



Integral University, Lucknow

Effective from Session: 2025-26							
Course Code	DME-501	Title of the Course	KINEMATICS OF MACHINES	L	T	P	C
Year	III	Semester	V	3	1	0	-
Pre-Requisite	10 th	Co-requisite	---				
Course Objectives	Ability to self-learn modern engineering tools, techniques, skills and contemporary engineering practice, necessary for engineering work.						

Course Outcomes	
CO1	Identify mechanism in real life application
CO2	Perform kinematic analysis of simple mechanisms
CO3	Perform statics and dynamics force analysis of slider crank mechanisms
CO4	Determine moment of inertia of rigid bodies experimentally
CO5	Analyze velocity and acceleration of mechanisms by vector and graphical method

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Mechanisms and machines	Definition, Kinematic pairs, types of mechanism, Special types of mechanism, Space mechanisms.	5	1
2	Kinematic analysis	Displacement, Velocity and Acceleration of plane mechanisms, Graphical and analytical techniques.	7	2
3	Synthesis of mechanisms	Crank Rockers, Four Bar Mechanisms, Slider Crank Mechanisms.	6	3
4	Cams and cam follower mechanisms	Purpose of using cam- Follower mechanisms, types of cams and cam follower mechanisms, Nomenclature synthesis of disc cam profiles for prescribed follower motion, determination of basic dimension, Graphical and analytical approaches for different types of followers, Dynamics of cam – follower systems - Jump and crossover stock.	7	4
5	Gears and gear drives	Power transmission by gears and fundamental law of gearing, Involute profile and conjugate action, Characteristics of involute tooth gear - Pinion to system, Under cutting and interference, Minimum number teeth, types of gears, Various gear drives - Spur, Helical, worm and Bevel gear, Gear train Simple compound and epicyclic gear trains, Differential gears	9	5

References Books:	
1.	Theory of Machines by : R.S. Khurmi
2.	Theory of Machines by : S.S. Ratan
e-Learning Source:	
https://www.youtube.com/watch?v=7WppBa-cLuk&list=PLhSp9OSVmeyJSYB4gKPL8UrmB_a3kfHYI	

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	--	--	1	--	--	1	3	-	2
CO2	1	--	2	--	1	--	--	3	-	2	-
CO3	--	3	--	--	--	--	--	-	2	-	1
CO4	1	--	--	2	--	2	--	2	-	-	3
CO5	1		2	-	3	-	-	-	3	2	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session: 2025-26							
Course Code	DME-503	Title of the Course	DESIGN AND ESTIMATION	L	T	P	C
Year	III	Semester	V	3	1	0	
Pre-Requisite	10 th	Co-requisite	--				
Course Objectives	1. To understand about basic concepts of Designing. 2. Be able to learn modern engineering tools, techniques, skills and contemporary engineering practice, necessary for machine design.						

Course Outcomes	
CO1	Ability to apply knowledge of engineering graphics, machine drawing, basic science & basic applied mathematics, basic machining processes, material science, for design procedures of mechanical component use in industries & incorporated in machine design.
CO2	Understand different welded and riveted joint structure and able to apply its knowledge to analyze its strength.
CO3	Be able to apply knowledge subjected to twisting moment ,machine parts subjected to combined bending and twisting moment and able to apply its knowledge to analyze its strength.
CO4	Be able to apply knowledge of the stresses & strain of mechanical component & incorporated in gear design.
CO5	Ability to apply knowledge of engineering machine drawing basic machining processes, material science, for estimation of material requirement & estimation of time for different machining operations.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Introduction to design & machine parts subjected to direct loads and shear loads	General design consideration in machine parts. Mechanical properties of materials of construction, steps in machine design. Factor of safety, Selection of materials. Threaded connections, core and nominal diameter of screw, boiler-Stay. Design for number of studs or bolts and their diameter for cylinder covers due to external forces. Punching and shearing. Design of cotter and Knuckle joints.	6	1
2	Riveted and welded joints machine parts subjected to bending moment	Types of riveted joints, possible failure of riveted joints. Strength and efficiency of riveted joint. Unwin's formula. Determination of safe load and pitch of rivets. Design of lap and butt joints. Common type of welded joints, definition of leg length, throat thickness and size of weld. Simple design for 'V' butt welded joint, Transverse fillet and parallel fillet welded joints. Design for the diameter of railway-Wagon axle, axle used in road-vehicles. Semi-elliptic Laminated Spring-Proof load and proof stress stiffness. Expression for max. stress and deflection. Determination of different dimensions number of Laminations, Central deflection in a Laminated spring.	7	2
3	Machine parts subjected to twisting moment, machine parts subjected to combined bending and twisting moment	Springs. Maximum shear stress induced for given axial load. Expression for axial deflection, spring index, solid length and stiffness. Calculation for number of coils, mean coil dia and dia of spring wire for axial gradual loads. Simple cases of composite springs. Design of keys and coupling bolts for a rigid flanged coupling Theory of failures: (i) Maxm. Principal stress theory. (ii) Maxm. shear stress theory concept of equivalent bending moment, equivalent torque, Design of over hung crank pin. Design of shaft dia for over hung pulley in a belt drive.	7	3
4	Machine parts subjected to combined direct and bending stress and design of gear	Eccentric load and eccentricity. Max. and minimum stress intensities. Reversal of stress. Design for safe load on small columns. Design of brackets and clamps for eccentric loading. Selection of material, Design analyzing, Lewis equation, Stress concentration, Dynamic load, Surface compressive stress, Beam strength, Bending stress, check or plastic deformation, Design procedure for Spur gear and Helical gear.	6	4
5	Estimation of material requirement & estimation of time for different machining operations	Estimation of the weight of simple machine parts. Review of the area/volume of triangle, equilateral triangle, Hexagon, rectangle, square rhomboid, parallelogram, Octagon, circle, Hollow circle, Sector of circle, Sector of Hollow circle circular, Semi circle, Cube prism, Square prism, general prism, Cylinders, Sphere, Hollow sphere segment of sphere, Zone of a sphere, Cones pyramids, Frustum of a pyramid, Frustum of a cone. Turning, Facing, Chamfering, Knurling, Taper Turning, Threading, Drilling, Boring, Shaping and planning, Milling, Broaching, Simple problems pertaining to above.	8	5

References Books:											
1. Machine Design : V.B. Bhandari											
2. Machine Design: Dr. Rajendra Kaur, Laxmi Publications.											
3. Machine Design: R.S. Khurmi											
e-Learning Source:											
https://youtube.com/playlist?list=PL3D4EECEFAA99D9BE&si=2nw22IU8g_E1YaP5											

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
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CO											
CO1	1	2	3	--	2	---	--	1	3	-	2
CO2	1	1	--	2	---	---	--	3	-	2	-
CO3	--	3	1	1	1	2	--	-	2	-	1
CO4	1	---	--	--	--	--	--	2	-	-	3
CO5	1	1	--	--	---	--	-	-	3	2	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session: 2025-26							
Course Code	DME-507	Title of the Course	COMPUTER AIDED DESIGN AND MANUFACTURING	L	T	P	C
Year	III	Semester	V	3	1	0	-
Pre-Requisite	10 th	Co-requisite	--				
Course Objectives	Creating 2D and 3D models Understanding CAD concepts Creating engineering drawings Understanding 3D modeling concepts Understanding CAM concepts						

Course Outcomes	
CO1	Students learn how to create 2D drawings and 3D models of products using CAD software.
CO2	Students learn the basics of CAD software, such as AutoCAD, Solid Works, and Fusion 360
CO3	Students learn how to create engineering drawings using part and assembly models
CO4	Students learn about wireframe, surface, and solid modeling.
CO5	Students learn how CAM systems can be used to monitor and regulate production.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Introduction	Introduction to CAD and CAM. Need, Scope & Importance of CAD in Industries, Design Steps & Reasons for Implementing CAD System, Salient Features, Benefits & Functional Areas of CAD. Introduction to CAM, Functions of CAM, Benefits of CAM, Integrated CAD/CAM Organization-Concept, Necessity of CAD/CAM Integration, Computer Integrated Production System-Features & Advantages.	7	1
2	Hardware & software	Hardware & Software In CAD SYSTEM, Input & output devices- types, configuration, applications & Installation. Graphic packages: Types, features, system requirements & applications; GUI-concept, meaning & features; Graphic standards such as GKS, PHIG, IGES. 2D & 3D geometric transformations, translation, scaling, rotation, Mirror, zooming. Geometric modeling; types, features & applications, Animation concepts, need applications	10	2
3	Modeling	3D modeling, Difference between 2D & 3D, Axes nomenclature. Surfaces- types & applications. Solid modeling- methods & applications, Feature based modeling-concept, meaning & applications. Parametric modeling- concept, meaning & applications. Constraints – concept, meaning, common. Constraints & their utilities. Dimensional relationships- concept, meaning & utility. Model tree- concept, applications & benefits.	8	3
4	CNC machines	CNC Machines, components and part programming. Numerical control: Introduction, features, Advantages & limitations, Layout of CNC system, functions of each component of NC system, manufacturing methodology of NC system, Development of CNC & DNC Systems. Computer numerical control (CNC): Introduction, types & classification, features, specifications, benefits & applications, Salient construction features of CNC machines differing from conventional machines. CNC tooling-types, working & applications. Working of Automatic Tool Changer (ATC) & Automatic Pallet Changer (APC), Work holding & loading devices.	7	4
5	Manufacturing	CNC axes, motion nomenclature & coordinate system, Various positions like machine zero, home position, work piece zero, program zero. Machine control systems- types & applications. Preparatory functions (G codes) & miscellaneous functions (M codes). APT programming, tool nose radius compensation, linear & circular interpolation methods-coding. Macros, subroutines, fixed cycles, canned cycles. Programming practice problems on plain, step & taper turning. Recent trends in CAD/CAM. Adaptive control- Definition, meaning, block diagram & applications. Direct Numerical Control -Definition, meaning, block diagram, applications. Flexible Manufacturing System- Concept, evaluation, main elements, layout, importance & applications. Robotics- Definition of robot, classification, types of robot, elements of robot & applications. Computer Integrated Manufacturing- Concept, definitions, area covered benefits.	8	5

References Books:
CAD/CAM/CIM by R. Radhakrishnan, S. Subramanain, New Age International Ltd.
CAD/ CAM by Ibrahim Zeid, Mastering TMH Publishing Company Ltd.
CAD/CAM by Mikell P. Groover, Emory Zimmens, Jr. Prentice Hall of India
Computer Integrated Design and Manufacturing, McGraw Hill-Bedworth David. D
Computer Integrated Manufacturing, PHI-Paul G. Ranky
e-Learning Source:
https://www.youtube.com/watch?v=3qEK7Lnk2TI
https://www.youtube.com/watch?v=a9dyeCl6Ejc&list=PLvBMRJ-z4QC9H3kuJzOqBxe_LP9f3b-Y
https://www.vssut.ac.in/lecture_notes/lecture1530947994.pdf
https://mrcet.com/downloads/digital_notes/ME/IV%20year/CAD%20CAM%20Digital%20Notes.pdf



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PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	1	1	1	2	3	1	1	2
CO2	1	2	2	1	1	1	2	3	1	1	2
CO3	1	1	1	1	1	2	1	1	1	1	1
CO4	1	1	1	2	2	1	2	1	2	2	1
CO5	1	1	2	2	2	2	1	2	2	2	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Refrigeration:	Introduction to refrigeration system, Methods of refrigeration, Carnot refrigeration cycle, unit of refrigeration effect and C. O.P. AIR REFRIGERATION CYCLE: Open and closed air refrigeration cycles, Reversed Carnot cycle, Bell Coleman or Reversed Joule air refrigeration cycle, Aircraft refrigeration system. Classification of aircraft refrigeration system. Simple air refrigeration system. Boot strap refrigeration, Regenerative, reduced ambient, Dry air rated Temperature (DART)	10	1
2	Vapour compression system	Single stage system, analysis of vapour compression cycle, use of T-S and P-H chart, effect of change in suction and discharge pressure on C. O. P., Effect of sub cooling of condensate and superheating of refrigerant vapour on C.O.P. of the cycle, Actual vapour compression refrigeration cycle, Multivapour compression system requirement, removal of flash gas, intercooling, Different configuration of multistage, Cascade system. 8	8	2
3	Vapour absorption system	Working principal of vapour absorption refrigeration, Compression between absorption and Compression system, Elementary idea of refrigeration absorption mixtures, Temperature- concentration diagram and Enthalpy concentration diagram, Adiabatic mixing of two streams, Ammonia-water vapour absorption system, Lithium Bromide water vapour absorption system Comparison. REFRIGERATION: Classification, Nomenclature, Desirable properties of refrigerants, Common refrigerants, Secondary refrigerant and CFC free refrigerants.	10	2
4	Air conditioning	Introduction to air conditioning, Psychometric properties and their definitions, Psychrometric chart, Different Psychometric processes, thermal analysis of human body Effective temperature and comfort, cooling and heating load calculation, Selection of inside and outside design conditions, Heat transfer through walls & roofs, Infiltration and ventilation, Internal heat gain, sensible heat factor (SHF), By- pass factor, Grand Sensible heat factor (GSHF), Apparatus dew point (ADP).	9	3
5	Refrigeration equipment and application	Elementary knowledge of refrigeration and air conditioning equipments e.g. Compressor, Condensers, Evaporators and Expansion devices, Air washers, Cooling towers and humidifying efficiency, Food preservation, cold storage, Refrigerates Freezers, Ice plant, Water cooling, Elementary knowledge of transmission and industrial air conditioning.	7	4



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Name & Sign of Program Coordinator	Sign & Seal of HoD
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Effective from Session: 2026-27							
Course Code	DAE-506	Title of the Course	AUTOMOBILE ENGINE AND HYBRID ELECTRIC VEHICLES	L	T	P	C
Year	III	Semester	V	3	1	0	-
Pre-Requisite	10 th	Co-requisite	-				
Course Objectives	The main objective of the course is to provide a comprehensive understanding of Automobile components like Engines, components of engines, combustion processes, Fuel supply systems, cooling systems, Lubrication and engine management systems. New technologies like BS-6, Electric Vehicles, Hybrid Vehicles.						

Course Outcomes	
CO1	Introduction to Automobile and its power.
CO2	Demonstrate the working of IC Engine and description about emission norms.
CO3	Illustrate the construction and working of Fuel supply and ignition of fuel in petrol and diesel engine.
CO4	Details of the Cooling and Lubrication system in Automobile.
CO5	Exposure to the current EV technologies of Automobiles.

UnitNo.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT-I	Introduction	Automobiles and their development. Various types of automobiles manufactured in India, their manufacturer and location of their manufacturing unit. Classification of automobiles. Layout of chassis. Types of drives-front wheel, rear wheel, four wheel. Torque and Power requirements of an Automobile. Torque characteristics of IC engine.	6	CO1
UNIT-II	I.C. Engine:	Construction and material of its Piston and Connecting rod Assembly; Crank shaft, Fly wheel and Bearings; Engine valve and Valve operating mechanism (Cam shaft, Valve timing gears, Tappet, Push rod, Rocker and Valve springs). Multicylinder engine, Advantage of multi-cylinder engine for automobiles use, Firing order, Arrangement of cylinders. Valve positions. Phenomenon of knocking or detonation, its cause and effect on engine. Octane number and cetane number. Exhaust Emissions: Types and use of catalytic converters, selective catalytic reduction methods for emission control, emission norm standards i.e. Bharat norms.	8	CO2
UNIT-III	Fuel supply and ignition system:	PETROL ENGINE: Fuel supply circuit components, their function. Exhaust pipe and silencer. Construction and working of mechanical and electrical fuel pumps, Construction and working of Simple Carburettor. Air fuel ratio, its variation with speed. Magneto and Coil Ignition Systems-Working of coil ignition system for multi-cylinder engine and electronic ignition system, Ignition timing, Ignition advance and retard-Their need and factors on which they depend. Spark Plugs-their types as used in automobile engines. Location of spark plug. DIESEL ENGINE: Fuel supply circuit for Diesel engine, Primary and secondary fuel filter, their positioning in the circuit. Construction and working of fuel pump and fuel injection pump. Governor and injector, Solid and Air injection in Diesel engine. Multi Point Fuel Supply-Construction of system and working. Introduction to other fuels - CNG, Battery, etc. BS6-What is the BS6 engine. The need to move from BS4 to BS6 norms. Technological changes in BS6 engines. Electronic control module (ECM i.e., 8 bit, 16 bit and 32 bit computers). Concept of double overhead cam, single overhead cam, Twin cam 16 valve technology in 4-cylinder engine.	10	CO3
UNIT-IV	Cooling system and lubrication system of automobile engines:	Cooling system and its types, Air cooling Shapes of cooling fins. Engine cooling liquids and their characteristics. Lubrication system and its types. Types of lubrication pumps, pump drive, Relief valves, Oil pressure, Oil filters and their location in lubrication system, Crank case ventilation, Crank case dilution. Engine Lubricants and their characteristics.	6	CO4
UNIT-V	Electric Vehicles and Hybrid Electric Vehicles:	Definition, History, Evolution of EVs, Importance of EVs in current scenario. Major components: Battery, Electric Motor, Power Converter, Controller, Transmission System. Comparison with Internal Combustion Engine Vehicles (ICEVs). Basic Construction and Working of Electric Vehicles (BEV) and Hybrid Electric Vehicles (HEV), Batteries of EV and HEV. Battery Management Systems (BMS), Types of Charging (AC, DC, Wireless). Fast Charging Technologies, Battery Swapping, Smart EVs, Autonomous EVs. Range Anxiety, Infrastructure Challenges, Government Policies, Global EV Market Trends.	10	CO5

References Books:
Automobile Engine: G.B.S Narang.
Automobile Engine: R.K. Rajput
e-Learning Source:



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<https://nptel.ac.in/courses/112104033>

<https://archive.nptel.ac.in/courses/107/106/107106088/>

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
CO1	3	1	-	-	1	2	2	1	2	-	-	-	-
CO2	3	-	-	-	1	1	2	2	1	-	-	-	-
CO3	3	1	-	-	1	1	2	2	1	-	-	-	-
CO4	3	2	1	3	2	2	1	1	1	-	-	-	-
CO5	3	2	2	3	1	1	1	1	1	-	-	-	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session: 2012-13

Course Code	DIM-501	Title of the Course	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
Year	III	Semester	V	3	1	0	-
Pre-Requisite	10 th	Co-requisite	--				
Course Objectives	The course Industrial Management and Entrepreneurship Development prepares Diploma in Automobile Engineering students with essential management and entrepreneurial skills. It covers key management principles like planning, organizing, and control, while enhancing leadership, communication, and motivation techniques. Students learn human resource development, industrial relations, labor welfare, and financial management, including wage administration and costing. Material management concepts such as inventory control and procurement are addressed, alongside industrial laws like the Factory Act and taxation policies. The course also highlights entrepreneurship, project report preparation, and intellectual property rights, equipping students for leadership roles and entrepreneurial opportunities in the automobile industry.						

Course Outcomes	
CO1	The course will increase the skills in the students like communication skills, presentation, Human skills, Leadership skills, Managerial skills etc. after the completion of the course.
CO2	Increase students' capabilities and confidence to handle administrative, managerial and financial activities.
CO3	The course will assist in developing intellectual skills like creative thinking, Decision making, Leadership, Brain Storming, Motivation, etc.
CO4	The course will introduce skills in the students like team work, leadership skills, communication skills, body languages, positive attitude, etc.
CO5	This course is designed to develop understanding of various functions of management, role of workers and engineers and providing knowledge

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Principles Of Management	Definition of management, Administration organisation, Functions management, Planning, Organizing, Co- ordination and control, Structure and function of industrial organisations, Leadership- Need for leadership, Factors to be considered for accomplishing effective leadership, Communication -Importance, Processes, Barriers to communication, Making communication, Effective, formal and informal communication, Motivation - Factors determining motivation, Positive and negative motivation, Methods for improving motivation, Incentives, Pay promotion and rewards, Controlling - Just in time, Total quality management, Quality circle, Zero defect concept. Concept of Stress Management.	8	1
2	Human Resource Development And Human And Industrial Relations	Introduction, Staff development and career development, Training strategies and methods. Human relations and performance in organisation, Understand self and others for effective behaviour, Industrial relation and disputes, Characteristics of group behaviour and Trade unionism, Mob psychology, Labour welfare, Workers participation in management.	8	2
3	Personnel And Financial Management	Responsibilities of human resource management - Policies and functions, Selection - Mode of selection - Procedure- training of workers, Job evaluation and Merit rating Objectives and importance wage and salary administration - Classification of wage, Payment schemes, Components of wage, Wage fixation. Fixed and working capital - resource of capital, Shares, types preference and equity shares, Debenture types, Public deposits, Factory costing, Direct cost, Indirect cost, Factory overhead, Fixation of selling price of product, Depreciation- Causes, Methods.	8	3
4	Material Management, Labour, Industrial And Tax Laws	Objective of a good stock control system - ABC analysis of inventory, Procurement and consumption cycle, Reorder level, Lead time, Economic order quantity, Purchasing procedure, Stock keeping, Bin card. Importance and necessity of industrial legislation, Types of labour laws and dispute, Factory Act 1948, Payment of Wages Act 1947, Employee State Insurance Act 1948, Various types of taxes - Production Tax, Local Tax, Trade tax, Excise duty, Income Tax.	8	4
5	Entrepreneurship Development And Intellectual Property Rights:	Concept of entrepreneurship, need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for entrepreneurship development. Idea of project report preparation. Introduction to IPR (Patents, Copy Right, Trade Mark), Protection of undisclosed information, Concept and history of patents, Indian and International Patents Acts and Rules, Patentable and No patentable invention including product versus Process.	8	5

References Books:

Industrial Management And Entrepreneurship Development by Dr. Mohd. Shuaib Siddiqui

e-Learning Source:

<https://www.youtube.com/watch?v=kqY4m059zFk&list=PLY8pCdWSlXrSNy8EBIQ9vclPRtd0qmpNo>

https://www.youtube.com/watch?v=Jq_BeC-gMEk&list=PL0x1u9aMwXImXW1J5Z7wfH2uwQW9ZgK83



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PO- PSO CO	P O 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO 8	PO 9	PO10	PO 11	PO12	PSO1
CO1	-	-	-	-	1	-	-	-	1	-	-	-	-
CO2	-	-	3	-	1	-	-	-	1	-	-	-	-
CO3	-	3	-	-	-	-	-	-	1	1	-	-	-
CO4	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	2	2	-	2	-	-	-	2	-	1	-	-	-
CO6	-	1	-	3	-	-	-	3	-	-	2	-	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator

Sign & Seal of HoD



Integral University, Lucknow

Effective from Session: 2012-13							
Course Code	DWS-551	Title of the Course	Mechanical Workshop	L	T	P	C
Year	III	Semester	V	0	0	3	-
Pre-Requisite	10 th	Co-requisite	---				
Course Objectives	To understand and compare the shaping/machining/treatment of various materials by different processes. To impart the knowledge of machines and tools used in different mechanical Processes.						

Course Outcomes	
CO1	To acquire skills in basic engineering practice.
CO2	To identify the hand tools and instruments.
CO3	To acquire measuring skills.
CO4	To acquire practical skills in the trades
CO5	To provides knowledge of job materials in various shops.

Exp No.	Title of the Experiment	Content of the Experiment(Any Ten)	Contact Hrs.	MappedCO
1.	Making utility jobs on lathe involving	Step turning, Parallel Turning, Taper turning and Knurling	3	1
2.		Drilling, Boring, Counter boring and Internal taper turning under cutting, Chamfering & Facing.	3	5
3.		V. thread cutting (Internal and External)	3	1
4.		Square thread Cutting (internal and external)	3	1
5.	Making utility jobs on	Planer - Planing of C.I Block & finish it on surface grinder to given specification	3	2
6.		Shaper - 'V' Block of different size	3	2
7.	Group work on milling machine involving down and climb Milling	Slab Milling	3	1
8.		Groove Cutting (Dovetail, Square, T-slot and Radius)	3	5
9.	Fitting shop	To make different types of keys.	3	2
10.		Making male and female fitting jobs.	3	2

References Books:

Workshop Technology: R S Khurmi and J K Gupta

e-Learning Source:

<https://www.vlab.co.in/>

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	-	-	1	-	2	-	-	-	-	-	-	-	1	1	-	1	-
CO2	1	-	-	1	-	2	-	-	-	-	-	-	-	2	1	-	2	-
CO3	1	-	-	1	-	2	-	-	-	-	-	-	-	1	1	-	2	-
CO4	1	-	-	1	-	2	-	-	-	-	-	-	-	1	1	-	1	-
CO5	2	-	-	3	-	-	-	-	-	-	-	-	-	2	1	-	1	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session: 2025-26

Course Code	DME-554	Title of the Course	COMPUTER AIDED DESIGN LAB	L	T	P	C
Year	III	Semester	V	0	0	2	-
Pre-Requisite	10 th	Co-requisite	--				
Course Objectives	Creating 2D and 3D models Understanding CAD concepts Creating engineering drawings Understanding 3D modeling concepts Understanding CAM concepts						

Course Outcomes

CO1	Students learn how to create 2D drawings and 3D models of products using CAD software.
CO2	Students learn the basics of CAD software, such as AutoCAD, SolidWorks, and Fusion 360
CO3	Students learn how to create engineering drawings using part and assembly models
CO4	Students learn about wireframe, surface, and solid modeling.
CO5	Students learn how CAM systems can be used to monitor and regulate production.

No.	Title of the Unit		Contact Hrs.	Mapped CO
1	EXPERIMENT-01	Development of simple graphic package using 2-D and 3-D transformation and algorithms for generation of lines and circles (programming using C)	2	3
2	EXPERIMENT-02	Development of wire frame models of simple 3-D objects like box , cylinder, cone, pyramids, prisms and sphere (programming using C).	2	5
3	EXPERIMENT-03	FEM Mesh generation	2	4
4	EXPERIMENT-04	Stress analysis / heat conduction analysis using standard FEM package.	2	3
5	EXPERIMENT-05	Stress analysis of cantilever using U.D.L.	2	2
6	EXPERIMENT-06	Stress analysis of simply supported beam using point load.	2	3
7	EXPERIMENT-07	Benching of circular plate and analysis of stress and strain	2	1
8	EXPERIMENT-08	Heat conduction analysis using circular bar	2	4
9	EXPERIMENT-09	Design and analysis of crank shaft.	2	1

References Books:

CAD/CAM/CIM by R. Radhakrishnan, S. Subramanain, New Age International Ltd.

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CAD/CAM by Mikell P. Groover, Emory Zimmens, Jr. Prentice Hall of India

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e-Learning Source:

<https://www.youtube.com/watch?v=3qEK7Lmk2TI>

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PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	1	1	1	2	3	1	1	2
CO2	1	2	2	1	1	1	2	3	1	1	2
CO3	1	1	1	1	1	2	1	1	1	1	1
CO4	1	1	1	2	2	1	2	1	2	2	1
CO5	1	1	2	2	2	2	1	2	2	2	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
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Integral University, Lucknow

Effective from Session: 2012-13							
Course Code	DAE-555	Title of the Course	REFRIGERATION AND AIR CONDITIONING LAB	L	T	P	C
Year	III	Semester	V	0	0	2	
Pre-Requisite	10 th	Co-requisite	-				
Course Objectives	Understand the basic processes of air conditioning, including psychometric charts and cooling load calculations						

Course Outcomes	
CO1	The fundamental principles and applications of refrigeration and air conditioning system.
CO2	Obtain cooling capacity and coefficient of performance by conducting test on vapor compression refrigeration systems.
CO3	Present the properties, applications and environmental issues of different refrigerants
CO4	Operate and analyze the refrigeration and air conditioning systems

No.	Experiment no	Experiment	Contact Hrs.	MappedCO
1	Experiment no-1	Experiment on the refrigeration test-rig and calculation of various performance parameters.	2	1
2	Experiment no-2	To study different types of expansion devices used in a refrigeration system	2	2
3	Experiment no-3	To study different types of evaporators used in a refrigeration system	2	3
4	Experiment no-4	To study basic components of an air conditioning system.	2	4
5	Experiment no-5	Experiment on air conditioning test-rig and calculation of various performance parameters	2	5
6	Experiment no-6	To study air washers.	2	1
7	Experiment no-7	Study and determination of volumetric efficiency of a compressor	2	2
8	Experiment no-8	Visit of a central air conditioning plant	2	3
9	Experiment no-9	Visit of a cold storage plant	2	4
10	Experiment no-10	Study of a window air conditioner	2	5

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO											
CO1	3		2			3		2		1	
CO2		3	3				2	3			
CO3		3	2	3			2		3	3	
CO4	2	1					2				
CO5	3	1	2	2					3		

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
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