Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	DMA-401	**Title of the Course**	APPLIED MATHEMATICS-II(B)	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	**-**
Pre-Requisite	10^{th}	**Co-requisite**	NA				
Course Objectives	To know the basic concepts of Mathematics with their Applications in Engineering.						

Course Outcomes	
CO1	Jacobians are used in designing and forging a robot.
CO2	Vector calculus or vector analysis is used in the description of electromagnetic fields.
CO3	A simple Laplace transform is conducted while sending signals over any two-way communication medium (FM/AM stereo-2-way radio sets, cellular phones.)
CO4	Fourier series is used in signal processing.
CO5	Probability models are useful anywhere that you cannot model a situation deterministically.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1.	Differential Calculus-II	Function of two variables, identification of surfaces in space, partial derivatives, chain rule, higher order partial derivatives, Euler's theorem (without proof) for homogeneous functions, Jacobians.	8	01
2.	Vectors Calculus	Scalar and Vector function. Derivative, Gradient, Divergence & Curl of functions. Directional derivatives. Line, Surface & Volume integrals	8	02
3.	Laplace Transformation	Definition & properties of Laplace & Inverse Laplace transformation. Unit step function, periodic function. Solution of ordinary differential equations by Laplace transformation.	8	03
4.	Beta and Gamma Functions Fourier Series	Definition of Beta and Gamma functions, relation between Beta and Gamma functions, their use in evaluating integrals. Fourier series of odd and even functions.	8	04
5.	Probability and Statistics Method of Least-Square and Curve Fitting:	Definition of probability, laws and conditional distribution, discrete and continuous distribution. Binomial, Normal and Poisson distribution. Straight line, parabola	8	05

References Books:

1. Applied Mathematics: Kailash Sinha, Meerut publication
2. Applied Mathematics: H.R Luthra, Bharat Bharti Prakashan.
3. Applied Mathematics: H.K Das, C.B.S Publication.
4. Mathematics for Polytechnic: S.P Deshpande, Pune Vidyarthi Griha.

e-Learning Source:

https://www.youtube.com/watch?v=syLIPtxjN0E&list=PLn78sdsv0QoXBxWmyGp5SQdg-F_AlyB05&pp=iAQB

https://www.youtube.com/watch?v=rBNQ0r7CN2c&list=PLn78sdsv0QoXUdre4aCAobj3cxACkNeLL&pp=iAQB

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

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

Integral University, Lucknow

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

Integral University, Lucknow

Effective from Session: 2010-11							
Course Code	DME-401	**Title of the Course**	HYDRAULICS AND HYDRAULICS MACHINES	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**2**	
Pre-Requisite	10^{th}	**Co-requisite**					
Course Objectives	After the successful completion, learner will develop following attributes.						

Course Outcomes	
CO1	Understand about the working, functions and applications of machine components.
CO2	Identify the broad context of Mechanical engineering problems, including describing the problem conditions and related factors.
CO3	Understand the fundamental of Hydraulics and hydraulics Machine, system components and processes
CO4	Understand the fundamental elements of Mechanical engineering systems, system components and processes
CO5	Synthesize analysis results to provide constructive and creative engineering solutions that reflect social and environmental sensitivities.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRODUCATION, HYDROSTATICS:	Fluid, Fluid Mechanics, Hydraulics, Hydro-statics, Hydrodynamics, Ideal fluid. Properties of fluids, Pressure and depth relationship, Hydrostatic pressure, Pascal's law, total pressure on flat surfaces, Centre of pressure on flat surfaces. (Simple Numerical Problems)	8	CO1
2	BUOYANCY, ENERGY AND MOMENTUM EQUATION	Buoyancy, Condition of equilibrium of a floating body, Meta centre and Meta centric height. (Simple Numerical Problems), Different types of flow, Reynold's number, Equation of continuity and its applications. (Simple Numerical Problems), Types of energies, Energy equation and its application. Bernoulle'stheorem flow measurement instruments where energy equation is used e.g. Venturimeter, Orifice meter, Flow nozzle, pitot tube,Prandtle tube. (Simple Numerical Problems)	8	CO2
3	ORIFICES, NOTCHES & WEIRS:	Flow through orifices, Co-efficient of contraction, Coefficient of velocity, Co-efficient of discharge, LargeVertical orifices, Drowned orifice, time of emptying a rectangular and circular tanks with flat bottoms.(Simple Numerical Problems), Different types of notches, Measurement of discharge over rectangular notch, V-notch, Francis and Brazin's formula for rectangular weirs. Submerged weirs, Broad crested weirs. (Simple Numerical Problems)	8	CO3
4	FLOW THROUGH PIPES, CHANNELS:	Losses in pipe flow due to friction, sudden enlargement, contraction and bends, Elbow & Tee. (SimpleNumerical Problems), Characteristics of flow, Uniform flow through channels. Rectangular and Trapezoidal channels,Application of Chezy's, Manning and Kutter's formula. Most economical channel sections of rectangular and trepozoidal shapes. (Simple Numerical Problems)	8	CO4
5	HYDRAULIC MACHINES:	Impulse and reaction turbines, Principle of working of Pelton wheel, Francis and Kaplan turbines with simple line diagrams, their classification, construction, working, operational problems. Centrifugal and reciprocating pumps, Hydraulic press and Hydraulic Jack.	8	CO5

References Books:

R.S. Khurmi – Fluid Mechanics & Machineries – S. Chand Publications

e-Learning Source:

https://nptel.ac.in/courses/105103096

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	3	2	1	1	2	1	2	3
CO2	3	1	3	3	1	1	2	2	2	1	3
CO3	3	2	2	3	3	1	2	1	3	3	2
CO4	1	2	3	3	2	1	1	3	2	2	3
CO5	3	1	3	3	3	1	3	3	3	3	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: 2010-11							
Course Code	DME-402	**Title of the Course**	MATERIAL SCIENCE-II	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	**0**
Pre-Requisite	DME-402	**Co-requisite**	MATERIAL SCIENCE-II				
Course Objectives	Mathematics and Science to solve engineering problems. Identify and rectify simple and common troubles in automotive vehicles. Supervise operation of boilers, steam turbines, air compressors, IC engines, refrigeration and air-conditioning Apply basic principles equipment. 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	NON-METALIC MATERIALS:	Timber: Conversion of Timber: Its meaning necessity, Seasoning of timber, Preservation of Timber : Types of preservation, Methods of application, Defects in timber, Surface treatment, Soaking treatment, Hot and Cold treatment; Common Indian timber specific uses, properties identification, units of purchase. Brief study of produces of Timber, Plywood, Hard board, Batten Board, Veneer board.	**8**	CO-1
2	Plastic and Other Synthetic Materials:	Plastics-Improtant sources-Natural and Synthetic, Classification, thermoset and thermoplastic, Various trade names, Important Properties and engineering use of plastics. Market forms-Pallets, Granules, Powder and Liquid forms; Uses of Sunglass rexin, Linoleum, Plastic coated paper, Fibres-Important sources. Inorganic fibres, Natural Organic Fibres and Synthetic organic fibre and their use	**8**	CO-2
3	Hardwares:	General specification, uses and methods of storage of G.I. and C.I. steel, Copper, A.C. pressure conduits, R.C.C. spun, P.V.C. pipes and their uses. General sheets specification (I.S.) and uses. Method of storage of G.I. sheets, M.S. sheets, General specification of pipe fittings viz. Elbow, Tee, Bend, Crosses and Sockets. General specification and use of wire nails, wood screws and door hinges, toggle bolts, sliding bolts. IDENTIFICATION AND TESTING OF METAL ALLOYS: Selection, specification forms and availability of materials. Testing of materials(Destructive and nondestructive), Identification of metal by giving mini project.	9	CO-2
4	HEAT TREATMENT OF METALS:	Elementary concept,purpose, Iron-carbon equilibrium diagram. T.T.T. or 'S' curve in steels and its significance, micro structure of steels and martensitic transformation (elementary idea). Hardening, Tempering, Annealing, Normalising and case hardening. Ageing, Various temperature ranges for different metals and alloy (From heat treatment hand book)	6	CO-3
5	MISCELLANEOUS MATERIALS:	Important properties, characteristics and use of the following materials. (a) Abrasives-Natural and Manufactured, sand stone, emery and corrundum, diamond, garnet, silicon carbide, Boron carbide, aluminum oxide, anyother abrasives qualities of good abrasive. (b) Celluloid or Xylomite (c) Felt (d) Magnetic Materials (e) Mica (f) Refractory Materials-Fire clay, Dolomite, Magnesite, Poreclain, Fire bricks and their uses (g) Jointing Materials-Glues and Adhesives, Cements Pyroxylene cement, Rubber cement, Magnestic cement. (h) Composite Materials : Introduction to polymers of metal matrix composite, Carbon fibre, Glass fibre (i) Germenium alloys (metal glasses) (j) Source of procurement of various Ferrous and nonferrous and composite materials	**9**	CO-4

References Books:

Manufacturing Process – Kalpak Jain Material Science – K. M. Gupta

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

Integral University, Lucknow

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

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

Integral University, Lucknow

Effective from Session: 2010-11							
Course Code	DME-403	**Title of the Course**	THERMAL ENGINEERING-II	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	**0**
Pre-Requisite	10th	**Co-requisite**	---				
Course Objectives	Apply basic principles of Mathematics and Science to solve engineering problems. Identify and rectify simple and common troubles in automotive vehicles. Supervise operation of boilers, steam turbines, air compressors, IC engines, refrigeration and air-conditioning equipment. UseHydraulic and pneumatic equipment. Use various instruments to measure heat/air related Parameters.						

Course Outcomes	
CO1	Thermal engineering applied in the field of Heating, ventilation, and air conditioning (HVAC)
CO2	Thermal engineering applied in the field of boiler design.
CO3	Thermal engineering applied in the field of Solar heating and solar power plant.
CO4	Thermal engineering applied in the field of Combustion engines.
CO5	Thermal engineering applied in the field of Thermal Power plant, Cooling systems and Heat exchangers.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	GAS TURBINE	Elements of gas turbine, working principle, fuel and fuel system, open and close cycle, methods of testing, operating characteristics, Atkinson cycle, Brayton cycle, Heat exchanger, Inter cooler, Reheater, Applications, Performance. Brief concept of heat exhanger.	8	CO-1
2	AIR COMPRESSOR	Definition and their use, Difference between reciprocating and rotary compressor, their types and working work done during compression in single stage and two stage, Heat rejected and inter cooling in tow stage compression, volumetric efficiency, compressor lubrication.	8	CO-2
3	THERMAL POWER PLANT	Main parts and working of plant, Thermodynamics cycle, Fuel handling, Combustion and combustion equipments, Problem of ash disposal, Circulating of water schemes and supply of makeup water, Selection of economiser, Super heater, Preheater, Feed water heater and dust collector, Steam power plant, Heat balance and efficiency	8	CO-2
4	NUCLEAR POWER PLANT	Elements of nuclear power plant, Types of nuclear reactor, Fuel moderators, Coolants, Controls, Disposal of nuclear wastes, Classification of nuclear power plant, Cost of nuclear power, Nuclear fuels.	8	CO-3
5	INTERNAL COMBUSTION PLANT	Engine classification, Engine cycle, C.I. engine combustion, S.I. engine combustion, Engine structure, Fuel admission system, Air intake system, Engine cooling system, Lubrication system, Engine starting system, I.C. engine in steam plant-Features and working.	8	CO-4

References Books:

R.S. Khurmi – Thermal Engineering

R.K.Rajput – Thermal Engineering

e-Learning Source:

https://books.google.ws/books?id=PAsbEAAAQBAJ&printsec=frontcover

https://link.springer.com/book/10.1007/978-3-030-67274-4

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	1	1	1	1	1	1	2	1
CO2	3	3	1	2	1	2	1	3	1	1	2
CO3	3	3	2	1	1	1	3	1	3	1	1
CO4	3	2	1	1	2	2	2	2	2	2	2
CO5	2	3	2	1	1	1	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: 2010-11							
Course Code	DME-404	**Title of the Course**	MANUFACTURING PROCESS	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	**40**
Pre-Requisite	10^{th}	**Co-requisite**	-				
Course Objectives	To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods of plastics.						

Course Outcomes	
CO1	It provides a basis to select appropriate manufacturing process to manufacture any component.
CO2	Interpret foundry practices like pattern making, core making, mould making.
CO3	Differentiate metal forming processes such as forging, extrusion, and drawing processes
CO4	Understand different sheet metal working processes
CO5	Calculation of material cost for casting and Forging.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	GENERAL FORMING PROCESSES AND WELDING	GENERAL FORMING PROCESSES: Classification and elementary idea of metal forming processes on the basis of the properties of deformability (Plasticity), fusibility and divisibility Viz: Rolling, Forging, Drawing, Extruding, Spining, Pressing, Punching, Blanking. WELDING: Weldedge preparation, Introduction to various welding processes with procedure equipments and applications such as (i) Electric arc welding. (ii) Resistance welding-Spot welding, Flash butt, Percussion welding. (iii) Thermit welding. (iv) Carbon arc welding (v) Metal-Inert-Gas welding (MIG). (vi) Tungsten arc welding (TIG). (vii) Atomic Hydrogen arc welding. (viii) Stud welding. (ix) Laser Beam, Electron Beam Welding, Explosion Welding, Ultrasonic Welding. (x) Under water welding, (xi) Submerged Arc welding	8	C0-1
2	WELDING OF SPECIAL MATERIALS	WELDING: Definition, arc initiation, arc structures, types of arc, metal transfer characteristics and influencing parameters, weld bead geometry, various types of electrodes used in various processes. Selection of electrode from catalogue, current and voltage setting from welder's hand book. WELDING OF SPECIAL MATERIALS: (i) Welding of plastics, equipment, filler, rods, weldability, procedures and precautions. (ii) Welding of Grey Cast Iron, shielded metal arc gas welding procedures. (iii) Welding of Aluminum, Argon arc and gas welding procedures. (iv) Welding of copper, Brass and Bronze, Gas shielded metallic arc welding, TIG. Oxyacetylene method (v) Welding of Alloy steels welding, Stainless steel, welding by oxyacetylene process, MIG, TIG.Specification of electrode as per latest I.S. code.	8	C0-2
3	COST ESTIMATION OF WELDING	COST ESTIMATION OF WELDING: Material cost, Fabrication cost, Preparation cost, Welding cost and Finishing cost, Over head cost, Cumulative effect of poor practices on cost, Calculation of cost of welding gas consumption and Welding electrodes. FOUNDRY PRACTICE: PATTERN AND MOULDING: The pattern materials used, Types of patterns, Allowances and pattern layout, Colour scheme pattern defects, Types of cores and their utility.	8	C0-3
4	MOULDING PROCESS	MOULDING PROCESS Classification of mould materials according to characteristics, Types of sands and their important test, parting powders and liquids. Sand mixing and preparation, Moulding defects MELTING AND POURING: Fuels and metallic materials used in foundry. Melting furnaces used in foundary such as pit furnace,Tilting and cupola furnaces, metals and alloys. Additions to molten metal, Closing and pouring of the moulds. Coring-up, venting and closing, use of ladles, spur and risers, Defects due to closing and spuring. Basic idea of fettling operations. Surface treatment, Salvaging of castings, Factors determining soundness of casting. Handling of molten metal from furnace to mould	8	C0-4

Integral University, Lucknow

Effective from Session: 2010-11							
Course Code	DME-406	**Title of the Course**	BASIC ELECTRICAL ENGINEERING	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**-**	**-**
Pre-Requisite	10^{th}	**Co-requisite**	---				
Course Objectives	1. Study of basic paramerters of electrical engineering 2. Operation of different electrical machine.						

Course Outcomes	
CO1	Basic concept of AC circuits..
CO2	Solution of electrical circuits using different network theorems.
CO3	Measurement of different electrical quantities using different electrical measuring instruments.
CO4	Basic concept of three phase circuit and power measurement. Introduction to electrical machines and their applications.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
Unit-I	Steady State Analysis of A.C. Circuits	Sinusoidal and phasor representation of voltage and current, single a.c. circuit Behaviour of resistance, inductance, capacitance and their combination in Series & parallel, and power factor, series & parallel resonance, bandwidth and Quality factor	8	1
Unit-II	Network Theory	Mesh and nodal analysis for a.c. and d.c.networks, Network theorem Superposition theorem. Thevenin's theorem, Norton's theorem and Maximum Power transfer theorem, Star-Delta transformation. Measuring Instruments. Construction and principle of operation of voltage and current measuring Instrument, introduction to power and energy meteres	8	2
Unit-III	Three phase AC Circuits	Star-Delta connection, line and phase voltage/current relations, three phase Power and its measurement. Magnetic Circuit and Transformer Magnetic circuit concept, principle of operation, phasor diagram, equivalent Circuit, efficiency, voltage regulation of single phase transformer, opern Circuit and short circuit test.	8	3
Unit-IV	D.C. Generator	Construction, types of d.c. generators, e.m.f. equation, Magnetization and Load characteristics, Losses and efficiency, Speed control of d.c. Motors, Applications. D.C. Motor Working principle, types of d.c. motor, speed, characteristic, efficiency And a applications. Single Phase Induction Motor Principle of operation, Methods of starting, split phase induction motor, Capacitor motor, capacitor start motor two value capacitor motor.	8	4
Unit-V	Three Phase Induction Motor	Production of rotating field, Principle of operation, slip-torque characteristics, applications. Three Phase Synchronous Motor Construction, principle of operation and applications.	8	4

References Books:

1. V. Del Toro "Principles of Electrical Engg." Prentice Hall International
2. W. H. Hayt & J.E. Kennedy, "Engineering Circuit Analysis." Mc.Graw Hill
3. I. J. Nagrath, "Basic Electrical Engg." Tata Mc Graw Hill
4. A.E. Fitgerald, D.E. Higginbortham and A Grabel, "Basic Electrical Engg." Mc Graw Hill.

e-Learning Source:

https://nptel.ac.in/

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-

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

Name & Sign of Program Coordinator	Sign & Seal of HoD

Integral University, Lucknow

5	SPECIAL CASTING	SPECIAL CASTING: Elementary idea of special casting processes-Shell mould casting, die casting, investment mould casting, Centrifugal and continuous casting full mould casting. Elementary idea of mechanisation of foundries. ESTIMATING AND COSTING: Calculation of material cost for casting and Forging. POWDER METALLURGY: Introduction, principle, scope and names of processes. Production of metal powders, compaction, sintering and sizing. Self lubricated bearings. Advantages of the process and its limitations. (Elementary concept only).	8	C0-5

References Books:

Manufacturing Processes – Kalpak Jian

Manufacturing Science – K.M. Moeed

e-Learning Source:

https://onlinecourses.nptel.ac.in/noc22_me28/preview

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	1	2	3	2	1	1	1
CO2	3	-	2	1	-	1	-	1	2	-	
CO3	2	-	1	2	-	-	1	2	-	3	-
CO4	3	-	1	1	3	-	1	-	-	1	2
CO5	2	1	-	-	1	3	-	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: 2010-11							
Course Code	DME-451	**Title of the Course**	HYDRAULICS LAB	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	0	0	3	
Pre-Requisite	10th	**Co-requisite**	--				
Course Objectives	1. To understand about basic concepts of hydraulics. 2. To understand about the working of different hydraulic machines						

Course Outcomes	
CO1	Learn law of hydrostatics and its application
CO2	Students learn how Bernoulli's experiment perform exp.
CO3	Understand the different theory of working of different machine.
CO4	Student will able to solve different numerical problem of hydraulics.
CO5	Understand basic component of hydraulic machine.

Experiment No	Experiment	Contact Hrs.	MappedCO
Experiment no-1	Piezometer tube, Mechanical flow meter, Manometers, Pressure gauge.	3	CO1
Experiment no-2	Hydraulic ram, press and jack.	3	CO1
Experiment no-3	Pelton wheel and Francis turbine or their model	3	CO5
Experiment no-4	Centrifugal and Reciprocating pumps.	3	CO5
Experiment no-5	Measurement of discharge over notches and its verification.	3	CO4
Experiment no-6	To determine coefficient of discharge of a Venturimeter.	3	CO3
Experiment no-7	To determine coefficient of contraction, coefficient of velocity and coefficient of discharge for a given orifice.	3	CO3
Experiment no-8	To determine the loss of head of water due to friction in a water pipe line.	3	CO4
Experiment no-9	To study performance of Pelton Wheel.	3	CO3
Experiment no-10	To study performance of Francis Turbine.	3	CO3
Experiment no-11	To study the performance of a Centrifugal Pump.	3	CO3
Experiment no-12	To study the performance of a Reciprocating Pump.	3	CO3
Experiment no-13	To study the performance of a Gear Pump.	3	CO3
Experiment no-14	To measure the velocity of water flow in a open channel by a current meter.	3	CO4
Experiment no-15	To verify Bernoulli's theorem.	3	CO2

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

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

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

Integral University, Lucknow

Effective from Session: 2010-11							
Course Code	DME-452	**Title of the Course**	WORKSHOP (MANUFACTURING PROCESS)	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**0**	**0**	**3**	
Pre-Requisite	10^{th}	**Co-requisite**	----				
Course Objectives	Students are able to understand how to make castings , how to make weld etc.						

Course Outcomes	
CO1	Students will be able to make pattern, core, mould etc.
CO2	Students will be able to understand how sand testing is performed.
CO3	Students should be able to do different welding.
CO4	Understand process of casting.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
Shop-1	FOUNDRY PRACTICE (WORKSHOP	1. PATTERN MAKING: (a) Making Patterns (At least two). (i) Solid one piece pattern.(ii) Split two piece pattern. (iii) Split three piece pattern. (iv) Gated pattern.(v) Four Piece pattern. (vi) Sweep pattern.(vii) Skeleton pattern. (viii) Segmental pattern. (b) MAKING CORE BOXES (At Least 2) For: (i) Straight Core Box.(ii) Bent Core Box.(iii) Unbalanced Cores.	3	CO1
Shop-2	SAND PREPARATION AND TESTING	**Sand Testing (At Least 2 Experiments). (i) Grading (Grain Size).(ii)Determination of Moisture content.** (iii) Determination of Clay content.(iv) Determination of Permeability for gases. (b) Preparation of :(i) Green Sand Composition. (ii) Dry Sand Composition. (iii) Loam Sand Composition. (iv) Oil Sand For Cores.	3	CO2
Shop-3	MOULDING	(a) Making at least 8 sands moulds of different forms with different types of pattern using. (i) Floor Moulding.(ii) Two Box Moulding.(iii)Three Box (or more) Moulding. (b) At least one of the following :(i) Making and setting of cores of different types. (ii) Making one shell mould apparatus.	3	CO4
Shop-4	MELTING AND POURING	Demonstration of Melting of cast iron in-(i)Pit Furnace(ii)Cupola Demonstration of melting a Non-Ferrous metal in-(i)Pit Furnace**.** ii) Tilting Furnace. Pouring of Metals in Moulds (Ferrous and Non Ferrous**).**	3	CO4
Shop-5	CLEANING, INSPECTION AND NON DESTRUCTIVE TESTING	(a) Shaking, cleaning and fettling of casting (At least 2 casting). (b) (i) Inspection of cast component (visual) and preparing inspection report (At least one report). (ii) Establishing cause of Defects seen (At least one cause).(iii)Dye penetration test for casting(iv) Magnetic flow detection test/Ultra sound flaw detection test for castings.	3	CO3
Shop-6	CASE STUDY	At least 2 sand casting products from sand preparation, pattern layout to final finished casting by shell moulding, centrifugal casting, investment casting and continuous casting.	3	C04
Shop-7	ADVANCE WELDING SHOP	(a) Study of various Gas cutting and welding equipments: - Welding transformer, Generator/rectifier, Gas cylinder, Gas cutting machines, Cutting torches etc., various electrodes and filler metals and fluxes. Practice of welding and cutting of different metals by making suitable jobs by different methods:- 1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs. 2. Tig Welding practice of Non-Ferrous metals, like Copper, Brass and Aluminum. 3. Practice of Gas cutting manually. 4. Practice of Gas cutting by cutting machine. 5. Practice of Arc cutting. 6. Study of Welding defects. 7. Inspection and Tests of welded joints. 8. Practice of Spot and Seam welding. 9. Practice of Welding pipe joints, Pipes and Pressure vessels.	3	CO3

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

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

Integral University, Lucknow

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

Integral University, Lucknow

Effective from Session: 2010-11							
Course Code	DME-456	**Title of the Course**	BASIC ELECTRICAL ENGINEERING LAB	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV			**3**	**-**
Pre-Requisite	10^{TH}	**Co-requisite**					
Course Objectives	1. Application and verification of characteristic of electrical motors. 2. Verification of different electrical network theorems.						

Course Outcomes	
CO1	Study and verification of characteristics of semiconductor devices like diode and transistor.
CO2	Verification of different network theorems on simple electrical circuits.
CO3	Operation and testing of electrical machines like transformer, induction motor.
CO4	Energy meter and their operations.

Experiment No.	Experiment	Contact Hrs.	Mapped CO
Experiment-1	Verification of Network theorems..	3	1
Experiment-2	Study of diode characteristics.	3	1
Experiment-3	To study a half wave and full rectifier circuit with and without capacitor filter and determine the ripple factor.	3	1
Experiment-4	Determination of common base ad common emitter characteristics of a transistor	3	1
Experiment-5	Study of phenomenon of resonance in RLS series circuit.	3	2
Experiment-6	Measurement of power in a three phase circuit by two wattmeter method.	3	2
Experiment-7	Measurement of efficiency of a single phase transformer by load test	3	2
Experiment-8	Determination of parameters and losses in a single phase transformer by OC and SC test	3	3
Experiment-9	DC generator characteristics.	3	3
Experiment-10	Speed control of de shunt motor.	3	4
Experiment-11	Study running and reversing of a three phase induction motor.	3	4
Experiment-12	Study of a single phase energy meter.	3	4
Experiment-13	To study the various logic gate (TTL)	3	4

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	3	-	-	-	-	-	-	-	-	-

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

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