# Integral University, Lucknow

| Effective from Session: 2025-26 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | DME-601 | **Title of the Course** | DYNAMICS OF MACHINES | **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** | **1** |
| **2** | **Governors** | Types and classification, Principle of working of gravity controlled and spring-controlled governors, Stability, Isochronisms, Sensitivity and capacity. | **7** | **2** |
| **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 of discs and rotors, Unbalance in reciprocating machines -engine, Compressor, Presses | **6** | **3** |
| **4** | **Engines and balancing** | Unbalanced force and moment in a single cylinder engine and balancing, Multi cylinder engine balancing in Line engine, V and Radial engines, Lanchester balancing techniques. | **6** | **4** |
| **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** | **5** |

**References Books:**


1. Theory of Machines : R.S. Khurmi
2. Theory of Machines: 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**

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

# Integral University, Lucknow

| Effective from Session: 2025-26 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | DME-604 | **Title of the Course** | INDUSTRIAL ENGINEERING AND SAFETY | **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** | To study about Knowledge and skill required for effective utilization of available resources in an industry. |
| **CO2** | To study the need, importance and functions the production, planning and control in the industries. |
| **CO3** | To make students about plant layout and various national and international codes and certifications. |
| **CO4** | To study the control charts for variables and attributes. |
| **CO5** | To make students aware of industrial safety requirement, causes of accidents and preventive steps. |

| Unit No. | Title of the Unit | | Contact Hrs. | Mapped CO |
|---|---|---|---|---|
| **1** | **Inspection and work study** | Inspection, Need and its planning, objective. Types of inspection. Inspection standards. Duties of inspector in inspection. Inspection needs. Method Study-Process chart, Flow process chart, Flow diagram, Man and Machine chart, Gang process Chart. Work Measurement-Time study, Tools used in time study, Performance rating, Allowance and use of time standard, Time and Motion study. Principle of human motion economy, Micro motion study, Memo motion study, Therbligs, left hand and right hand chart. | **8** | **1** |
| **2** | **Production, planning and control, material handling and material handling equipment** | Methods of production-Unit, Batch, mass. Sales forecasting and its use. Planning-Products, process parts, materials, Optimum Batch quantity for production and Inventory, Theory and Analysis of M/C capacity, Batch quantity, Loading and Balancing-Scheduling M/C loading. Preplanning activities, Routing, Dispatching, Follow up activities Factors in material handling problems, Cost reduction through improved material handling, Reduction in time of material handling, Material handling equipment – Lifting lowering devices, Transporting devices, Combination devices, Maintenance of material handling equipment. | **8** | **2** |
| **3** | **Plant layout, standard and code** | General plant location factors, Influence of location on plant layout, selection of plant site, Product layout, Process layout. Advantages and disadvantage of process Layout. National and International code, value of standardization. Standardization programme, Role of Standardization department, standardization techniques and problems.ISO-9000 - Concept and its evolution and implications | **8** | **3** |
| **4** | **Quality control and cost estimation** | Concept of quality control, Quality assurance elements of quality control, Statistical quality control, Acceptance sampling, control chart for variable and attributes, Uses of X, R, "P" and "C" chart - O.C. curve, Concept of Total Quality Management Introduction and function of cost estimation, estimation procedure, elements of cost, depreciation - methods of calculating depreciation, overhead expenses, distribution of over head expenses, calculation of cost for machining and metal forming process and break even analyzer. | **8** | **4** |
| **5** | **Value engineering, accidents and safety** | Concept of value engineering and technique Classification of accidents, causes of accidents, Effects of accidents, Action to be taken in case different types of accidents, Safety - needs, consciousness, procedures, measures. General safety devices used on machines, Safe working condition and productivity | **8** | **5** |

**References Books:**

1.Industrial Engineering And Management by O.P Khanna

2. Industrial Engineering And Production Management by M . Mahajan

**e-Learning Source:**

https://archive.nptel.ac.in/courses/112/107/112107292/

| 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 |

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

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

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| Effective from Session: 2025-26 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | DME-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** | **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** | **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** | **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** | **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** | **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 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **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**

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| **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 |
|---|---|---|---|---|
| **1** | **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.<br><br>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.<br><br>PROPELLER SHAFT: Its function, Universal joint and slip joint, Hotchkiss drive and Torque tube drive.<br><br>FINAL DRIVES: Concept of tail pinion, Crown wheel, Differential type rear axle.<br><br>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. | **8** | **1** |
| **2** | **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. | **8** | **2** |
| **3** | **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.<br>**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.<br>**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. | **8** | **3** |
| **4** | **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. | **8** | **4** |

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| | | 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. | | |
| **5** | **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.<br>Clutch, Gear Box, Propeller Shaft, Final Drive, Wheel and tyre manufactured in India | **8** | **5** |

**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**

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| **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 |
|---|---|---|---|---|
| **1** | **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. | **8** | **1** |
| **2** | **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. | **8** | **2** |
| **3** | **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 | **8** | **3** |
| **4** | **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. | **8** | **4** |
| **5** | **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, cooling & dehumidifying coil. Care & servicing-Air control unit, | **8** | **5** |

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| | | 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**

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| **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 |
|---|---|---|---|---|
| **1** | **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** | **1** |
| **2** | **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** | **2** |
| **3** | **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** | **3** |
| **4** | **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** | **4** |
| **5** | **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** | **5** |

**References Books:**


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

# Integral University, Lucknow

| 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: 2025-26 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | DME-653 | **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** | **1** |
| **2** | EXPERIMENT NO-02 | Study and sketch of various types of optical projectors. | **2** | **2** |
| **3** | EXPERIMENT NO-03 | Use of comparators for measurement | **2** | **2** |
| **4** | EXPERIMENT NO-04 | To measure the diameter of a hole with the help of precision balls. | **2** | **3** |
| **5** | EXPERIMENT NO-05 | To measure the diameter of a hole with the help of precision balls. | **2** | **4** |
| **6** | EXPERIMENT NO-06 | To test the squareness of a component with autocollimeter. | **2** | **4** |
| **7** | EXPERIMENT NO-07 | To measure the pitch, angle and form of thread of a screw | **2** | **4** |
| **8** | EXPERIMENT NO-08 | Measurement of gear elements by using gear tooth vernier. | **2** | **4** |
| **9** | EXPERIMENT NO-09 | To measure the straightness of the edge of a component with the help of auto collimeter | **2** | **4** |
| **10** | EXPERIMENT NO-010 | Use of linear measuring instruments such as vernier caliper and micrometer. | **2** | **5** |
| **11** | EXPERIMENT NO-011 | Use of height gauge and vernier calipers. | **2** | **5** |

**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: 2025-26 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | DAE-653 | **Title of the Course** | AUTOMOBILE ENGINEERING LAB | **L** | **T** | **P** | **C** |
| **Year** | III | **Semester** | VI | 0 | 0 | 3 | - |
| **Pre-Requisite** | 10th | **Co-requisite** | None | | | | |
| **Course Objectives** | The aim of this course is to provide complete knowledge of the procedure and technique for Maintenance, Service and Repair of Automobile. | | | | | | |

**Practical**

| 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. |

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

**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 | 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** |