These references must be reflected in text at appropriate places in square bracket

In case of web pages complete web page address with assessing date has to be enlisted

List of references should be as per use in the text of the report

#### Appendices

Related data or specifications or referred charts, details computer code/program, *etc.*  
(1 Page)

Expression of gratitude and thankfulness for helping in completion of the said task with name

Signed by the candidate

- General Guidelines

Text should be printed on front and correct side of the watermark on quality bond paper

Paper size- A4, 75 to 85 gsm paper

Left Margin-1.5"

Right Margin-3/4"

Top Margin-1"

Bottom Margin-1"

- First page of first chapter need not be printed anywhere ,second page onwards at right hand corner at ½ inch from right and top side from second chapter onwards starting page number of chapter should be printed at bottom center place report total pages –around.  
All Greek words must be italic

Report Heading -All Capital—16 Font

Chapter heading -All Capital—14 Font

Subchapter –title case-12 Font

Sub-Subchapter –First Alphabet Capital case-12 Font

Page numbers for Index/Contents/Intent should be in roman

Title of the Report should not be more than two lines

Text pages should be in times new roman

The page of the Index/Contents/Intent heading should be below the words for appropriate sub chapter or sub-sub chapter as shown in sample copy

Cover page should have (Mission statement of Institute) in inverted commas, Symbol of Institute, Name of Department, and Institute

Suitable flap with name of the candidate, Department and Institute name and symbol can be used with nylon strip.

*For more information and sample of hard copy please contact the respective Head of the Department*