Integral University, Lucknow

Effective from Session: 2012-13							
Course Code	DAE-601	**Title of the Course**	DYNAMICS OF MACHINE	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**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	Static and dynamic force analysis and construct turning moment diagram and flywheel analysis
CO2	Study the principle of working of different types of governors.
CO3	To study the unbalance and calculate balancing mass and its position.
CO4	To study the balancing of different types of machines
CO5	Identify different types of vibration, their causes and remedies

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	**DYNAMICS OF MACHINES**	Static and dynamic force analysis, Graphical and analytical approaches, Engine mechanisms, Turning moment diagram, Flywheel analysis, Gyroscopic action in machines.	6	CO1
2	**GOVERNORS**	Types and classification, Principle of working of gravity controlled and spring controlled governors, Stability, Isochronisms, Sensitivity and capacity.	7	CO2
3	**UNBALANCE IN MACHINES**	Origin of unbalanced forces and moments and effects of unbalance, Unbalance in rotating bodies and balancing of discs and rotors, Balancing machines, Field balancing ofdiscs and rotors, Unbalance in reciprocating machines -engine, Compressor, Presses	6	CO3
4	**ENGINES AND BALANCING**	Unbalance force and moment in a single cylinder engine and balancing, Multi cylinder engine balancing in Line engine, V and Radial engines, Lanchestor balancing techniques.	6	CO4
5	**VIBRATIONS**	Vibration of single degree of freedom, Systems, Free forced, Damped and undamped vibration, Frequency response and resonance, Bare excitation - Transmissibility and Isolation, Free vibration 2 DOF system - Concept of normal mode, vibration absorber, Multi degree of freedom systems, Free vibration of bars, Shafts and beams, Energy methods and approximate methods.	8	CO5

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=p075LPq3Eas&list=PL46AAEDA6ABAFCA78

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

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	DAE-603	**Title of the Course**	AUTOMOBILE ENGINE	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**3**	**1**	**0**	**-**
Pre-Requisite	10^{th}	**Co-requisite**	-				
Course Objectives	The course provides a comprehensive understanding of automotive engines and their systems. It begins with the classification and layout of automobiles, covering front, rear, and four-wheel drive vehicles, along with power unit selection based on torque and power requirements. The construction and components of I.C. engines, including multi-cylinder engines, valve mechanisms, and combustion chambers, are explored. It delves into fuel supply and ignition systems for petrol and diesel engines, carburetors, fuel injection, and alternative fuels like CNG. The course also covers engine cooling and lubrication systems, emphasizing their necessity, types, and components, ensuring thorough technical knowledge.						

Course Outcomes	
CO1	Illustrate the types and working of clutch and transmission system.
CO2	Demonstrate the working of different types of steering gears and braking systems.
CO3	Illustrate the constructional features of wheels, tyres and suspension systems.
CO4	Demonstrate the understanding of types of storage, charging and starting systems.
CO5	Identify the type of body and chassis of an automobile.

UnitNo.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT-I	GENERAL CHOICE OF POWER UNIT FOR AN AUTOMOBILE: GENERAL CONCEPT OF AUTOMOBILES:	**GENERAL CONCEPT OF AUTOMOBILES:** Their classification name and make of some India made automobiles. Layout of chassis. Meaning of the terms : Front wheel drive, Rear wheel drive, Four wheel drive, Front and Rear wheeled vehicles. Basic requirements of an automobile. Study of specifications of different engines used in Indian vehicles. **CHOICE OF POWER UNIT FOR AN AUTOMOBILE:** Torque and power requirements of an automobile in various conditions. Torque characteristics of some power units such as Gas turbine, Electric motor and I.C. engine; their suitability to automobile needs. Drawback of I.C. engine to meet these needs. Measures taken to make it suitable to these needs.	8	CO1
UNIT-II	I.C. ENGINE:	**I.C. ENGINE:** Multicylinder 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). Advantage of multi-cylinder engine for automobiles use, Firing order, Arrangement of cylinders. Valve positions and design of combustion chamber cylinder head and gasket. Wankle rotary engine. Idea of super charging, its advantages phenomenon of knocking or detonation, its cause and effect on engine. Octane number and cetane number.	9	CO2
UNIT-III	FUEL SUPPLY AND IGNITION SYSTEM:	**PETROL ENGINE:** Fuel supply circuit components (fuel tank to engine), their function. Exhaust pipe and silencer. Construction and working of mechanical and electrical fuel pumps, carburettor, its function. Simple carburettor, its limitations. Modified carburettor-Zenith, Carter, Solex and S.U. carburettors, their construction and working. Carburettor Controls-Throttle, Choke (Conventional, Automatic). 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. Distributor types of diesel Injection pump. Turbulence in filters wet and dry types. Inlet and exhaust manifolds arrangement. Exhaust pipe and silencer. Concept of fuel energy saving. **MULTI POINT FUEL SUPPLY FOR PETROL ENGINE :** Construction, Fuel Supply system and working. Introduction to other fuels - CNG, Battery, etc.	9	CO3
UNIT-IV	COOLING SYSTEM:	Necessity for cooling the engine Air cooling Shapes of cooling fins. Field of application for air cooling. Water Cooling- Thermo syphon system, Pump circulated water cooling system. Details of water cooling system-Water jackets, Hose, radiators and fans. Thermostat, Water pump and pressure type radiator cap, Anti-freeze and anti-corrosive additives. Engine cooling liquids other than water and their characteristics.	7	CO4

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UNIT-V	LUBRICATION SYSTEM OF AUTOMOBILE ENGINES:	Principle of lubrication on multi-cylinder petrol/diesel engine. Types of lubrication systems-Splash type, Pressure type and Combined. Types of lubrication pumps, pump drive, Relief valves, Oil pressure, Oil filters and their location in lubrication system, Crank case ventilation, Crank case dilution.	7	CO5

References Books:

Automobile Engine: G.B.S Narang.

Automobile Engine: R.K. Rajput

e-Learning Source:

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**

Integral University, Lucknow

Effective from Session: 2012-13							
Course Code	DAE-604	**Title of the Course**	AUTOMOBILE TECHNOLOGY	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**3**	**1**	**0**	**…**
Pre-Requisite	10th	**Co-requisite**	…				
Course Objectives	The Automobile Technology course equips students with comprehensive knowledge of modern automotive systems, focusing on their construction, operation, and maintenance. It covers essential topics such as transmission systems, including clutches, gearboxes, propeller shafts, and final drives, and explains the principles of steering, braking, and suspension systems used in vehicles. Students gain insights into automotive electrical systems, including storage batteries, alternators, dynamos, and engine-starting circuits. The course explores automobile wiring, lighting systems, and instruments like gauges, wipers, and indicators. Additionally, it introduces vehicle air-conditioning systems, their components, and operational fundamentals. This course emphasizes the application of these technologies in Indian vehicles, preparing students to excel in the automotive industry.						

Course Outcomes	
CO1	List different types of Engine and their classifications. Judge firing order for multi-cylinder engines for igniting of fuels
CO2	Develop concept and define working of Automobile Engine cooling and Lubrication system.
CO3	Describe functioning of Transmission train, conventional and non-conventional drives, Clutches, Gear boxes, Synchromesh device, Propeller shaft, Differential axle, Braking system and Suspension systems.
CO4	Calculate fuel air ratio in Carburetor and describe working of different types of fuel injection and fuel ignition systems for modern gasoline and diesel engine.
CO5	Describe functioning of steering system, steering geometry wheel alignment and wheel angles for modern Automobile.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT-I	**Auto Transmission System**	CLUTCH: Function of clutch in an auto mobile, Construction detail of single plate and multi plate friction clutches, Centrifugal and semi-centrifugal clutch. Construction and working of fluid flywheel. GEAR BOX: Its function, Assembly detail and working of sliding Mesh, constant mesh, Synchromesh and epicyclic gear boxes. Simple concept of over drive, overrunning clutch, transfer case and torque converter. PROPELLER SHAFT: Its function, Universal joint and slip joint, Hotchkiss drive and Torque tube drive. FINAL DRIVES: Concept of tail pinion, Crown wheel, Differential type rear axle. WHEELS AND TYRES: Sizes of tyres used in Indian vehicles, over inflation, under inflation and their effect. Causes of tyre wear, Tyre retarding, idea of Toe in, Toe out, Camber, Caster, King pin inclination. Advantages of tube less tyres over tyres with tubes. Wheel alignment and balancing, Tyre rotation, Difference between radial and cross ply.	08	CO1
UNIT-II	**Steering, Braking And Suspension System**	Its function, Principle of steering. Ackerman and Devis steering gears, Steering gear types, Worm and nut, Worm and wheel, Worm and roller, Rack and pinion type. Concept of steering system commonly used in Indian Vehicles. Concept of steering locking assembly, introduction to power steering. Construction details and working of mechanical, Hydraulic and Vacuum brakes, disc brake, air brake, Introduction to power brake. Details of master cylinder, Wheel cylinders, Concept of brake drum and brake linings and brake adjustment. Function of suspension system. Types of suspension systems, Working of leaf springs, Coil springs. Shock absorbers, Torsion bar suspension and stabilisers. Mac-Phersion system.	08	CO2
UNIT-III	**Electrical System**	**STORAGE BATTERY:** Storage Battery constructional detail of lead acid cell battery. Specific gravity preparation of electrolyte, effect of temperature, Charging and discharging on specific gravity of electrolyte. Capacity and efficiency of battery. Battery charging from D.C. mains, A.C. mains, Battery charger-Charging circuit, care and maintenance of batteries. Checking of cells for voltage and specific gravity of electrolyte. **DYNAMO AND ALTERNATORS:** Introduction to Dynamo and its details, Regulators-Voltage, current and compensated types. Cutout Construction working and their adjustment. Alternators-Construction and working, charging of battery from alternator. Use of battery, dynamo/alternator in an automobile. **ENGINE STARTING**: Engine starting circuit, Drive motor and its characteristics, Conditions of starting and behaviour of motor at starting. Starter Drive-Bendix pinion, Torsion, compression, Clutch and sliding armature type. Starter Switch-Manual, over running, solenoid and vacuum switches. Turbo charging and inter-cooling.	08	CO3
UNIT-IV	**Automobile Wiring & Lighting System:**	Earth return and insulated return systems-6 volts, 12 volts and 24 volts systems, Positive and negative earthing,Fuse in circuit, Automobile cables-Specifications and colour code. Diagram of typical wiring systems. Principle of auto illumination, Lighting requirement-Head lamp mounting and construction, sealed beam lamp, Assymetrical head lights, dip and full beam type bulb, auxillary type lights. Polarised head light, Flesher unit, Warning lights and panel lights. Fore head lamp systems. Other lamps-Pass lamps, Fog lamp, reversing lamps.	08	CO4

		Switching of lamps. Parking brake, Direction indicators. Electric horns, Revolution counter, Speedometer, Fuel gauge, Pressure gauge, Temperature gauge, Wind screen wipers, stereo system and speaker, introduction to remote sensing devices. Microprocessor control of automobile.		
UNIT-V	**Vehicle Air-conditioning And Study Of Specification For Different Units**	Meaning of air-conditioning and its applications, brief idea of various type heat loads in vehicles, concepts of room air conditioner, fundamental of comfort air conditioning and its conditions, brief idea of air-conditioning cycle and its layout, fundamental and working of compressor magnet clutch, condenser, evaporator, expansion valve, thermo switch, three way solenoid valve, check valve, fan assembly and air-conditioners relay, H.V.A.C. Clutch, Gear Box, Propeller Shaft, Final Drive, Wheel and tyre manufactured in India	08	CO5

References Books:

Automobile Technology by Dr. K. M. Gupta

Automobile Technology by Dr. K. M. Moeed

e-Learning Source:

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

https://onlinecourses.nptel.ac.in/noc21_de02/preview

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

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	DAE-605	**Title of the Course**	AUTOMOBILE MAINTENANCE, SERVICE & REPAIRING	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**3**	**1**	**0**	**-**
Pre-Requisite	10^{th}	**Co-requisite**	…				
Course Objectives	The course focuses on developing skills for effective vehicle upkeep and repair. It covers routine maintenance schedules, troubleshooting, engine overhauling, and tuning for petrol and diesel engines. Students learn to repair key components like cylinders, valves, and crankshafts, maintain radiators and lubrication systems, and service chassis, brakes, and electrical systems. Emphasis is placed on using specialized tools for precision repairs and addressing automobile pollution through control measures and compliance. The course also includes training in air conditioning system maintenance, ensuring a comprehensive understanding of modern vehicle service and repair techniques.						

Course Outcomes	
CO1	Elementary idea of maintenance techniques and maintenance schedule of different automobiles
CO2	Students will be able to prepare PDI sheets and certificate
CO3	Students will be able to answer questions related to periodic as well as breakdown maintenance of the automobiles
CO4	Elementary knowledge of tools used in maintenance of the automobiles
CO5	Basic idea of automobile pollution control
CO1	Elementary idea of maintenance techniques and maintenance schedule of different automobiles

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT-I	**Engine Maintenance & Repairing**	Maintenance, Maintenance schedule, Routine Maintenance schedule for petrol engine and diesel engine, lubricating chart, cleaning and adjustment, preventive maintenance, trouble shooting for faults in engines. Overhauling of engines, Adjusting the engine timing, Maintenance and adjustment of carburettor and fuel injection pump. Checking the valve clearance and adjustment, valve grinding and lapping, engine tuning, detection and rectification of faults using compression gauge and vaccum gauge, general methods of predelivery inspection of vehicle.	08	CO1
UNIT-II	**Automobile Repairing**	**REPAIRING PROCESSES:** Cylinder reboring and re-sleeving, Removal of liners and fitting, inspection; Repair and fitting of valve and valve guides, checking the connecting rod for bending and connecting rod alignment, inspection of crank shaft for ovality and regrinding, Phasing and calibration of fuel injection pump, nozzle testing, cleaning and grinding. **REPAIR AND MAINTENANCE OF RADITOR AND LUBRICATING SYSTEM:** Radiator repair and maintenance, Maintenance of lubricating system, Flushing the lubricating system, Change of used lubricating oils, clearing and fitting of oil filter lubrication of water pump, grades of oils, multi grade oil, additives for improving the quality of oil.	08	CO2
UNIT-III	**Automobile Chassis And Electrical Systems**	**CHASIS REPAIR AND MAINTENANCE:** Grease and greasing points requiring greasing, specifications of greases to be used for different parts, repair of tyres and tubes, greasing of wheel bearing, rotating schedule for front and rear tyres, bleeding of brakes, pedal play adjustment in clutch and brakes, adjustment, change of brake lining, testing of brakes, disassembly greasing and recambering of leaf spring. **ELECTRICAL SYSTEM REPAIR AND MAINTENANCE:** Starter trouble, shooting and suggesting remedies, removal of starter from engine, repairing the starter, bushes and bushes replacement, checking of armature for short circuit, cleaning of commentators, checking, repairing of starter drive reassembly and testing of starter, dynamo, lubricating the dynamo, changing the bushes, checking and turning the electrical horn	08	CO3
UNIT-IV	**Electrical Systems**	**ACCESSORIES OF ELECTRICAL SYSTEM AND THEIR SERVICE :** Wind screen, wiper, electrical horn and relay, cigarette lighter, growler, spark plug cleaner and tester, electrical test bench. **TOOLS AND EQUIPMENTS:** Cylinder reboring machine, surface grinder, arbor press, valve seat cutter and grinder, valve refacer crank shaft grinder, engine tune up instruments, feeler gauge, Timing light (Neon light), Tachometer, Spark Plug cleaner micrometer, vernier callipers, cylinder gauge, dial gauge, hydraulic hoist specification and working, car washer specification and working, air compressor specification and utility, screw jack, bearing puller, fuel pump testing and calibration machine, nozzle testing machine, grease guns.	08	CO4
UNIT-V	**Automobile Pollution Control And Air-Conditioning**	**AUTOMOBILE POLLUTION & CONTROL:** Source and control of automobile air pollution, causes of automobile pollution and their remedies monitoring and analysis of auto exhaust emission, legislative action, judicial response. Introduction to energy conservation. **REPAIR AND MAINTENANCE OF VEHICLE AIR CONDITIONING SYSTEM :**Testing and Charging of Air Conditioner, care & maintenance electrical components, noise level system, fresh air allowance, primary & secondary circuit, heat exchanger,	08	CO5

		cooling & dehumidifying coil. Care & servicing-Air control unit, temperature control unit, magnet clutch, condenser, fan assembly, Evaporator, relays, expansion valve, filters and three way solenoid valve. Checking of harness of air conditioning.		

References Books:

Automobile Maintenance, Service and Repair (Bluerose Publisher): Er. Mohd Saad Saleem

e-Learning Source:

https://www.youtube.com/watch?v=-n5uu9jALPg&list=PLY8pCdWSlXrQU16hnWuk3vmTcre8mwcG3&index=24

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

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

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	DAE-607	**Title of the Course**	METROLOGY & QUALITY CONTROL	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**3**	**1**	**0**	**-**
Pre-Requisite	10th	**Co-requisite**	…				
Course Objectives	Use hydraulic and pneumatic equipment. Use various instruments to measure heat/air related parameters.						

Course Outcomes	
CO1	It provides a basis for understanding how structure property. Processing relationships are developed and used for different types of materials.
CO2	It provides a basis for testing of metal alloys.
CO3	It illustrates how to improve properties of metals.
CO4	It provides properties , characteristics and use of miscellaneous materials.
CO5	It provides a basis for understanding how structure /property/ processing relationships are developed and used for different types of materials.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	INTRODUCTION TO METROLOGY	Metrology Basis: Definition of metrology, objectives, categories, scientific metrology, Industrial metrology, legal metrology, need of inspection, precision, accuracy, sensitivity, readability, calibration, traceability, reproducibility, sources of errors. Linear and Angular Measurements: Definition of standards, line & end standards, end and length bars, wave length standards. Instruments used for angular measurements: (a) Vernier and optical Bevel Protractor. (b) Sine bars angle gauges, clinometers, Auto collimator.	8	CO-1
2	SURFACE FINISH MACHINE TOOL TESTING	Meaning of surface texture, surface roughness, methods of measuring surface finish, stylus probe instruments, tomlinson surface meter, root mean square value, center line average value, symbols for designating the surface roughness on drawings. Parallelism, straightness, squareness, co-axiallity, roundness, alignment testing of machine tools such as lathe machine, milling machine & drilling machine. Study of optical flat for flatness testing	8	CO-2
3	LIMITS, FITS, TRANSDUCERS, COMPARATORS	Concept of limits, fits and tolerances, interchangeability, hole & shaft basis system, Taylor principle. Transducers: classification of transducers, active & passive, resistive, inductive ,capacitive ,piezo resistive, thermo-resistive. Comparators: classification of comparators, use & working principle of comparators, dial indicator, sigma comparator, pneumatic comparator-high pressure differential type, electrical (LVDT) advantages & disadvantages	9	CO-2
4	TEMPERATURE MEASUREMENT MEASUREMENT OF VIBRATIONS	Non electrical methods- Bimetallic, liquid in glass and pressure thermometer . Electrical methods- Platinum resistance thermometer, thermistor, RTD. Pyrometers- radiation & optical.Seismic Accelerometer, Potentiometric type, L.V.D.T. Type, Piezoelectric type accelerometer.	6	CO-3
5	QUALITY CONTROL	Quality: Definitions, meaning of quality of produce & services, Quality characteristics, Quality of design, Quality of conformance, Quality of performance, Concept of reliability, cost, Quality assurance, Cost of network & repair, Quality & Inspection, Inspection stages. Total Quality Management: Principles & concept of total quality management. (a) Quality Audit: Concept of audit practices, lead assessor certification. (b) Six sigma: statistical meaning, methodology of system improvement. (c) Introduction of ISO 9001-2008.ISO-14000 & TS 16949. Statistical Quality Control: Basics of Statistical concepts, Meaning & importance of SQC, Variable & attribute Measurement. Control charts-inherent & assignable sources of variation, control charts for variables-X & R charts, control charts for attributes, p, np, C charts, process capability of machines, Cp & Cpk calculations, determination of statistical limits, different possibilities, Rejection area, statistically capable & incapable processes.	9	CO-4

References Books:

D. S. Kumar: Mechanical Measurement & Control Publication:- Metropolitan, New Delhi

R. K. Jain: Mechanical & industrial Measurements Khanna Publication, New Delhi

S. K. Singh Industrial Instrumentation & Control: - Tata McGraw Hill

R.K. Rajput Mechanical Measurement & Instrumentation: - KATSON Publication

e-Learning Source:

https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/TEKNOLOGI%20REKAYASA%20MATERIAL%20PERTAHANAN/Materials%20Science%20and%20Engineering%20An%20Introduction%20by%20William%20D.%20Callister,%20Jr.,%20David%20G.%20Rethwish%20(z-lib.org).pdf

https://home.iitk.ac.in/~anandh/E-book.htm

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

Integral University, Lucknow

CO2	1	2	2	1	1	1	2	3	1	1	2
CO3	1	1	1	1	2	1	2	3	2	3	2
CO4	1	2	2	1	1	2	2	3	1	1	2
CO5	1	2	2	1	2	1	2	3	1	1	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	DEV-601	**Title of the Course**	ENVIRONMENTAL EDUCATION AND DISASTER MANAGEMENT	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**3**	**1**	**0**	
Pre-Requisite	10^{th}	**Co-requisite**	…				
Course Objectives	1.The course objective is to provide a comprehensive understanding of ecology, environmental impacts of human activities such as urbanization and industrialization, pollution control, waste management, and the legal framework governing environmental protection. Additionally, it introduces disaster management, environmental impact assessment (EIA), and strategies for mitigation and prevention, emphasizing sustainable development and environmental preservation.						

Course Outcomes	
CO1	Understand the natural environment and its relationships with human activities.
CO2	Characterize and analyze human impacts on the environment.
CO3	Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
CO4	Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels.
CO5	Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.

UnitNo.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT-I	**Ecology & Ecosystem**	Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects. Lowering of water level, Urbanization. Biodegradation and Biodegradability, composting, bioremediation, Microbes. Use of biopesticides and bio fungicides. Global warning concerns Ozone layer depletion, Greenh ouse effect, Acid rain etc. Sources of pollution, natural and man-made, their effects on living environments and related legislation.	8	CO-1
UNIT-II	**Water & Noise Pollution**	Factors contributing to water pollution and their effect. Domestic wastewater and industrial wastewater. Heavy metals, microbes and leaching metal. Physical, Chemical and Biological Characteristics of Wastewater. Indian Standards for quality of drinking water. Indian Standards for quality of treated wastewater. Treatment methods of effluent (domestic wastewater and industrial/ mining wastewater), its reuse/safe disposal Sources of noise pollution, its effect and control.	8	CO-2
UNIT-III	**Air Pollution & Radioactive Pollution**	Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment. Monitoring and controlling air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e. Settling chambers Cyclones Scrubbers (Dry and Wet) Multi Clones Electrostatic Precipitations Bog Fillers. Ambient air quality measurement and their standards. Process and domestic emission control Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV. Sources and its effect on human, animal, plant and material, means to control and preventive measures.	8	CO-3
UNIT-IV	**Solid Waste Management & Legislations**	Municipal solid waste, Biomedical waste, Industrial and Hazardous waste, Plastic waste and its management. Preliminary knowledge of the following Acts and rules made there under- The Water (Prevention and Control of Pollution) Act - 1974. The Air (Prevention and Control of Pollution) Act - 1981. The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act - 1986 Viz. The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000. The Hazardous Wastes (Management and Handling) Amendment Rules, 2003. Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003. Noise Pollution (Regulation and Control) (Amendment) Rules, 2002. Municipal Solid Wastes (Management and Handling) Rules, 2000. The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.	8	CO-4
UNIT-V	**Environmental Impact Assessment (EIA) & Disaster Management**	Basic concepts, objective and methodology of EIA. Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction). Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Framework, Disaster mitigation and prevention, Legal Policy Framework, Early warning system, Human Resource Development and Function, Information dissemination and communication.	8	CO-5

References Books:

1. "Environmental Education and Disaster Management" – Dr. Sameer Rastogi, Dr. Praveen Kumar Gaur, Ms. Nidhi Srivastava.

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e-Learning Source:
1. https://www.youtube.com/watch?v=k_sYIs8C-IQ&t=10s&pp=ygUURWNvbG9neSBhbmQgRWNvc3R5ZW0%3D
2. https://www.youtube.com/watch?v=76snt7DG57U&pp=ygUXV2F0ZXIgYW5kIGFpciBwb2xsdXRpb24%3D
3. https://www.youtube.com/watch?v=t6wKiSyhmtE&list=PLfYetoC-zFdCM1v0OvvqcQJsmcuKLmRET

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3								2						2					1
CO2	3								2							2				
CO3	3								2							2				
CO4	3								1									2		
CO5	3								2									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	DAE-652	**Title of the Course**	METROLOGY LAB	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**3**	**1**	**0**	**-**
Pre-Requisite	10th	**Co-requisite**	…				
Course Objectives	Use hydraulic and pneumatic equipment. Use various instruments to measure heat/air related parameters.						

Course Outcomes	
CO1	It provides a basis for understanding how structure property. processing relationships are developed and used for different types of materials.
CO2	It provides a basis for testing of metal alloys.
CO3	It illustrates how to improve properties of metals.
CO4	It provides properties , characteristics and use of miscellaneous materials.
CO5	It provides a basis for understanding how structure /property/ processing relationships are developed and used for different types of materials.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	EXPERIMENT NO-01	Measurement of angle with the help of sine bar/ vernier Bevel protractor	2	CO-1
2	EXPERIMENT NO-02	Study and sketch of various types of optical projectors.	2	CO-2
3	EXPERIMENT NO-03	Use of comparators for measurement	2	CO-2
4	EXPERIMENT NO-04	To measure the diameter of a hole with the help of precision balls.	2	CO-3
5	EXPERIMENT NO-05	To measure the diameter of a hole with the help of precision balls.	2	CO-4
6	EXPERIMENT NO-06	To test the squareness of a component with autocollimeter.	2	CO-4
7	EXPERIMENT NO-07	To measure the pitch, angle and form of thread of a screw	2	CO-4
8	EXPERIMENT NO-08	Measurement of gear elements by using gear tooth vernier.	2	CO-4
9	EXPERIMENT NO-09	To measure the straightness of the edge of a component with the help of auto collimeter	2	CO-4
10	EXPERIMENT NO-010	Use of linear measuring instrument such as vernier caliper and micrometer.	2	CO-4
11	EXPERIMENT NO-011	Use of height gauge and vernier calipers.	2	CO-4

References Books:

D. S. Kumar: Mechanical Measurement & Control Publication:- Metropolitan, New Delhi

R. K. Jain: Mechanical & industrial Measurements Khanna Publication, New Delhi

e-Learning Source:

https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/TEKNOLOGI%20REKAYASA%20MATERIAL%20PERTAHANAN/Materials%20Science%20and%20Engineering%20An%20Introduction%20by%20William%20D.%20Callister,%20Jr.,%20David%20G.%20Rethwish%20(z-lib.org).pdf

https://home.iitk.ac.in/~anandh/E-book.htm

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	2	1	2	3	2	3	2
CO4	1	2	2	1	1	2	2	3	1	1	2
CO5	1	2	2	1	2	1	2	3	1	1	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	DAE-653	**Title of the Course**	AUTOMOBILE ENGINE LAB	**L**	**T**	**P**	**C**
Year	III	**Semester**	V	0	0	2	-
Pre-Requisite	10^{th}	**Co-requisite**	None				
Course Objectives	This is a discipline which finds many applications in our daily life.						

Course Outcomes	
CO1	Learn basics of automobiles.
CO2	Students learn how electrical components of an automobile works.
CO3	Students learn how accessories of an automobile works.
CO4	Learn basics of using stroboscope and tachometer.
CO5	Students learn about fault finding and wheel alignment.

Experiment no	Experiment	Contact Hrs.	Mapped CO
Experiment no-1	Study and Sketch of Battery Ignition System and Magnetic Ignition System.	2	CO1
Experiment no-2	Study and sketch of Head Light Model and Wiper and Indicator.	2	CO2
Experiment no-3	Study and sketch of Radiator, Water Pump , Oil Pump and Shock absorber.	2	CO3
Experiment no-4	Study and sketch of A.C.Pump ,S.V. Pump ,Master Cylinder.	2	CO4
Experiment no-5	Study and Sketch Of: Rear axle, Differential Steering System, Bendix Drive.	2	CO5
Experiment no-6	Checking and setting of ignition on timing using timing light advance and retard.	2	CO1
Experiment no-7	Charging of Automobile battery and measuring cell voltage and specific gravity of electrolyte.	2	CO2
Experiment no-8	Determination on of gear ratio of an auto engine tachometer/stroboscope.	2	CO3
Experiment no-9	Cleaning and adjustment a carburetor.	2	CO4
Experiment no-10	Changing of wheels and checking the alignment of wheels.	2	CO5

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