



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
Diploma in Mechanical Engineering (2021-2024)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME401	DC	PRODUCTION MANAGEMENT AND INFORMATION SYSTEMS	60	20	20	0	0	2	1	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A) This subject aims at introduction of basic concepts of production management & principles of production management. (B) It covers the optimization of factory resources. (C) It also includes understand the processing of various jobs in industries.(D) Student will understand role of Industrial engineering department in the industry.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes

1. To understand the functioning of manufacturing organizations.
2. To understand optimization of factory resources.
3. To understand the processing of various jobs in industries.
4. To understand role of Industrial engineering department in the industry.
5. To understand various components of management.

Syllabus: -

UNIT – I

8 Hrs.

Introduction and Management Process: Definition, objectives, functions, organization structure; Types of production; Production procedure; what is Management? Evolution, various definitions, Concept of management, Levels of management, Administration & management scientific management by F.W. Taylor; Principles of Management (14 principles of Henry Fayol)

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Functions of Management Planning, Organizing, Directing and Controlling; Organizational Management Organization - Definition Steps in organization; Types of organization- Line & staff Functional Project.

UNIT -II

9 Hrs.

Product development & Design: Marketing aspect; product characteristic; economic analysis-profit consideration, standardization, simplification and specialization; Production aspect; break even analysis -concept & problems; Make or Buy Decisions - Functional aspects of Make or Buy Decisions; Economic and Non-Economic Factors influencing Make or Buy Decisions.

UNIT -III

8 Hrs.

Linear Programming: Linear programming in multi-product system; Formulation of Linear Programming Problem (LPP) and problems on graphical solution only.

Plant Layout, Material Handling: Study of plant layout; flow systems; types of layout requirements of good plant layout; different material handling equipment; Productivity-Definition, benefits, measures of effectiveness; factors affecting; Productivity improvement techniques.

UNIT -IV

8 Hrs.

Inventory Control: Types of inventories; ABC analysis; concepts of Economic Order Quantity (EOQ), inventory control with deterministic demand; instantaneous and gradual replenishment; quantity discount, shortages; Problems on Simple inventory control model without shortages; Project Management: Critical path method (CPM) and Program Evaluation & Review Technique (PERT); Simple problems on PERT / CPM.

UNIT -V

9 Hrs.

Work Study: Definition, need, method study procedures; Flow Diagrams, String Diagrams, Process charts: Outline process chart; Flow Process Chart, Multiple activity chart, Travel chart, Workplace layout design; Principles of Motion Economy; Two handed process chart; Work measurement: Work Sampling, Time study – procedures & equipment's, performance rating, allowances, calculation of standard times, Predetermined Time Standards (PTS); MTM techniques.

References Books:

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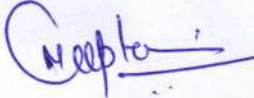


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1. "MartandTelsang", "Industrial Engineering & Production Management", S. Chand & Co. Ltd.2010
2. "M. S. Mahajan", "Industrial Engineering. And Production Management", "DhanpatRai& Co.2006.
3. "Banga& Sharma", "Industrial Organization & Management",2010.
4. "P. K. Gupta, & D. S. Hira", "Operations Research", S. Chand,2018.


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			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME402	DC	THEORY OF MACHINES	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

(A) To familiarize students with basic types of mechanisms, joints and degrees of freedom to perform position, velocity and acceleration analysis using graphical and analytical methods. (B) To provide students an understanding of different types of mechanisms and to teach the basics of synthesis of simple mechanisms and also to teach students the kinematic analysis of cam-follower motion. (C) To provide basic concept gyroscope, which allows the calculation of orientation and rotation; designers have incorporated them into modern technology.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes

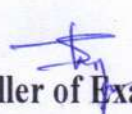
1. Students will be able to define systematically design and develop mechanisms to perform a specified task and demonstrate an understanding of the concepts of various mechanisms and pairs.
2. Students will be able to do the velocity and acceleration analysis of simple mechanisms.
3. Students will be able to explain effectively present written, oral, and graphical solutions to design problems & develop ability to come up with innovative ideas and design a layout of cam for specified motion.
4. Students will be able demonstrate an understanding of principle of gears.


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5. Students will be able to synthesis simple gyroscopic forces and couple, and gyroscopic effect in airplanes, ship, and vehicle.

Syllabus: -

UNIT-I

9 Hrs.

Simple Mechanism: Introduction of theory of machines; definitions of statics, dynamics, kinematics, kinetics, kinematic pair, kinematic chain, mechanism, machine inversions, relation between number of links, number of joints and number of pairs; Four bar chain and its inversion; Slider crank chain and its inversions.

UNIT-II

8 Hrs.

Dynamic force analysis, Crank Effort Diagrams and Flywheel: Dynamics of reciprocating engine mechanism; Inertia force due to reciprocating mass; piston effort crank effort, turning moment on crank shaft; Analytical and graphical methods of construction of turning moment diagrams for steam and I.C. Engines; Fluctuation of energy and speed; Coefficient of fluctuation of energy and speed; Flywheel and its function; calculation of moment of inertia; Weight of flywheel for steam and I.C. Engines.

UNIT-III

9 Hrs.

Brakes and Dynamometers: Brakes-Need, types, braking force, braking torque; Band brakes; block brakes; Band and Block brakes; internally expanded brakes; Dynamometers-Need, Types, principles, Construction and working.

UNIT-IV

8 Hrs.

Power Transmission: Classification of power transmission devices, belt drive, chain drive, rope drive and gear drives; Flat and 'V' belt drives; ratio of tensions; Slip length of belt calculation for open and cross belt drive.

UNIT-V

9 Hrs.

Governors: Classification of governors, Watt governor, porter governor, Pro-ell governor and Hartnell governor-their construction and working; Sensitivity; stability; power and effort; hunting phenomenon and isochronous governor; Cams and Followers-Need, Classification, motion of follower; Displacement, velocity and acceleration diagrams uniform velocity, uniform acceleration, and retardation.

Reference Books:

1. S.S. Rattan, "Theory of Machines", Third Edition, Tata McGraw-Hill, 2009.


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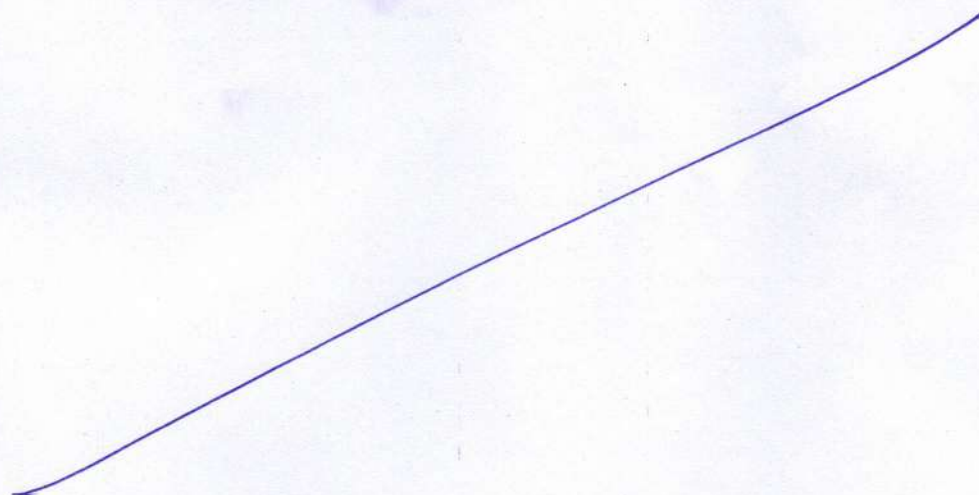


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2. *Ambekar A.G, "Mechanism and Machine Theory" Prentice Hall of India", New Delhi, 2007.*
3. *Rattan SS; "Theory of machines"; MC GrawHills, 2014.*
4. *Ambekar AG; "Mechanism and Machine Theory; PHI. Eastern Economy Edition", 2015.*
5. *Rao JS and Dukkipati; "Mechanism and Machine Theory"; New Age Delhi, 2011.*

List of Practical's:

1. To find out gyroscopic couple.
2. To Find out velocity & acceleration of slider crank mechanism by Klien's Construction.
3. To find out velocity ratio of various gear trains
4. To study various types of belt drives & find out the velocity ratio of the drive.
5. To draw the cam profile.
6. Study of working models of various popular mechanisms like quick return mechanism etc
7. To draw Involute profile of a gear by generating method.
8. Study of the mechanisms like Pantograph mechanism, Davis & Ackerman's steering mechanism etc.



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			END SEM UNIVERSITY EXAM	TWO TERMS EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME403	DC	MACHINE DESIGN	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 20 marks.

Course Educational Objectives (CEOs):

Students will learn (A) How to apply the concepts of stress analysis (B) Theories of failure and selection of machine components (C) Familiarize the various steps involved in the Design Process (D) The principle involved in evaluating the shape and dimensions of a component (E) Functional and strength requirements, (F) Use of standard practices and standard data.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes

1. Students will be able to know about the machine elements, mechanical properties, and types of failure.
2. Students will be able to Design of shaft and flange coupling.
3. Students will be able to Design of machine elements subjected to different types of loads and moment.
4. Students will be able to Design Riveted joint, welded joints, and Threaded joints.
5. Students will be able to Design of Clutch.

Syllabus: -

UNIT- Introduction to Machine Design: Machine and machine elements; Introduction of bolt, nut, axle, shaft, bearing, coupling, clutch, belt, rope, chain, gear etc.; Basic design procedure, Basic

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requirements for machine elements; General design considerations like fatigue, creep, fabrication methods and economic considerations for strength.

UNIT-II

Shafts, Keys and Couplings: Various types of shafts; Stresses in Shafts; Design of shafts (solid and hollow) subjected to torque and bending moment; Definition of term key; Its various types, Splines, Forces acting on sunk keys; Shaft coupling and its various types; Design of flanges coupling.

UNIT-III

Design of Machine Elements: Design of Machine Elements Subjected to Direct and Shear Loads; members subjected to direct loads – bolt, column, rod, cotter and knuckle joints; members subjected to shear loads- rivet, cotter knuckle pin, root of threaded bolt, coupling, bolt and key; Design of Machine Elements Subjected to Bending Moment, Twisting Moment and Combined Bending and Twisting Moment; Introduction to pure bending, fundamental equation of pure bending.

UNIT-IV

Design of Riveted Joint, Welded Joints, Threaded Joints: Types of Riveted joint - lap and butt joint; Modes of failure of riveted joints; Definition of welding, types of welded joints, strength of the butt weld; Types of threads and their proportions.

UNIT-V

Design of Clutch and Brakes:

Clutch: Need, Classification, Construction and Working of single and multi-plate clutches; power transmitted by single and multi-plate clutches.


Brake: Need & Classification of Brakes, Constructional detail and working of mechanical brakes; hydraulic and vacuum brake; Details of expert cylinder, wheel cylinder, Concept of brake drum, brake lining and brake equipment; Bleeding of brake.

Reference Books:

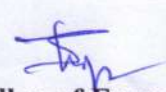
1. "Text book of Machine Design" by R.S. Khurmi & J.K. Gupta; S.Chand Publication, 2005
2. "Design of Machine Elements" by Bhandari, Tata McGraw-Hill Publishing Company Ltd, 2016.


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3. "Machine Design" by Sadhu Singh, Khanna Publishers, 2014.
4. "Machine Design" by, Sharma and Agrawal, S. K. Kataria & Sons, 2012.
5. "Machine Design Vol-II & II" I by F. Haideri, NiraliPrakashan, Pune, 2011.
6. "Machine Design" by Pandya and Shah, Charotar Publishing House, 2010.

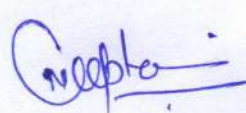
Note: PSG Design data book and/ or Mahadevan and Reddy's Mechanical design data book are to be provided/ permitted in exam hall (duly verified by authority)

List of Practical's:

Designing and sketching of components contained in the syllabus.


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			END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHER ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHER ASSESSMENT*				
DTME404	DC	FLUID MECHANICS	60	20	20	30	20	2	1	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

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Course Educational Objectives (CEOs):

- (A) The course is designed to give fundamental knowledge of fluid, its properties and behavior under various conditions. (B) To understand the basic concept of fluid mechanics. (C) To understand the basic concept of Impact of Jet & Hydraulic Turbines. (D) To understand the basic concept and principal of pump.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes

1. Student will be able to understand statics, dynamics, and various approaches to fluid mechanics.
2. Student will be able to understand fundamentals of flow through pipes.
3. Student will be able to understand basics of compressible flow.
4. Student will be able to correlate fundamentals of fluid mechanics with various mechanical systems.
5. Student will be able to understand basic principle of pump.

Syllabus: -

UNIT -I

8 Hrs.

Properties of fluid: Density, Specific gravity, Specific Weight, Specific Volume, Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillary Tube, Vapour Pressure and Compressibility.

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UNIT-II

8 Hrs.

Pressure Measurement Devices: Fluid pressure, Pressure head and Pressure intensity; Concept of absolute vacuum, gauge pressure, atmospheric pressure, and absolute pressure; Simple and differential manometers; Bourdon pressure gauge; Concept of Total pressure on immersed bodies; center of pressure; Numerical on Manometers; Total Pressure and Centre of pressure.

UNIT- III

10 Hrs.

Fluid Flow & Flow through Pipes: Types of fluid flows; Continuity equation; Bernoulli's theorem; Venturi meter-Construction, principle of working, Coefficient of discharge, Derivation for discharge through Venturi meter; Orifice meter – Construction, Principle of working, hydraulic coefficients, Derivation for discharge through Orifice meter; Pitot tube-Construction, Principle and Working; Law of fluid friction (Laminar only); Darcy's equation and Chezy's equation for frictional losses; Minor losses in pipes; Hydraulic gradient and total gradient line; Hydraulic power transmission through pipe.

UNIT- IV

9 Hrs.

Impact of Jet & Hydraulic Turbines: Impact of jet on fixed vertical, moving vertical flat plates; Impact of jet on curved vanes with special reference to turbines & pumps; Classification of hydraulic turbines; Selection of turbine based on head and discharge available; Construction and working principle of Pelton wheel, Francis and Kaplan turbine; Draft tubes-types and construction; concept of cavitation in turbines; Calculation of Work done, Power and efficiency of turbine.

UNIT – V

8 Hrs.

Pumps: Construction, principle of working and applications; Types of casings and impellers; Concept of multistage; Priming and its methods; Cavitations; Manometric head, Work done, Manometric efficiency; Overall efficiency; NPSH; Performance Characteristics of Centrifugal pumps.

Reference Books:

1. *Fluid Mechanics and Hydraulic Machines* by Dr. R.K. Bansal, 2009.
2. *Engineering Fluid Mechanics* by K. L. Kumar, 2013.
3. *Fluid Mechanics* by Victor L. Streeter, Benjamin Wylie Ninth, 2004.
4. *Fluid Mechanics* by Frank M. White, 2000.
5. *Fluid Mechanics* by Robert Fox, Alan McDonald, 2003.
6. *Fluid Mechanics* by Yunus A. Cengel, John M. Cimbala, 2007.


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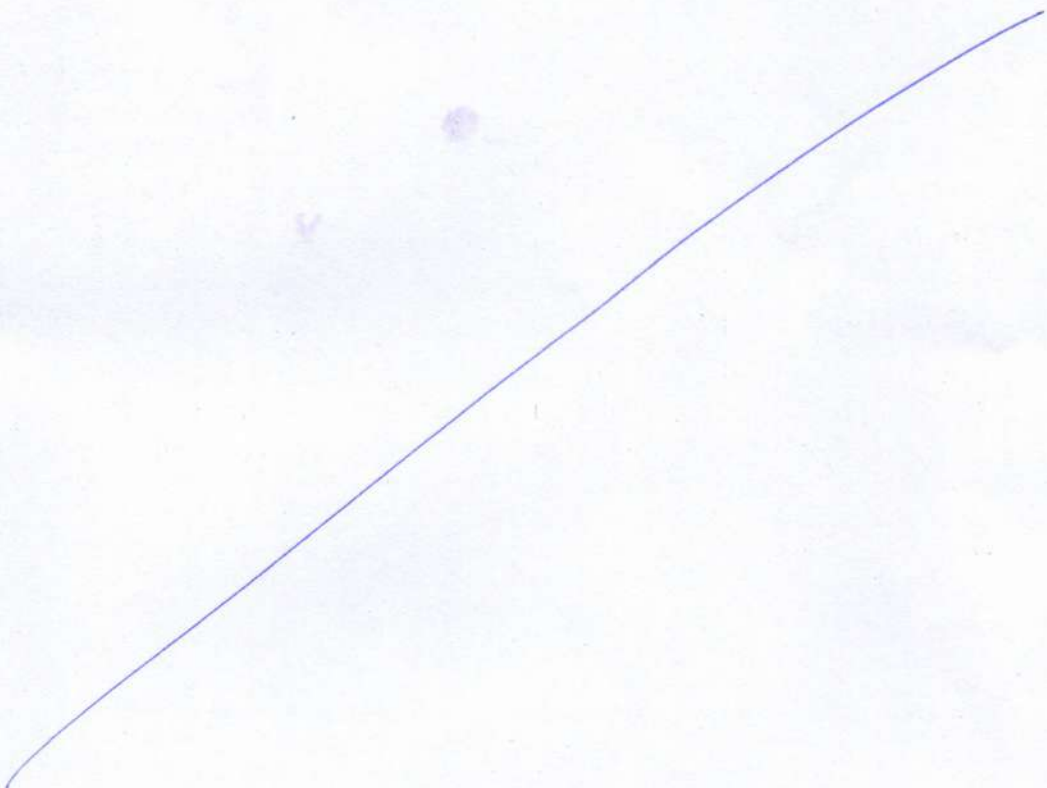
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List of Practical's:

1. Verifying the Bernoulli's Theorem.
2. Determination of co-efficient of discharge of a mouthpiece and orifice by variable head method.
3. Determination of co-efficient of discharge of a venturi meter and orificemeter.
4. Determination of the Friction Factor in a pipe.
5. Performance test on reciprocating pump and to draw the characteristics curves.
6. Performance test on centrifugal pump and to draw the characteristics curves.
7. Performance test on impulse turbine and to find out the Efficiency.
8. Performance test on reaction turbine and to find out the Efficiency.



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DTME405	AEC	CAD/CAM LAB	0	0	0	30	20	0	0	4	2

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

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Course Educational Objectives (CEOs):

To understand (A) the current available CAD/CAM hardware, software, and fundamentals (B) To learn new design optimization techniques and newer techniques in CAD/CAM (C) Students will gain a basic understanding of computer numerical control (CNC) machining processes and operations using a combination of G-codes, milling and turning machines.

Course Outcomes (COs):

1. Use CAD software to generate a computer model and technical drawing for a simple, well-defined part or assembly.
2. Generate and interpret engineering technical drawings of parts and assemblies according to engineering design standards.
3. To demonstrate a basic understanding of machining fundamentals including speed and feed calculations, tooling systems, and work-holding systems for CNC milling and turning equipment.
4. To demonstrate a basic and advanced understanding of numerical controlled (NC) programming strategies.
5. To demonstrate ability to set-up, program, and operate CNC milling and turning equipment. To demonstrate an ability to generate NC code using G-codes to machine parts to specifications.

List of Practical's:

1. Experiments and problem based on theory topics
2. Study of CAD Hardware system using physical and visual aid


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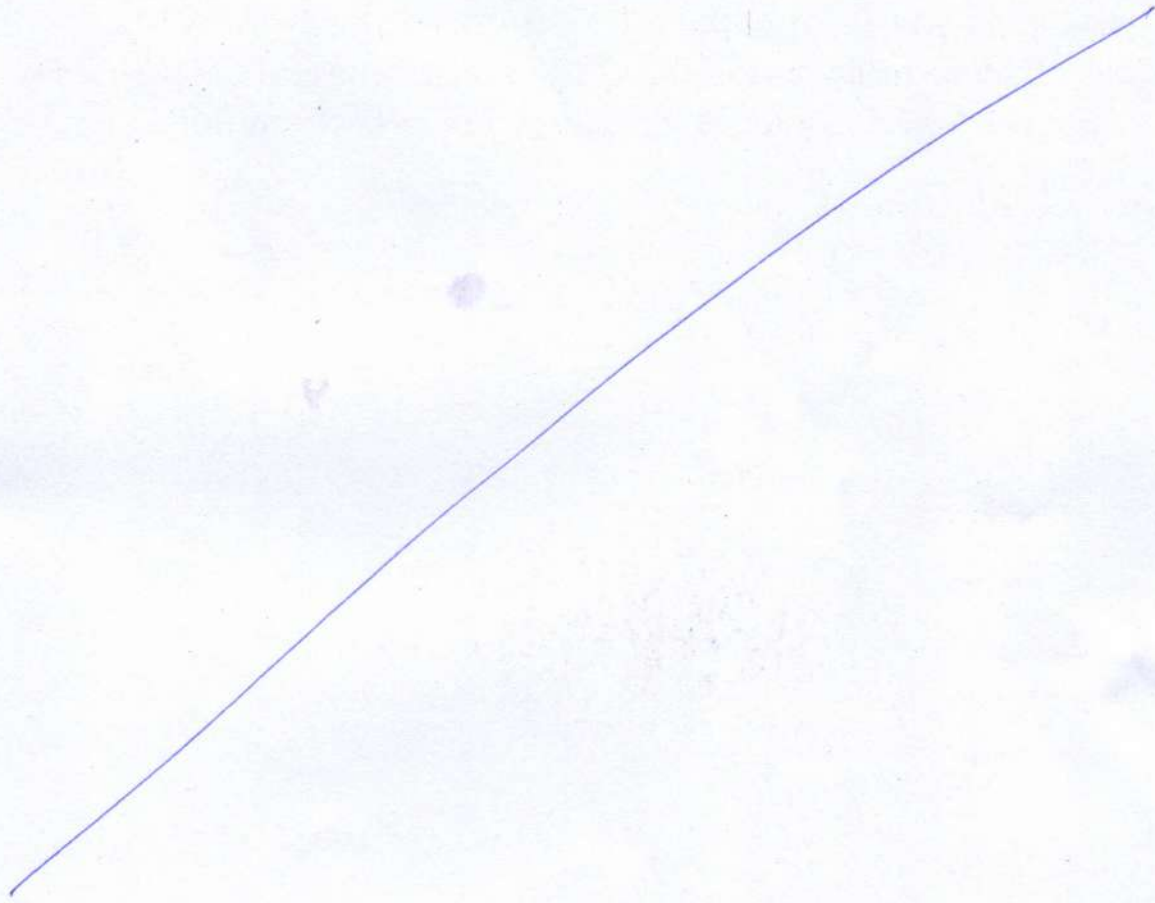
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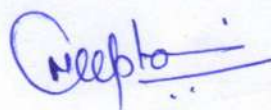
3. Auto CAD commands and their applications in various types of designs/ drawings. ten/fifteen experiments
4. Solid modeling using parametric software
5. Demonstration of CNC machine for identifying machine zero, drive systems, safety precautions.

Write CNC part programming of a given component.



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Vishwavidyalaya, Indore



Controller of Examination
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore



Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore