Annasaheb Dange College of Engineering and Technology, Ashta

An Autonomous Institute

S.Y. B. Tech.
Curriculum

MECHANICAL ENGINEERING

SEMESTER III- IV
w.e.f. 2023-24

Department of Mechanical Engineering

ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY, ASHTA
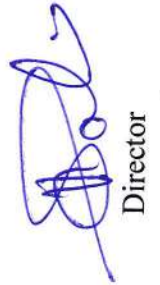
(An Autonomous Institute)

Department of Mechanical Engineering

Teaching and Evaluation Scheme
S. Y. B. Tech Semester - III

Course Code	Course Name	Teaching Scheme				THEORY						PRACTICAL						GRAND TOTAL
		L	T	P	Credits	ISE Max	ISE Min	MSE	ESE	MSE+ESE Min	Total	Min	ISE Max	ISE Min	ESE Max	ESE Min	Total	Min	
2MEPC201	Applied Mathematics-III	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEPC202	Kinematics of Machines	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEPC203	Applied Thermodynamics	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEPC204	Mechanics of Deformable Solids	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEPC205	Material Science and Metallurgy	2	-	2	3	40	16	30	30	24	100	40	25	10	25	10	50	20	150
2MEPC206	Machine Tools	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEPC207	Machine Drawing Laboratory	-	-	2	1	-	-	-	-	-	-	-	25	10	25	10	50	20	50
2MEVS208	Python Programming Laboratory	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEHS209	Universal Human Values	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50
2MEHS210	Environment Studies	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50
2MECC211	Aptitude and Reasoning Part -I	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
		18	0	10	23														775
	Total Contact Hours	28																	

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Course details:

Class	SY B Tech, Semester - III
Course Code and Course Title	**2MEPC201, Applied Mathematics-III**
Prerequisite/s	2MEBS102, 2MEBS111
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme T ISE/MSE/ESE	40/30/30

Course Outcomes: Upon successful completion of this course, the student will be able to:

2MEPC201_1	**Use** linear differential equation to solve the problems on oscillations by using analytical method.
2MEPC201_2	**Apply** the concept of Vector calculus to calculate area and volume of given surface.
2MEPC201_3	**Construct** the Fourier Series for the any functions by using Euler's Formulae.
2MEPC201_4	**Solve** the linear differential equation by using laplace transform.
2MEPC201_5	**Evaluate** algebraic and transcendental equations by numerical techniques.
2MEPC201_6	**Make use of** partial differential equations to solve one dimensional Heat and Wave Equation for boundary value problems.

Course Content:		Hrs.
Unit 1	**Linear Differential Equations and Its Application** Definitions, Complete solution, Operator D, Rules for finding Complementary function, Inverse operator, Rules for finding the Particular integral, Oscillations of a spring - Free oscillations, Damped Oscillations, Forced oscillations without damping.	07
Unit 2	**Vector Calculus** Introduction, Scalar and vector point functions - vector operator del, Del applied to scalar point functions - gradient, directional derivative, Del applied to vector point functions - Divergence and curl, Line integral, Green's theorem in the plane	07
Unit 3	**Fourier Series** Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Expansion of odd or even periodic functions, Half range series	06

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Unit 4	**Laplace Transform** Introduction, Laplace transform of elementary functions. Properties of Laplace Transforms, Transforms of derivatives, Transforms of integrals, Multiplication by t^n, Division by t, Evaluation of integrals by Laplace Transforms. Inverse Laplace transforms - Method of Partial Fractions, convolution Theorem, Applications of Laplace transform to solve linear differential equations	06
Unit 5	**Numerical Solution of Algebraic and Transcendental Equations** Numerical Solution of Algebraic &Trancedental Equations by Bisection method, Regular-Falsi Method, Newton-Raphson Method, Secant Method, Muller's method, Multiple roots by Newton's method.	06
Unit 6	**Partial Differential Equations and its Application** Introduction –Formation of partial differential equations, linear equation of the first order (Lagrange's equation) , Method of separation of variables, Vibration of a stretched string, one dimensional wave equation (using separation of variables), One dimensional heat flow equation (using separation of variables).	07

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics	Dr. B. S. Grewal	KhannaPublication	4th	2007
02	Higher Engineering Mathematics.	H. K. Das	S. Chand and company ltd.,	1st	2011
03	Higher Engineering Mathematics.	B.V. Ramana	Tata McGraw Hill Education Pvt., ltd.	1st.	2007
04	A text book of Engineering Mathematics	N.P.Bali, Manish Goyal	Laxmi Publication New Delhi	7th	2007

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ADCET

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley &Sons,Inc.	9th	2007
02	Advanced Engineering Mathematics.	Potter Merle C.	Oxford University Press,	3rd	2005
03	Engineering Mathematics Vol. I & II	ITL Education	Cengage Learning India PrivateLtd.	1st	2015
04	Advanced Engineering Mathematics.	Oneil Peter V	CengageLearing India Pvt. Ltd.	1st	2012

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Course Details:

Class		SY B Tech, Semester - III
Course Code and Course Title		**2MEPC202, Kinematics of Machines**
Prerequisite/s		2MEBS110
Teaching Scheme: Lecture/Tutorial/Practical		03/00/00
Credits		03
Evaluation Scheme	T ISE/MSE/ESE	40/30/30

Course Outcomes (COs): After successful completion of this course, the student will be able to:

2MEPC202_1	**Explain** the terminology associated with different mechanisms, gears, cam using theory of kinematics.
2MEPC202_2	**Compute** different parameters related to power transmitting devices and cam and follower using analytical or graphical approaches.
2MEPC202_3	**Select** the appropriate mechanism, power transmitting and storing devices for a particular application based on its kinematic analysis.
2MEPC202_4	**Analyze** kinematic behaviour of complex mechanisms using velocity and acceleration diagrams and cam profiles.
2MEPC202_5	**Estimate** dimensional parameters of an appropriate mechanism for selected applications using the theory of kinematics.

Course Contents:

		Hrs
Unit 1	**Basics of Kinematics and Mechanisms** Kinematic link, Types of links, Kinematic pair, Types of constrained motions, Types of Kinematic pairs, Kinematic chain, Types of joints, Mechanism, Machine, Degree of freedom (Mobility), Kutzbach criterion, Grubler's criterion, Inversion, Four bar chain and its inversions, Grashoff's law, Slider crank chain and its inversions, Double slider crank chain and its inversions, pantograph, steering gear mechanisms, Hooke's joint	06
Unit 2	**Analysis of Mechanisms** Velocity and Acceleration Analysis in Mechanism: (Graphical analysis- Velocity and acceleration for different mechanisms using relative velocity and acceleration method), Corioli's component of acceleration, Klein's construction for slider crank mechanism, Instantaneous centre method (Up to 6 IC), Kennedy's theorem. Analytical analysis- Approximate analytical method for Velocity and acceleration of the piston.	08
Unit 3	**Mechanical Power Transmitting and Storing Devices** 1) Belt Drive- Calculation of power transmitted, Belt tension ratio, Actual tension in a running belt, Centrifugal and initial tension in the belt, Slip and creep of the belt, V Belts, Selection of Belts.	05

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	2) Flywheel- Turning moment diagrams, fluctuation of energy, Coefficient of fluctuation of speed, Rimmed flywheel	
Unit 4	**Theory of Gears** Classification of gears, Types of gears, Spur gears - terminology, fundamental law of toothed gearing, involute and cycloidal profile, conjugate action, contact ratio, minimum number of teeth, interference and undercutting. Helical gears: Nomenclatures, centre distance, force analysis.	07
Unit 5	**Theory of Gear Trains** Types of gear trains, simple, compound, reverted, epicyclic gear train, tabular method for finding the speeds of elements in epicyclic gear trains, torques in the epicyclic gear train, differential gearbox.	07
Unit 6	**Kinematics of Cams and Follower** Classification of cams, Classification of followers, Terminologies of cam and follower, Motions of Follower a) Uniform Velocity b) Simple harmonic motion c) Uniform acceleration and retardation d) Cycloidal motions, Displacement diagram of follower, Velocity and acceleration diagram of Follower, Construction of cam profile	06

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Theory of Machines	Ratan S.S	Tata McGraw Hill New Delhi.	3rd	2012
02	Theory of Machines	P.L.Ballany	Khanna Publication, New Delhi	25th	2012
03	Theory of Machines	V.P. Singh	DhanpatRai and Sons	3rd	2012
04	Kinematics & Dynamics of Machines	George Martin	Waveland Press, Inc.	2nd	2002

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Theory of Machines	Thomas Bevan	CBS Publishers, New Delhi.	3rd	2005
02	Theory of Machines and Mechanism	Shigley	Oxford International	3rd	2009
03	Theory of mechanism and machines	Sadhu Singh	Pearson	1st	2012
04	Theory of machines and Mechanism	JagdishLal	Metropolitin Book Company	1st	2011
05	Mechanism and Machines	Gosh And Mallik	East West Press	3rd	1998
06	Theory of Machine	Sarkar	Tata McGraw Hill	1st	2002

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Course Details:

Class	S.Y.B. Tech, Semester-III
Course Code and Course Title	**2MEPC203, Applied Thermodynamics**
Prerequisite/s	2MEBS102, 2MEBS106, 2MEBS107
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme	T	ISE/MSE/ESE	40/30/30

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEPC203_1	**Explain** the fundamentals of thermodynamics for a given system using diagrams or plots.
2MEPC203_2	**Apply** the First law of thermodynamics to the given system using mathematical equations (SFEE).
2MEPC203_3	**Determine** the performance of a given system using second law of thermodynamics.
2MEPC203_4	**Evaluate** the properties of pure substance for a given system using steam table / Mollier chart/ mathematical equations.
2MEPC203_5	**Compute** the performance of given gas / steam turbine using P-V-T diagram, velocity diagram /compounding diagram.

Course Contents:		Hrs.
Unit 1	**First Law of Thermodynamics** Thermodynamic systems, properties of a system, state and equilibrium, processes and cycles, temperature and the zeroth law of thermodynamics, heat and work transfer, the first law of thermodynamics, limitations of first law of thermodynamics, energy- a property of system, The first law of thermodynamics for a control volume, The steady-flow process; numerical treatment of SFEE processes	07
Unit 2	**Second Law of Thermodynamics** Kelvin–Planck statement, Clausius statement, refrigerators, and heat pumps, the equivalence of the two statements, perpetual-motion machines, Clausius theorem, inequality, useful work, dead state, entropy-property of system, Clausius principle of increase of entropy, available energy referred to cycle, law of degradation of energy	07
Unit 3	**Properties of Pure Substance** Definition of pure substance, the phase change of pure substances, p-T, p-v-T Surface and the triple point of water, Ideal gas equation of state and van der Waals equation of state, phase rule formation and properties of	06

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	steam, quality of steam, Superheated steam & Characteristics of superheated steam, steam calorimeters, h-s chart or Mollier chart, use of steam table and Mollier chart.	
Unit 4	**Impulse turbines** Rankine and modified Rankine cycle, reheat cycle, regenerative heating, principles of operation, classification, impulse and reaction steam turbine, compounding of steam turbines. flow through impulse turbine blades, velocity diagrams, work done, efficiencies, end thrust, blade friction, influence of ratio of blade speed to steam speed on efficiency of single stage turbines.	07
Unit 5	**Reaction turbines** Flow through impulse reaction blades, velocity diagram, degree of reaction, parson's reaction turbine, back pressure, and pass-out turbine, Governing of steam turbines. losses in steam turbinesperformance of steam turbines and different methods of improving performance, function of the diaphragm, glands, and turbine troubles like erosion, corrosion, vibration, fouling.	06
Unit 6	**Gas Turbines and Jet Propulsion** Classification, Merits, Constant pressure combustion, Constant volume combustion, methods of improving thermal efficiency of gas turbine, applications and uses, Fuels, Jet propulsion engine, Gas turbine Blade cooling	06

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Thermodynamics: An Engineering Approach	Yunus A. Cengel	McGraw Hill	8th .	2015
02	Engineering Thermodynamics	P. K. Nag	McGraw Hill	5th	2013
03	Applied Thermodynamics	Onkar Singh	New Age International	3rd	2009
04	Engineering Thermodynamics	M. Achuthan	PHI Learning Pvt. Ltd.	2nd	2009

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamentals of Thermodynamics	Richard E. Sonntag, Claus Borgnakke	New Age International	7th	2009
02	Fundamentals of Thermodynamics	Borhnakke, Sonnatag	Wiley Publication	7th	2009
03	Introduction to Thermal System Engineering	M.J. Moran, H.N. Shapiro, B.R. Munson, D.P. Dewitt	Wiley Publication	10th	2013
04	Fundamentals of Engineering Thermodynamics	Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Bailey	John Wiley & Sons, Inc.	8th	2014

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Course Details:

Class		S.Y.B. Tech, Semester-III
Course Code and Course Title		**2MEPC204, Mechanics of Deformable Solids**
Prerequisite/s		2MEES112
Teaching Scheme: Lecture/Tutorial/Practical		03/00/00
Credits		03
Evaluation Scheme	**T** ISE/MSE/ESE	40/30/30

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1MEPC204_1	**Explain** different types of stresses, strains and elastic constants.
1MEPC204_2	**Identify** and apply a particular theoretical method of stress and strain determination for mechanical elements under various loads.
1MEPC204_3	**Determine** the deflection of beams under different loading conditions.
1MEPC204_4	**Apply** different theories to determine safe load on the columns.
1MEPC204_5	**Determine** strain energy absorbed in the body due to external load, torsion and bending.
1MEPC204_6	**Analyze** the beam by drawing shear force and bending moment diagram.

Course Contents:

		Hrs.
Unit 1	**Stresses and Strain** Stress, strain, normal and shear stresses, complementary shear stress, Factor of safety, Elasticity, Hooke's Law, Modulus of Elasticity, Poisson's ratio, Bulk modulus, Shear modulus, Inter-relationship between elastic constants, stresses in varying sections of normal and composite bars, thermal stresses.	07
Unit 2	**Principal Stresses and Strains (2D)** Normal and shear stresses on any oblique planes, concept of principal planes, derivation for principal stresses and maximum shear stress, positions of principal planes and planes of maximum shear, graphical solutions using Mohr's circle of stresses, Theories of failures, Introduction to 3D stresses.	06
Unit 3	**I) Shear Force and Bending Moment:** Shear force and bending moment diagram for simply supported, cantilever and overhanging beam subjected to point load, inclined load, UDL, UVL and couple. **II) Torsion:** Theory of torsion, assumptions, derivation of torsion equation, Polar modulus, stresses in solid and hollow circular shaft, power transmitted by shaft.	06

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Unit 4	**Stresses in Beams** **I) Bending stresses:** Pure bending of beams, flexural formula, moment of inertia, bending stresses in beams of various commonly used sections such as I, T, C and cut-out sections. **II) Shear stresses:** Shear stress for different cross-section of beams, distribution of shear stress in beams of various commonly used sections.	07
Unit 5	**Deflection of Beams** Concept of slope and deflection, Strain curvature and moment curvature relation, Methods for determining deflections, Solution of beam deflection problem by Double integration method. (Simply supported, cantilever subjected to point load, UDL).	06
Unit 6	**I) Columns:** Concept of critical load and buckling, derivation of Euler's formula for buckling load with various end conditions, limitations of Euler's formula, Rankine's buckling load, safe load on column. **II) Strain Energy:** Strain energy due to different types of loading, Pure bending (simply supported beam & cantilever), Shear stresses (Direct Shear & Pure Torsion).	07

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Mechanics of Materials	Ferdinand P Beer E.R. Johnston	McGraw Hill Book Company	5th	2009
02	Strength of Materials	Ramamurthum	DhanpatRai and Sons, New Delhi	7th	2011
03	Strength of Materials	Khurmi Gupta	S. Chand Publication.	26th	2011
04	Strength of Materials	P. N. Chandramouli	PHI, New Delhi.	1st	2013

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Advanced Strength of Materials	Den Hartong J P	Dover Publication Inc Mineola.	1st	2002
02	Mechanical Analysis and Design	H. BURR and John Cheatam	PHI, New Delhi.	2nd	1997
03	Machine Design	Robert Norton	Prentice Hall	2nd	2003
04	Strength of materials	B.K.Sarkar	McGraw Hill Pub.	2nd	2007

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Course Details:

Class		S.Y.B. Tech, Sem. - III
Course Code and Course Title		**2MEPC205, Materials Science and Metallurgy**
Prerequisite/s		2MEBS101, 2MEBS110
Teaching Scheme: Lecture/Tutorial/Practical		02/00/02
Credits		03
Evaluation Scheme	T	ISE/MSE/ESE	40/30/30
	P	ISE/ESE	25/25

Course Outcomes (COs): After successful completion of this course, the student will be able to:

2MEPC205_1	**Explain** classification of various materials according to their properties using equilibrium diagrams and cooling curves.
2MEPC205_2	**Classify** ferrous and non-ferrous materials in engineering applications using their compositions and properties.
2MEPC205_3	**Find** defects in engineering materials using destructive and Non-destructive testing.
2MEPC205_4	**Select** appropriate heat treatment process for metals and alloys using TTT and CCT diagrams.
2MEPC205_5	**Illustrate** fundamentals of powder metallurgy processes for industrial applications through powder manufacturing processes.

Course Contents: Theory		Hrs
Unit 1	**Engineering materials and Alloy Systems:** Introduction to Metallic and Non-metallic materials and its classification (metals/alloys), Crystal, Crystal Defects, Cooling curves, Gibbs phase rule, Construction of equilibrium diagrams from cooling curves, Lever arm principles.	04
Unit 2	**Ferrous Alloys and Non-Ferrous Alloys:** Detailed compositions, Properties and Applications for alloys. Fe- Fe3C equilibrium diagram, Ferrous alloys- Carbon steels, cast iron, Alloy steels - Free cutting steels, HSLA high carbon low alloy steels, maraging steels. Stainless steels- different types. Tool steels- types. Copper based alloys and aluminum-based alloys.	04
Unit 3	**Principles of Heat Treatment:** Transformation of Pearlite into austenite upon heating, Transformation of austenite into Pearlite, Bainite and Martensite on cooling. TTT –Diagram and CCT - Diagrams - significance, Effect of alloying elements on TTT diagram and its Significance. Heat treatment of steels, Annealing and Normalizing.	05

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Unit 4	**Heat Treatment Processes:** Hardening (Hardening types), Purposes, Austempering & Martempering, Mechanism of quenching and Quenching media, Hardenability- Grossmans critical diameter method and Jominy end quench test. Tempering, Surface hardening, Carburising, Nitriding, Plasma ion nitriding, Cyaniding, Carbonitriding, Laser Heat Treatment, Electron Beam Hardening, Heat treatment defects and remedies.	05
Unit 5	**Material Testing:** Destructive Testing methods: Tensile, Compressive, Impact, Fatigue, Creep, and Hardness. Non- Destructive Testing: Visual inspection, Dye Penetrant, Magnetic, Ultrasonic, Radiography, Eddy Current testing, Near Filed Testing (NFT).	04
Unit 6	**Powder Metallurgy:** Advantages, Limitations and Applications of Powder Metallurgy Powder manufacturing types- Mechanical, Physical, Chemical and Electro-Chemical, Mixing/ Blending, Powder rolling and extrusion, Sintering-Types liquid stage and solid stage sintering, High Temperature Sintering, Finishing operations: Sizing, Machining, Infiltration and Impregnation. Powder metallurgy defects and remedies	04

Course Content: Laboratory

1. Spark tree analysis of different types of material.
2. Conduct Hardness test of engineering materials by Brinell and Rockwell tester.
3. Determine Impact strength of engineering materials using impact test.
4. Crack detection in metal components using Ultrasonic testing.
5. Surface damage analysis using dye-penetration test.
6. Examination of microstructure of different types of steel and Cast Iron
7. Examination of microstructure of different types of Aluminum and copper
8. Hardenability testing by Jominy end quench test
9. Tensile test for measurement of mechanical properties
10. Industrial visit

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Material science and metallurgy for engineers	V.D. Kodgire	Everest Publishers Pune	12th	2009
02	Introduction to physical metallurgy	S.H.Avner	McGraw Hill Book Company Inc	2nd	1988
03	Engineering Metallurgy Part-I	R. A. Higgins	ELBS with Edward Arnold	6th	1994
04	Material Science and Engineering	V Raghwan	Prentice Hall of India Pvt. Ltd., New Delhi	3rd	1995

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Materials Science & Engineering	W. Callister	John Wiley & sons	2nd	Reprint 2017
02	Heat Treatments Principles and Practices	T.V. Rajan / C.P. Sharma	Prentice Hall of India Pvt Ltd, New Delhi	4th	1994
03	Callister's Materials Science and Engineering	R. Balasubramaniam	Wiley India Pvt Ltd	3rd	2008
04	Mechanical Behaviour and Testing of Materials	K. Bhargava	Publication PHI	2nd	2011

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Course Details:

Class	S.Y.B. Tech, Semester-III
Course Code and Course Title	**2MEPC206, Machine Tools**
Prerequisite/s	2MEPC108, 2MEPC117
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme	P	ISE / ESE	25/00

Course Outcomes (COs):	After successful completion of this course, the student will be able to:
2MEPC206_1	**Plan** the sequence of machining operations and prepare process sheet to manufacture a given component by using machining time calculations.
2MEPC206_2	**Execute** various machining operations to produce a component using given production drawing on Lathe machine.
2MEPC206_3	**Use** grinding and shaping operations to produce required features using surface grinder and shaping machine.
2MEPC206_4	**Implement** drilling and milling operations to produce required features using surface drilling and milling machine.
2MEPC206_5	**Select** the machine tool to manufacture the given component using various operations performed on machine tools.

Course Contents: Theory		Hrs.
Unit 1	**Lathe Machine**: Introduction, Working principle, types, specifications, parts, accessories, attachments, and various lathe operations.	03
Unit 2	**Grinding machines:** Introduction, types of grinding, classification of grinding machines, principle of grinding operations, grinding wheel.	02
Unit 3	**Shaping machine**: Crank shaper, hydraulic shaper, table feed mechanism, various operations on shaper, introduction to planer machine.	02
Unit 4	**Drilling machine:** Classifications, construction & working of Radial drilling machine, Various operations on drilling machines, introduction to boring machine.	02
Unit 5	**Milling machine:** Classification of milling machines, construction and working of column and knee type milling machine, milling operations, study of standard accessories - dividing head, gear cutting on milling machine.	02
Unit 6	**CNC Machine:** Introduction to CNC Machine technology, CNC control, CNC Programming.	02

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Course Contents for Laboratory:

1. Preparation of Process sheet to produce the job on lathe machine.

2. One job of plain turning, taper tuning, external threading and knurling operation.

3. Hands on Practice on Surface Grinding Machine.

4. Hands on Practice on Shaping Machine.

5. Hands on Practice on Radial Drilling Machine.

6. Hands on Practice on Milling Machine.

7. Hands on Practice on CNC Machine

8. Industrial visit.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Manufacturing Technology- Foundry, Forming and Welding	P. N. Rao	Tata Mc- Graw Hill Publication	2nd	2009
02	Foundry Technology	O. P. Khanna	DhanpatRai Publication	15th	2011
03	Production Technology: Vol. 1: Manufacturing Processes	P. C. Sharma	S. Chand	1st	2006
04	Production Technology: Vol. 2: Machine Tools	P.C.Sharma	S. Chand	2nd	2006
05	Workshop technology vol.1	S.K.HajraChoudhary S.K.Bose	Media promoters and publishers pvt ltd.	12th	2012
06	Workshop technology vol.2 (Machine tools)	S.K.HajraChoudhary S.K.Bose	Media promoters and publishers pvt ltd.	12th	2012
07	Workshop Technology vol. II,	B.S. Raghuvanshi	DhanpatRai and Sons.	6th	2015

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Materials and Processes in Manufacturing	E. Paul DeGarmo, J.T. Black.	PHI Publication	8th	1997
02	Mechanical Metallurgy	George E. Dieter	Tata McGraw Hill Publication	3rd	2013
03	Machine Tools and Manufacturing Technology	Steve F. Krar, Mario Rapisarda.	Delmar publisher	2nd	2010
04	Workshop Technology", Vol. I 2001, Vol. II 2007 and Vol. III 1995.	W.A.J. Chapman	CBS Publishing and Distributors, N. Delhi	5th	2001

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Course Details:

Class	S.Y.B. Tech, Semester-III
Course Code and Course Title	**2MEPC207, Machine Drawing Laboratory**
Prerequisite/s	2MEES106
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme P	ISE/ESE	25/25

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEPC207_1	**Sketch** of given machine component using empirical relations.
2MEPC207_2	**Apply** the BIS conventions on the drawings of a given component using principles and fundamentals of machines drawing.
2MEPC207_3	**Assign** limits, fits, tolerances and machining symbols on manufacturing/production drawings using principles and fundamentals of geometric dimensioning and Tolerancing.
2MEPC207_4	**Produce** curves of intersections of the surfaces of solids using principles and fundamentals of intersections of solids.
2MEPC207_5	**Prepare** the assembly and detail drawing of a given mechanical engineering components using CAD software.

Course Contents:	
Unit 1	Preparation of sheets on B.I.S. (Bureau of Indian Standards) Conventions for Engineering Materials. Spur, helical and bevel gears. Worm and worm wheel. Rack and pinion. Gear assemblies. Type of helical coil, disc and leaf springs. Internal and external threads. Square thread. Splined shaft, diamond knurling, BIS conventions for sectioning, type of sections. Exceptional cases in sections. BIS methods of linear and angular dimensioning. Symbolic representation of welds as per BIS. conventions.
Unit 2	Preparation of sheets on free hand sketching of machine components like nut, bolts, square and hexagonal nuts, flanged nuts, lock nut, dome nuts, capstan nut, wing nut, castle nut, split pin, square headed bolt, cup headed bolt, T-headed bolt, Rag foundation bolt, stud, washer. Various types of rivets. Various types of keys. Flat pulley, Knuckle joint, Rigid flanged coupling, Solid and bush bearing, Plummer block and applications of above machine components.
Unit 3	Interpenetration of solids - prism with cylinder (Prisms limited up to rectangular base), cylinder with cylinder.
Unit 4	Assembly and details drawing with part list of a assembly containing 6-8 major components.
Unit 5	Preparation of production drawing of a given component using Computer aided drafting.

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Course Contents:

1. Preparation of sheets on B.I.S. (Bureau of Indian Standards) Conventions on A2 size sheet.
2. Preparation of sheets on free hand sketching of machine components on A2 size sheet.
3. Preparation of sheets on interpenetration of solids on A2 size sheet.
4. Computer aided drafting of components and print out of the same on A4 size sheet (minimum eight).
5. Computer aided drafting of details and assembly containing 6-8 major components. Print out of the same on A4 size sheet.
6. Preparation of production drawing of a given component using Computer aided drafting. Print out of the same on A4 size sheet.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Machine Drawing	R. K. Dhavan,	S. Chand and Company.	1st	2007
02	Machine Drawing.	N. D. Bhatt	Charotor Publication House, Bombay.	5th	2010
03	Production Drawing	Narayana, Kannaiah and Venkatareddy,	New Age International	3rd	2008
04	Machine Drawing	Warren Luzadder	Prentice Hall, India	11th	1999

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Machine Drawing	P.S. Gill	S.K. Kataria and Sons Delhi.	17th	2008
02	Auto cad 2014 for engineers and designers	Sham Tickoo	Dreamtech Publisher	1st	2013
03	Advanced AutoCAD	Robert M. Thomas	Tech Publication.	3rd	1993
04	Exercise workbook for Advanced AutoCAD 2006	Cheryl R. Shrock	New Age International Publication.	1st	2006

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Course Details:

Class	S.Y.B. Tech, Semester-III
Course Code and Course Title	**2MEVS208, Python Programming Laboratory**
Prerequisite/s	2MEVS107, 2MEVS116
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme **P** **ISE/ESE**	25/00

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEVS208_1	**Prepare** programs for given problems without error using python basics, Python's syntax, data types, variables, operators, and basic programming concepts.
2MEVS208_2	**Apply** data structures effectively for storing, manipulating, and retrieving data with the concepts of string, list dictionaries, sets, range and tuples.
2MEVS208_3	**Implement** Python programs for computational problems, using techniques learned in flow control block.
2MEVS208_4	**Design** functions and import modules for repetitive use of sub-program, relating concepts of in-built functions, user defined functions and modules.
2MEVS208_5	**Use** effective debugging skills while resolving common errors with concepts of exception handling.

Course Content:	
Unit 1	**Introduction to Python:** Installation and Working with Python Introduction, why python, Versions of Python, SET PATH, PEP 8 standards , Coding conventions , Understanding Python variables, Identifier rules, Literals, Keywords, IDLE and information, Different ways of execution, Scripting, Python Operators
Unit 2	**Python Data Types** Mutable and Immutable data types, Declaring and using Numeric data types: int, float, complex, Using string data type and string operations, Defining list and list slicing, its methods, Use of Tuple data type
Unit 3	**Python String, Tuple Manipulations** Building blocks of python programs, Understanding string built-in methods, String manipulation using built-in methods, Tuple operation,
Unit 4	**Python List, set and Dictionary Manipulations** List manipulation using built-in methods, Set: its methods and manipulation, Dictionary: its methods and manipulation, functions.

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Unit 5	**Python Program with Flow Control blocks** Conditional blocks using 'if', 'else' and 'elif', 'nested if', 'elif' ladder, Simple 'for' loops in Python, 'For' loop using range, string, list and dictionaries, Use of 'while' loops in Python, Loop manipulation using: pass, continue, break , Programming using Python conditional and loops block.
Unit 6	**Introduction to Functions and Object orientated Programming:** Defining and calling functions, Function parameters and return values, Scopes and namespaces, Exception handling, Introduction to Object orientated Programming.

Course Content:

01 **Introduction to Python:**
- Write a program to print "Hello, World!" on the console.
- Perform basic arithmetic operations (addition, subtraction, multiplication, division) using Python.
- Write a program to convert temperature from Celsius to Fahrenheit.

02 **Data Types and Variables:**
- Create variables of different data types (integer, float, string) and perform operations on them.
- Use string manipulation techniques (concatenation, slicing) to modify and display strings.
- Write a program to swap the values of two variables without using a temporary variable.

03 **Data Structures:**
- Create and manipulate string.
- Implement basic operations on string (string alteration) .
- Write a program to find index value of the substring in the given string.

04 **Data Structures:**
- Create and manipulate lists, tuples, and dictionaries.
- Implement basic operations on lists (append, insert, remove, sort) and dictionaries (add, delete, update).
Write a program to find the second-largest number in a list.

05 **Control Structures:**
- Implement conditional statements (if-else) to check and display the largest among three numbers.
- Write a program to find the factorial of a given number using a while loop.
- Implement a for loop to print the Fibonacci series up to a specified limit.

06 **Functions and Modules:**
- Create a function to calculate the area and perimeter of a rectangle.
- Write a program that imports a custom module and uses its functions to perform mathematical operations.

07 **Exception Handling**
- Prepare **a python program to use try, except and final**

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Core Python Programming	Rao, R.N.	DreamtechPress,New Delhi	1st	2017
02	Python Object Oriented Programming	Phillips Dusty	Shroff Pub Distrib Pvt Ltd	1st	2010
03	Head First Python	Barry Paul	Shroff Pub Distrib Pvt Ltd	1st	2010
04	Texts in Computational Science and Engineering Programming	Barth,T.J. (Ed.)	Springer Pvt Ltd.,	1st	2016

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	How to Think Like a Computer Scientist Learning with Python	Downey,A.	Dreamtech Press, New Delhi	1st	2015
02	Machine Learning in Data Science Using Python	Rao,R.N.	Dreamtech Press, New Delhi	1st	2022
03	Texts in Computational Science and Engineering Programming for Computation Python	Barth,T.J. (Ed.)	Springer Pvt. Ltd.,	1st	2016
04	Python Programming: A Beginner's Guide To Learn Python From Zero	John Mnemonic	Paul Colbert and Eleanor Webb	1st	2020

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Course Details:

Class	S. Y. B. Tech. Semester-III
Course Code and Course Title	**2MEHS209, Universal Human Values-I**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme T ISE/MSE/ESE	50/00/00

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEHS209_1	**Integrate** the process of self-exploration to achieve Harmony in the human being's based on Holistic perspective of value education.
2MEHS209_2	**Understanding** Harmony in human being, family, society and nature /existence, based on methods to fulfill human aspiration.
2MEHS209_3	**Apply** the human values for maintaining the relationships with one self and others using the principals of harmony.
2MEHS209_4	**Adopt** the methods of maintaining harmony with the society, nature, and its existence by utilizing the human order systems.

Course Contents:		Hrs.
Unit 1	**Introduction to Value Education** Introduction, Need, Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority.	04
Unit 2	**Understanding Happiness and Prosperity** Understanding Happiness and Prosperity correctly, Prevailing sources of happiness, Prosperity and its implications Method to fulfil the human aspirations: understanding and living in harmony at various levels.	04
Unit 3	**Understanding Harmony in the Human Being - Harmony in Myself** Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health.	05

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Unit 4	**Understanding Harmony in the Family - Harmony in Human-Human Relationship** Understanding values in human-human relationship: meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship Understanding the meaning of Trust: Difference between intention and competence Understanding the meaning of Respect, Difference between respect and differentiation; Peer Pressure the Concerns and its Resolution the other salient values in relationship.	**06**
Unit 5	**Understanding Harmony in the Society** Understanding the harmony in society: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals Human order systems and dimensions	**04**
Unit 6	**Understanding Harmony in the Nature and Existence** Understanding the harmony in the Nature, Inter-connectedness and mutual fulfilment among the four orders of nature, recyclability and self-regulation in nature	**03**

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Understanding Human Being, Nature and Existence Comprehensively	UHV Team	UHV	1st	2022
02	A Foundation Course in Human Values and Professional Ethics	R. R. Gaur, R Asthana,G P Bagaria	Excel Books	2nd	2019
03	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics	R. R. Gaur, R Asthana, G P Bagaria	Excel Books	2nd	2019
04	Human Values	A.N Tripathy	New Age International	2nd	2006

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria	Excel Books	3rd	2010
02	Indian Ethos and Modern Management: Amalgam of the Best of the Ideas from the East and the West	B.L. Bajpai	New Royal Book	1st	2004
03	Small Is Beautiful	E. FSchumacher.	Hartley & Marks	1st	1999
04	An Introduction to Ethics	William Lilly	Allied	1st	1967

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Course Details:

Class	S. Y. B. Tech. Semester-III		
Course Code and Course Title	**2MEHS210, Environmental Studies**		
Prerequisite/s	--		
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00		
Credits	02		
Evaluation Scheme	**T**	**ISE/MSE/ESE**	50/00/00

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

2MEHS210_1	**Comprehend** the concepts and principles of sustainable development and its importance in environmental preservation.
2MEHS210_2	**Explain** ethical and legal responsibility of an engineer and his role in effective implementation of sustainable activities through EIA and EMS in the corporate sector.
2MEHS210_3	**Predict** impact of contemporary issues (Population Explosion, Climate change, Environmental pollution) on the environment.
2MEHS210_4	**Classify** and analyse different types of environmental pollution, understand their causes and effects, and propose control measures.
2MEHS210_5	**Prepare** a technical report highlighting importance of environment in human life by using techniques like survey, case studies, mini project.

Course Contents:		Hrs.
Unit 1	**Introduction to Environment and concept of Sustainable development:** Natural and Built Environment, Environmental Education: Definition, Scope, Objectives and importance. Components of the Environment: Atmosphere, Hydrosphere, Lithosphere and Biosphere. Biological Diversity: Introduction, Values of biodiversity, Threats to biodiversity, Conservation of biodiversity. Sustainable development goals, pillars of sustainable development.	05
Unit 2	**Energy and Natural Resources** Energy Scenario: Future projections of Energy Demand, Utilization of various Energy Sources, Conventional Energy Sources and Non-Conventional Energy Sources, Urban problems related to energy. Natural Resources: Food, Water, Forest, Geological, Equitable Use of Resources for Sustainable lifestyle. Concept of life cycle analysis, Case studies.	04

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Unit 3	**Introduction to global environmental issues, Impact of modernization** Climate change: Global warming, Ozone depletion, Acid Rain etc. Environmental Impact: Impact of Modern agriculture on the Environment, Impact of Mining on the Environment, Impact of Large dams on the Environment. Environmental pollution: Air, Water, Soil, Noise, Marine, classification of pollutants, their causes, effects and control measures. Case studies.	04
Unit 4	**Environmental Pollution** Definition: Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste Management: Causes, effects and control measures of urban and industrial wastes. E waste management. Role of an individual in prevention of pollution.	05
Unit 5	**Environmental Management and Legislation** Environmental ethics: Introduction, Ethical responsibility, issues and possible solutions. Environmental Management: Introduction to Environmental Impact Assessment, Environmental Management System: ISO 14001Standard, Environmental Auditing, National and International Environmental protection agencies pertaining to Environmental Protection. Introduction to Environmental Legislation.	04
Unit 6	**Cleaner technology:** Consumerism and Waste Products, Green buildings, Green products, Minimization of Hazardous Products, Reuse of Waste, By-products, Rainwater Harvesting, Translocation of trees. Some Success Stories. Role of Information Technology in Environment protection.	04

Text Books					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Environmental Studies	AninditaBasak	PEARSON	1st	2017
02	Environmental Studies	N.K Uberoi,	Excel Books Publications New Delhi,	1st	2005.
03	Environmental Studies from crisis to cure	R. Rajagopalan,	Oxford university press,	2nd	2011

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Environmental Science: A Global Concern	William Cunningham and Barbara Woodworth Saigo	WCB/McGraw Hill publication	5th	1999
02	Peter. H. Raven, Linda. R. Berg, George. B. Johnson	Environment	McGraw Hill publication	2nd	1998
03	"Adaptive Environmental Management	Catherine Allan & George H. Stanley (Editors),	Springer Publications.	--	2009.
04	Elements of Environmental Science and Engineering	P. Meenakshi	Prentice Hall of India Private Limited, New Delhi	-	2006

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Course Details:

Class	S. Y. B. Tech. Semester-III
Course Code and Course Title	2MECC211-Aptitude and Reasoning Part-I
Prerequisite/s	-
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme	P	ISE/ESE	25/00

(Note: Evaluation Scheme row — "P" and "ISE/ESE" are sub-columns, value 25/00)

Course Outcomes (COs) : The students will be able to:	
2MECC211_1	Solve problems based on Vedic Mathematics, Calendar, Average, Age,
2MECC211_2	Solve problems based on Speed Time distance and equations
2MECC211_3	Solve problems based on Blood Relations, Directions, Time Rate Work, Pipes and Tanks, Percentage, Profit and Loss
2MECC211_4	Solve Problems based on Spot the Error and Jumbled Para

Course Contents:		Hrs.
Unit 1	Vedic Mathematics, Calendar	04
Unit 2	Average, Ages	04
Unit 3	Speed Time Distance, Equations	04
Unit 4	Blood Relations, Directions, Time Rate Work, Pipes and Tanks	04
Unit 5	Percentage, Profit and Loss	04
Unit 6	Spot the Error, Jumbled Para	04
	Self-Study Module	02

Text Books:					
Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
02	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
03	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

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Reference Books:

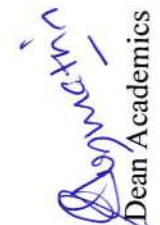| Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
02	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
03	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

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Teaching and Evaluation Scheme
S. Y. B. Tech Semester - IV

Course Code	Course Name	L	T	P	Credits	ISE Max	ISE Min	MSE	ESE	MSE+ESE Min	Total	Min	ISE Max	ISE Min	ESE Max	ESE Min	Total	Min	GRAND TOTAL
2ME****	Minor Course-I	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEPC212	Fluid Mechanics	3	-	2	4	40	16	30	30	24	100	40	25	10	25	10	50	20	150
2MEPC213	Machine Design-I	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEPC214	Manufacturing Processes	2	-	2	3	40	16	30	30	24	100	40	25	10	-	-	25	10	125
2MEPC215	Dynamics of Machines	2	-	2	3	40	16	30	30	24	100	40	25	10	-	-	25	10	125
2MEPC216	CAD Laboratory	-	-	2	1	-	-	-	-	-	-	-	25	10	25	10	50	20	50
2MEVS217	Microcontroller Laboratory	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEEL218	Innovation/Prototype	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEHS219	Psychology	2	-	-	2	50	20	-	-	-	50	20	-	-	-	-	-	-	50
2MEHS220	Constitution of India	1	-	-	1	25	10	-	-	-	25	10	-	-	-	-	-	-	25
2MECC221	Aptitude and Reasoning Part -II	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
		15	0	14	22														800
	Total Contact Hours	29																	

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Course Details:

Class	S. Y. B. Tech. Semester-IV	
Course Code and Course Title	**2MEPC212, Fluid Mechanics**	
Prerequisite/s	2MEBS105	
Teaching Scheme: Lecture/Tutorial/Practical	03/00/02	
Credits	04	
Evaluation Scheme	**T** ISE/MSE/ESE	40/30/30
	P ISE/ESE	25/25

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEPC212_1	**Explain** the fluid properties, fluid characteristics and governing equations for a given fluid/fluid system by using principles of fluid flows.
2MEPC212_2	**Identify** the fluids, fluid flows, and flow measuring devices to analyse its behaviour by using fluid mechanics principles.
2MEPC212_3	**Obtain** expressions of fluid flow parameters to understand the consequences of various consideration susing the principles of fluid mechanics.
2MEPC212_4	**Compute** the fluid flow parameters like velocity, discharge, drag, lift, dimensionless parameters etc. for a given application by using the governing equations.
2MEPC212_5	**Apply** empirical formulae to determine the velocity distribution, shear stress distribution, head losses of the flow through pipes by using fluid mechanics principles.

Course Contents: Theory		Hrs.
Unit 1	**Fluid Properties and Fluid Statics:** **A) Fluid Properties**: Definition of fluid, Fluid as a continuum, Properties of fluid, Viscosity, Types of fluid, Compressibility, Surface tension, Capillarity and vapour pressure. **B) Fluid Statics**: Pascal's law, Hydrostatic law of pressure. (Only theoretical treatment on part B)	07
Unit 2	**Fluid Kinematics:** Eulerian and Langragian approach of fluid flow, Types of flow, Streamline Path line, Streak line, Stream tube, Continuity equation in Cartesian coordinates in three dimensional forms. Velocity and Acceleration of fluid particles.	06
Unit 3	**Fluid Dynamics:** Forces acting on fluid, Euler's equation. Bernoulli's equation, Energy correction factor, Venturimeter, Orifice meter, Flow over triangular and rectangular notches, Introduction to CFD.	07

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Unit 4	**Laminar Flow and Pipe Flow:** **A) Laminar Flow:** Laminar flow through circular pipes. Laminar flow through parallel plates. **B) Pipe Flow:** Major and Minor Energy losses in pipes, Series and Parallel pipe, Siphon pipes.	07
Unit 5	**Boundary Layer Theory and Dimensional Analysis, Similitude** **A) Boundary Layer Theory:** laminar and turbulent boundary layer, Boundary layer thicknesses, its characteristics, Boundary layer separation, boundary layer control. **B) Dimensional Analysis, Similitude:** Dimensionally homogeneous equations, Buckingham's Pi-theorem, similitude, complete similarity.	07
Unit 6	**Forces on Immersed Bodies:** Lift and Drag, Drag on a flat plate and on aerofoil. Types of drags, Development of lift, Magnus effect, Stalling condition of an aerofoil.	05

Course Content: Laboratory

1. Flow visualization by Heleshaw apparatus

2. Identify the type of flow by using Reynolds's experiment.

3. Verification of Bernoulli's theorem.

4. Determination of coefficient of discharge for given Venturimeter.

5. Determination of coefficient of discharge for given orifice meter.

6. Determination of coefficient of discharge for given rectangular notch.

7. Orifice under steady flow condition to determine hydraulic coefficients.

8. Determination of velocity profile through circular pipes for laminar flow.

9. Determination of coefficient of friction for different pipes.

10. Case study on discharge measurement (Field work)

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fluid Mechanics and Hydraulic Machines	R.K.Rajput	S. Chand Publication	10th	2019
02	Fluid mechanics and hydraulic machines	P. N. Modi, S.M.Seth	Standard Book House	22nd	2019
03	Fluid Mechanics and Hydraulic Machines	S. Ramamrutham	DhanpatRai Publishing Company	8th	2020
04	Fluid Mechanics	K.L.Kumar	S.Chand Publication	5th	2020

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Fluid Mechanics	V.L.Streeter&E.B.wylie	Tata McGraw- Hill	8th	2017
02	Introduction to fluid Mechanics	Edward J. Shaughnessy	Oxford university press	5th	2018
03	Fluid Mechanics	Y.A.Cengel	McGraw-Hill,	2nd	2009
04	Fluid Mechanics	White	Tata McGraw-Hill, New Delhi	7th	2014
05	Fundamentals of Fluid Mechanics	Munson Young	Wiley India Pvt.Ltd	6th	2013
06	Fluid Mechanics	FoxMcDonald Pritchard	Wiley India Pvt.Ltd	8th	2014

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Course Details:

Class	S. Y. B. Tech. Semester-IV
Course Code and Course Title	**2MEPC213, Machine Design-1**
Prerequisite/s	2MEBS110
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme T ISE/MSE/ESE	40/30/30

Course Outcomes (COs): After successful completion of this course, the student will be able to:

2MEPC213_1	**Describe** the functional requirements, terminologies and classification with working principles of various machine elements by knowing its actual use in real practice/applications.
2MEPC213_2	**Select** the engineering material with proper selection criteria for various elements used in machines by referring the IS codes.
2MEPC213_3	**Derive** the expression to determine dimensions of machine elements under static conditions by acquired knowledge of machine element design.
2MEPC213_4	**Design** the various elements of machine on strength of material basis by using design data book or standard catalogues.
2MEPC213_5	**Compute** the design parameters of various elements of machine subjected to fluctuating conditions by referring standard design procedures.

Course Contents: Theory		Hrs.
Unit 1	**Fundamentals of Machine Design:** Concept of Machine design, basic procedure of design of machine elements, Types of loads, Factor of safety- its selection & significance, Theories of elastic failures, Review & Selection of various engineering material properties, Factors governing the selection of engineering materials.	06
Unit 2	**Mechanics of Machine element & Design for static load:** Load & stress, Fundamental concept of Shear stress-shear strain, stresses due to bending and torsional moment, principal stresses, Eccentric axial loading, Modes of failure, Design of simple machine elements under static loading- Knuckle joint, Turn buckle and Levers. Numerical on each machine element.	07
Unit 3	**Design of Threaded and Welded joints:** **a) Threaded joints:** Types of threads, Terminology of threads, Types of threaded joints, Design of bolted joint loaded eccentrically for condition such as 1) Joints in shear 2) Joints subjected to load perpendicular to the axis of bolt. Numerical on each case. **b) Welded joints** – Terms used in weld joints, Types of welded joints and weld material, Strength of transverse and parallel fillet welds, Design of welded joint loaded eccentrically for condition such as 1) Joint loaded in plane of weld 2)Joint subjected to bending moment. Numerical on each case.	07

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Unit 4	**Design of Spring:** Functions of spring, Types of springs, its material and applications, Terminology used for helical springs, styles of end, Design of helical compression spring subjected to static loading. Numerical on helical springs.	**06**
Unit 5	**Design of Power screw:** Forms of threads, Terminology of screw threads, Torque requirement, Self-locking and overhauling properties, Efficiency of square threaded, Self-locking screw, Collar friction torque, Design of power screw & nuts, Numerical on power screw applications.	**06**
Unit 6	**Design for fluctuating load:** Stress concentration - causes & remedies, fluctuating stresses, S-N diagram under fatigue load, Endurance limit, Notch sensitivity, Endurance strength-modifying factors, Design for finite and infinite life under reversed stresses, Soderberg and Goodman diagrams, Modified Goodman diagram, Fatigue design for components under combined stresses such as springs, Beams subjected to point loads etc.	**07**

Text Books:					
Sr. No	**Title**	**Author**	**Publisher**	**Edition**	**Year of Edition**
01	Design of Machine Elements	V.B. Bhandari	Tata Mc- Graw Hill Publication	3rd	2012
02	Design of Machine Element	J.F. Shigley	Tata Mc-Graw Hill Publication	8th	2010
03	Machine Design	R. K. Jain	Khanna Publication	7th	2004
04	Mechanical Engineering Design	Shigley& C. R. Miscke	Tata Mc- Graw Hill Publication	8th	2010
05	Design of Machine Elements	M. F. Spotts	PearsonsEdu. Inc.	8th	2004
06	Design of Machine Elements	P. Kannaiah	Scitech Publication.	2nd	2008

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Machine Design an Integrated Approach	R.L Norton	Pearson Education Publication	2nd	2007
02	Fundamentals of Machine Component Design	J Marshek	Willey Eastern Ltd.	3rd	2011
03	Mechanical Analysis & Design	H. Burr & Cheatam	Prentice Hall Publication.	2nd	1997
04	Machine Design	Hall, Holowenko, Laughlin	Tata Mc-Graw Hill Publication.	1st	2008
05	Standard Handbook of Machine Design	J. Shigley, C. Mischke,	Tata Mc-Graw Hill Publication.	3rd	2004
06	Design data book	V.B. Bhandari	Tata Mc- Graw Hill Publication	1st	2014

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Course Details:

Class		S. Y. B. Tech. Semester-IV
Course Code and Course Title		**2MEPC214, Manufacturing Processes**
Prerequisite/s		2MEPC206
Teaching Scheme: Lecture/Tutorial/Practical		02/00/02
Credits		03
Evaluation Scheme	T	ISE/MSE/ESE	40/30/30
	P	ISE/ESE	25/00

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEPC214_1	**Explain** the working and elements of different casting processes to produce the work using basic principle of various casting process like sand casting, permanent mould casting.
2MEPC214_2	**Interpret** the working of forming and plastic moulding processes to produce different shaped components with method of operation of these processes.
2MEPC214_3	**Differentiate** between various metal joining processes on the basis of working and elements used in joining processes like welding, soldering and brazing, riveted and bolted joints.
2MEPC214_4	**Choose** the modern manufacturing methods to cut metals, glass, plastic by using the basic principle, mechanism and components of non-conventional machining processes.
2MEPC214_5	**Select** the manufacturing process to produce the various components required in industry using the fundamental knowledge of different manufacturing processes.

Course Contents: Theory		Hrs.
Unit 1	**Introduction to manufacturing processes** Introduction and classification of manufacturing processes **Fundamentals of Casting** Importance of casting, advantages, disadvantages and limitations of casting, introduction and types of patterns and core boxes, materials used and selection criteria for patterns, pattern allowances Moulding and core processes: Types of sands used in moulding and core making, their properties. Sand moulding types such as Green sand Moulding, shell Moulding, CO_2 Moulding, Investment casting. Equipments and tools used for moulding and core making. Components of gating system, functions and importance of runners and risers, solidification control devices: chills, ceramics.	05

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Unit 2	**Casting Processes** Introduction to permanent mould casting processes such as Continuous casting, Gravity die casting, pressure die-casting, Centrifugal casting, Vacuum die casting, Squeeze casting, etc. Sand mould casting such as shell mould casting, green sand casting , dry sand casting, lost foam casting investment casing etc. various casting defects. Introduction to Additive manufacturing processes for mould making.	04
Unit 3	**Forming Processes** Various metal forming operations, hot and cold working of metals such as forging, rolling, extrusion, wire drawing, sheet metal working, spinning, swaging, thread rolling, metal forming defects etc.	04
Unit 4	**Plastic Moulding** Blow moulding, compression moulding, transfer moulding, injection moulding, extrusion, thermoforming, rotational moulding, foam moulding and calendaring etc.	04
Unit 5	**Joining Processes** Overview and classification of joining processes, Surface preparation and various joints, Arc Welding- SMAW, TIG, MIG, Resistance welding- Spot, Seam and Projection welding process, Soldering and Brazing, riveted and bolted joints. Introduction to inspection techniques to inspect the welding joints.	05
Unit 6	**Nonconventional machining processes** Need of nonconventional machining, Electro-chemical, electro-discharge, ultrasonic, LASER, electron beam, water jet machining. Introduction to Various Software used for different Manufacturing Processes.	04

Course Contents: Laboratory

1. Preparation of Pattern for solid casting with allowances.

2. Determination of Grain fineness number of moulding sand.

3. Preparation and testing of standard Specimen for Green Compressive strength.

4. Preparation of green sand mould for mould Hardness testing.

5. Produce one job based on forging operation.

6. Hands on practice on TIG/MIG welding process for different material.

7. Hands on practice on Soldering/Brazing process for material joining.

8. Industrial visit.

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Manufacturing Technology- Foundry, Forming and Welding	P. N. Rao	Tata Mc- Graw Hill Publication	2nd	2009
02	Foundry Technology	O. P. Khanna	DhanpatRai Publication	15th	2011
03	Production Technology: Vol. 1: Manufacturing Processes	P. C. Sharma	S. Chand	1st	2006
04	Production Technology: Vol. 2: Machine Tools	P.C.Sharma	S. Chand	2nd	2006
05	Workshop technology vol.1	S.K.HajraChoudhary S.K.Bose	Media promoters and publishers pvt ltd.	12th	2012
06	Workshop technology vol.2 (Machine tools)	S.K.HajraChoudhary S.K.Bose	Media promoters and publishers pvt ltd.	12th	2012
07	Workshop Technology vol. II,	B.S. Raghuvanshi	DhanpatRai and Sons.	6th	2015

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Materials and Processes in Manufacturing	E. Paul DeGarmo, J.T. Black.	PHI Publication	8th	1997
02	Mechanical Metallurgy	George E. Dieter	Tata McGraw Hill Publication	3rd	2013
03	Machine Tools and Manufacturing Technology	Steve F. Krar, Mario Rapisarda.	Delmar publisher	2nd	2010
04	Workshop Technology", Vol.I 2001, Vol.II 2007 andVol.III 1995.	W.A.J.Chapman	CBS Publishing and Distributors, N. Delhi	5th	2001

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Course Details:

Class			SY B Tech, Semester - IV
Course Code and Course Title			**2MEPC215, Dynamics of Machines**
Prerequisite/s			2MEPC202
Teaching Scheme: Lecture/Tutorial/Practical			02/00/02
Credits			03
Evaluation Scheme	T	ISE/MSE/ESE	40/30/30
	P	ISE/ESE	25/00

Course Outcomes (COs): After successful completion of this course, the student will be able to	
2MEPC215_1	**Explain** the terminologies of gyroscope, balancing, governors, dynamics of mechanisms and vibration using basic fundamentals.
2MEPC215_2	**Compute** MI of given bodies anddifferent parameters related to gyroscope, balancing, governor, dynamics of mechanisms, vibration using analytical approaches.
2MEPC215_3	**Select** the appropriate balancing technique and damping method to minimize the vibrations for selected applications through dynamic analysis.
2MEPC215_4	**Determine** the unbalanced forces and couples in different mechanical systems through graphical approach.
2MEPC215_5	**Analyze** the dynamic behaviour of a system using the theory of free vibration.

Course Contents: Theory		Hrs.
Unit 1	**Gyroscope**	05
	Introduction, Angular acceleration, gyroscopic couple, Effect of gyroscopic couple on an aeroplane, naval ship, Stability of four-wheelers, Gyroscope sensors, Gyroscopic stabilization	
Unit 2	**Governor Mechanism**	04
	Governors Comparison between governors and flywheel. Types-centrifugal governors, inertia governors. Force analysis - gravity loaded governors-Porter, Spring loaded governors-Hartnell	
Unit 3	**Static and Dynamic force analysis of mechanisms**	04
	Static and dynamic force analysis of mechanisms: Velocity and acceleration of slider crank mechanism by analytical method, Inertia force and torque, D'Alemberts's principle, Dynamically equivalent system	
Unit 4	**Balancing of Rotary Masses**	04
	Static and dynamic balancing, Balancing of a single rotating mass by a single mass rotating in the same plane, Balancing of a single mass by two masses rotating in different planes, Balancing of several masses rotating in the same plane, Balancing of several masses rotating in different planes	

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Unit 5	**Balancing of Reciprocating Masses**	
	Primary forces, Secondary forces and a couple in reciprocating machines, Balancing of single cylinder, Balancing of Multi-cylinder inline engine, Balancing of radial engines, Direct and Reverse crack methods of Balancing	05
Unit 6	**Fundamentals of Vibration and Single DoF**	
	Basic concepts and definitions, vibration measuring parameters-Displacement, free and forced vibrations, equivalent springs, types of damping	04
	Single degree of freedom systems: Free vibrations with and without damping (Rectilinear, torsional and transverse), degree of damping, logarithmic decrement	

Course Contents: Laboratory:

01	Determination of MI of a connecting rod using a compound pendulum method.
02	Determination of MI of a given component using bifilar suspension method.
03	Determination of MI of a given component using trifiler suspension method.
04	A numerical analysis of dynamically equivalent system used for connecting rod.
05	Find the gyroscopic effect on the spinning body.
06	Estimation of characteristics for a Hartnell governor.
07	Experiment on balancing of masses rotating in different planes.
08	A graphical analysis of unbalanced primary and secondary forces and a couple of inline reciprocating engine
09	Experiment to determine the theoretical and experimental natural frequency of spring mass system and verify with PYTHON.
10	Find the damping factor of a given system by Logarithmic decrement experimentally and plot a time response using PYTHON.

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Theory of Machines	Ratan S.S	Tata McGraw Hill New Delhi.	3rd	13th reprint 2012
02	Theory of Machines	P.L.Ballany	Khanna Publication, New Delhi	25th	2012
03	Theory of Machines	V.P. Singh	DhanpatRai and Sons	3rd	2012
04	Kinematics & Dynamics of Machines	George Martin	Waveland Press, Inc.	2nd	2002
05	Mechanical Vibrations	V. P. Singh	DhanpatRai and Sons	6th	2017
06	Mechanical Vibrations	G.K.Grover	Nem Chand & Bros, Roorkee, U.K., India	8th	2014

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Theory of Machines	Thomas Bevan	CBS Publishers, New Delhi.	3rd	reprint 2005
02	Theory of Machines and Mechanism	Shigley	Oxford International	3rd	2009
03	Theory of mechanism and machines	Sadhu Singh	Pearson	1st	2012
04	Theory of machines and Mechanism	JagdishLal	Metropolitin Book Company	1st	2011
05	Mechanism and Machines	Gosh And Mallik	East West Press	3rd	1998
06	Theory of Machine	Sarkar	Tata McGraw Hill	1st	2002
07	Mechanical Vibrations	SingiresuS.Rao	Pearson Education	6th	2004

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Course Details:

Class	SY B Tech, Semester - IV
Course Code and Course Title	**2MEPC216, CAD Laboratory**
Prerequisite/s	2MEES106
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme	P	ISE/ESE	25/25

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEPC216_1	**Draw** 2D drawings as per given drawing utilizing the modelling software interface.
2MEPC216_2	**Prepare** parametric solid models, surface models and simulation incorporating modelling features with the drawing of given components.
2MEPC216_3	**Modify** parametric solid models, surface models and simulation using modification features with the given constraints.
2MEPC216_4	**Prepare** assembly models using assembly features with the desired assembly constraints.
2MEPC216_5	**Apply** drafting technique on 3D model conforming to recognized standards and conventions using concepts of dimensioning, tolerance, and annotation.

Course Contents: Theory	
Unit 1	**Introduction to CAD/CAM/CAE** Introduction to CAD, CAM, CAE, modelling, simulation, analysis and optimization. Different CAD software, file format IGES, STEP, applications. Introduction to Graphical User Interface (GUI) of 3D modelling software, 2D sketching.
Unit 2	**Solid Modelling** Parametric solid modelling – fundamentals, transform the parametric 2-D sketch into a 3D solid, introduction to different commands in 3-D solid modelling, feature operations.
Unit 3	**Assembly Modelling** Introduction to Assembly modelling, defining relationship between various parts of machine, top down approach, bottom up approach, creation of constraints, generation of exploded view.
Unit 4	**2–D Drafting** Introduction to Drafting, Production drawing – Generation of 2-D sketches from solid model and assembly model, Geometric Dimensioning and Tolerance, straightness, perpendicularity, flatness, angularity, roundness, concentricity, cylindricity, run out, profile, true position, parallelism, orientation.

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Unit 5	**Surface Modelling** Introduction to surface modelling, difference between part modelling and surface modelling, various commands in surface modelling, creation of different surfaces.
Unit 6	**Kinematics Simulations** Introduction to DMU Kinematics, defining constraints, simulating motion of different parts of the assembly, velocity and acceleration of assembly parts.

Course Contents: Laboratory
1. Introduction to CAD/CAM/CAE
2. Solid Modelling with drafting - 3 Exercises
3. Assembly with minimum 5 components - 2 Exercises
4. Surface Modelling - 1 Exercises
5. DMU Kinematics - 1 Exercises

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	CAD/CAM	Ibrahim Zeid, R. Sivasubramanian	Tata McGraw Hill Pvt. Ltd.	1st	2008
02	CAD/CAM (Principles & Applications)	P.N.Rao	Tata McGraw Hill Pvt. Ltd.	5th	2012
03	CAD/CAM	KuldeepSareen, ChandandeepGrewal	S.Chand	1st	2009
04	CATIA V6R16/17	ShyamTickoo Deepak Maini.	DreamTech Press.	-	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	CAD/CAM	M.P.Grover, E.W.Zimmer.	Prentice Hall of India Pvt. Ltd.	1st	2007
02	CAD/CAM/CIM	Radhakrishnan, Subramanyam,	New Age Int. Publishers.	3rd	2004, 2008
03	Computer Aided Mechanical Design & Analysis	V. Ramamurti	Tata McGraw Hill Pvt. Ltd.	4th	2000
04	Computer Aided Design	C.S.Krishnamoorthy,S. Rajeev, A.Rajaraman	Narosa Publishing House	2nd	2005
05	CAD/CAM/CAE	N.K. Chougule	Scitech	1st	2009

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Course Details:

Class	SY B Tech, Semester - IV
Course Code and Course Title	**2MEVS217, Microcontroller Laboratory**
Prerequisite/s	2MEVS107, 2MEES104, 2MEVS116, 2MEPC208.
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme	P	ISE/ESE	25/00

Course Outcomes (COs):After successful completion of this course, the student will be able to:	
2MEVS217_1	**Explain** the types, working and characteristics of different sensors, actuators and Transducers using microcontrollers and IOT.
2MEVS217_2	**Integrate** different sensors and Actuators to control various parameters using Arduino-UNO board, PIC, STM32 and Raspberry Pi Microcontrollers.
2MEVS217_3	**Illustrate** speed control programme for various applications of motor using STM32 Microcontroller
2MEVS217_4	**Implement** analog value transmission and LDR control system for various industrial applications using PIC Microcontroller.
2MEVS217_5	**Test** mechanical parameters in various mechanical engineering applications using Node MCU.

Course Content: Theory	
Unit 1	**Introduction to Microcontroller:** Microcontroller Basics: Difference between microprocessor and microcontroller, architectural considerations, CPU, memory sub system, I/O sub system, control logic. Architecture of different microcontroller. Memory structure, different registers (SFR's), addressing modes.
Unit 2	**Types of Sensors and Peripherals:** Sensors: Temperature Sensor, Light Sensor, Proximity/range Sensor; Analog to digital converters: ADC Interfacing; Actuators, Displays, Motors, couplers/isolators, relays. Peripherals: Control and Status Registers, Device Driver, Timer Driver.
Unit 3	**Design and Development:** Embedded system development Environment – IDE, types of file generated on cross compilation, disassemble / de-compiler, simulator, emulator and debugging, embedded product development life-cycle, trends in embedded industry.

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Unit 4	**Introduction to Internet of Things (IOT):** Understanding IOT fundamentals, IOT Architecture and protocols, Various Platforms for IOT, Real time Examples of IOT, Overview of IOT components and IoT Communication Technologies, Challenges in IOT.

Course Contents: Laboratory:

1. Introduction to different microcontrollers (Arduino, Node MCU, PIC, STM32)
2. Introduction to different types of sensors for IOT applications
3. Various protocols for communicating in Microcontrollers.
4. Interfacing Ultrasonic sensor using Arduino kit.
5. Interfacing Temperature sensor using Arduino kit to display temperature and humidity.
6. Experiment on speed control of motor using STM 32.
7. LDR interfacing and Analog value transmission control with PIC Microcontroller.
8. Experiment on vibration measurement using wireless vibration sensor with NodeMCU.
9. Control various switches i.e. AC/DC using IOT.
10. Introduction to Raspberry pi and their control system.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Arduino Programming	Ryan Turner	Nelly B.L. International Consulting Limited	2nd	2020
02	Exploring Arduino: Tools and Techniques for Engineering Wizardry	Jeremy Blum	Wiley	1st	2019
03	Internet of Things (IoT)	Dr KamleshLakhwani	BPB Publications	1st	2020
04	Raspberry Pi For Dummies	Sean McManus	Wiley	3rd	2017

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Arduino: A Technical Reference	J. M. Hughes	O'Reilly Media	1st	2016
02	The PIC Microcontroller	John Morton	Elsevier Science	3rd	2005
03	Beginning STM32	Warren Gay	Apress	1st	2018
04	Raspberry Pi Cookbook	Simon Monk	O'Reilly	1st	2013

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Course Details:

Class	SY B Tech, Semester - IV
Course Code and Course Title	**2MEEL218, Innovation/Prototype**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme P ISE/ESE	25/00

Course Outcomes (COs):	After successful completion of this course, the student will be able to:
2MEEL218_1	Apply the product development process and adapt it to meet specific product requirements during new product development/innovations
2MEEL218_2	Identify customer needs, including latent needs, and establish target specifications aligned with market requirements.
2MEEL218_3	Generate and evaluate innovative product concepts using systematic methods such as concept screening, scoring, and testing.

Course Contents:	
Unit 1	**Introduction to Product Innovation and Development** Characteristics of Successful Product Development, Who Designs and Develops Products, Duration and Cost of Product Development, The Challenges of Product Development, The Product Development Process, and Concept Development: The Front-End Process, Adapting the Generic Product Development Process. Product Development Process Flows.
Unit 2	**Identifying Customer Needs and Product Specifications** The Importance of Latent Needs, The Process of Identifying Customer Needs, What Are Specifications? When Are Specifications Established? Establishing Target Specifications.
Unit 3	**Concept Generation and Concept Selection** The Activity of Concept Generation, A Five-Step Method, Concept Screening, Concept Scoring and Concept testing.
Unit 4	**Prototyping and Intellectual Property Rights** Understanding Prototypes, Principles of Prototyping, Prototyping Technologies, Planning for Prototypes, What Is Intellectual Property? Patent application

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Course Contents: Laboratory (Any seven)

1. Discovering User Needs: Customer Survey and Analysis
2. From Idea to Reality: Building a Simple Prototype
3. Ideas in Action: Brainstorming and Concept Sketching
4. Design Demands: Setting Effective Specifications
5. Choosing the Best: Comparing Design Concepts
6. Print Your Imagination: Introduction to 3D Printing
7. Guarding Ideas: Intellectual Property Insights
8. Developing Virtually: Simulating Product Creation
9. Market Insights: Exploring Consumer Preferences
10. Risk Alert: Identifying Design Flaws with FMEA

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Product design and development.	Eppinger, S., & Ulrich, K	McGraw-Hill Higher Education.	5th	2017
02	Engineering Design Process	Yousef Haik	Florida State University	4th	2010
03	Product design and Manufacturing	A.K. Chitale, R. C. Gupta	PHI Publication	4th	2009
04	Engineering Design Process	Yousef Haik, T. M. M. Shahin	Cengage Learning	2nd	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Product Design	Kevin Otto, Kristin Wood	Pearson Education Indian Reprint	--	2004
02	Engineering Design	George E. Dieter, Linda C. Schmidt	McGraw-Hill International	4th	2009
03	Engineering Design: A Project-based Introduction	Clive L. Dym, Patrick Little	John Wiley & Sons	3rd	2009
04	Product Design and Development	Anita Goyal, Karl T Ulrich, Steven D Eppinger	Tata McGraw-Hill Education	4th	2009

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Course Details:

Class	SY B Tech, Semester - IV
Course Code and Course Title	**2MEHS219,Psychology**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme	**T**	**ISE/MSE/ESE**	50/00/00

Course Outcomes (COs):
Upon successful completion of this course, the student will be able to:

2MEHS219_1	Identify types of emotions, domains of emotional intelligence and their effects on individual and group behavior for fostering empathy and positive relationships.
2MEHS219_2	Explain human behaviour, cognition, and emotions by psychological theories in real-life scenarios and contexts.
2MEHS219_3	Discuss effective time management strategies to overcome time-related challenges.
2MEHS219_4	Interpret psychological factors that contribute procrastination to recognize the situational triggers.
2MEHS219_5	Apply the A-B-C model to manage stress for well-being.

Course Contents:

		Hrs.
Unit 1	**Psychology** –Definition of Psychology, Different fields of Psychology, Introduction and Need of psychology	2
Unit 2	**Emotional Intelligence (EI) (Part one)**– Role of Emotions, Types of Emotions, Emotions/ stress and performance	4
Unit 3	**Emotional Intelligence (EI) (Part Two)**– Definition of Emotional Intelligence, Key signs of emotional Intelligence, How EI helps students, Marshmallow Experiment, Five domains of Emotional Intelligence	6
Unit 4	**Time Management**– Definition of Time Management, Need and importance of Time management for an individual, Effective steps/ strategies of Time Management, Obstacles of Time Management	4
Unit 5	**Procrastination** – Definition of Procrastination, Types of Procrastination excuses , How to work on excuses, Why Do People Procrastinate?, Procrastination Cycle, Challenging Your assumptions, techniques to beat Procrastination	5
Unit 6	**Stress Management** – Definition of Stress, A-B-C model for Stress, Identifying Stressful Thoughts and identifying cognitive distortions, Restructuring, Behavioural Coping Strategies	5

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Organizational Behaviour- An Evidence-Based Approach	Fred Luthan	McGraw-Hill/Irwin	12th	2011
02	Essentials of Organizational Behaviour	Stephen P. Robbins Timothy A. Judge Katherine E. Breward	Pearson	-	2018
03	Essentials of organizational Behaviour	Stephen P. Robbins	Prentice Hall	7th	2002
04	Understanding and Managing Organizational Behaviour	Jennifer M. George Gareth R. Jones	Pearson	6th	2012
05	Emotional Intelligence at Work A Professional Guide	Dalip Singh	Response Books A division of Sage Publications	3rd	2006

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Course Details:

Class	SY B Tech, Semester - IV
Course Code and Course Title	**2MEHS220, Constitution of India**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	01/00/00
Credits	01
Evaluation Scheme	**T**	**ISE/MSE/ESE**	25/00/00

Course Outcomes (COs): After successful completion of this course, the student will be able to:	
2MEHS220_1	**Explain** the meaning and history of the Indian constitution using acts of 1935 and 1947.
2MEHS220_2	**Illustrate** the features of Indian constitution for pursuance of the solemn resolution using interpretation of Preamble.
2MEHS220_3	**Recognize** morality and social responsibilities of the Indian Citizen through fundamental rights and duties.
2MEHS220_4	**Identify** different laws and regulations for setting out the practical regime using various information acts.
2MEHS220_5	**Distinguish** the functioning of the centre and state government using Indian parliamentary system and legislative system.

Course Contents:		Hrs.
Unit 1	**Constitution: Basic Structure** Meaning of the constitution law and constitutionalism, Historical perspective of the constitution of India, Government of India Act of 1935 and Indian Independence Act of 1947.	02
Unit 2	**Making of Indian Constitution :** Enforcement of the Constitution, Meaning and importance of Constitution, Making of Indian Constitution – Sources, Salient features of Indian Constitution, Preamble.	02
Unit 3	**Fundamental Rights:** Fundamental Rights – Features and characteristics, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies.	03
Unit 4	**Fundamental Duties:** Directive Principles-Definition and Meaning, 42nd Constitutional Amendment Act, List and Importance of Fundamental Duties.	02

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Unit 5	**Regulation to Information :** Introduction, Right to Information Act: 2005, Information Technology Act 2000, Electronic Governance in India, Secure Electronic Records and Digital Signatures.	02
Unit 6	**Government of The Union and States:** President of India – Election and Powers, Prime Minister of India - Election and Powers, Loksabha - Structure, Rajyasabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.	02

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Indian Polity	M.Laxmikanth	McGraw Hill Publications Delhi	7th	2023
02	The Constitution of India	P.M. Bakshi	Lexis Nexis	19th	2023
03	Introduction to the Constitution of India	Durga Das Basu	Lexis Nexis	26th	2022
04	Governance in India	M. Laxmikanth	McGraw Hill Publications Delhi	3rd	2021

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Constitution of India	V.N.Shukla	EBC	14th	2022
02	The Constitutional Law of India,	J.N. Pandey	Allahabad; Central Law Agency	59th	2022
03	Constitution of India	V.N.Tripathi	Premier Publishing Company	9th	2021
04	India's Constitution	M.V.Pylee	S. Chand Publications New Delhi	18th	2020

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Course Details:

Class			SY B Tech, Semester - IV
Course Code and Course Title			**2MECC221, Aptitude and Reasoning Part- II**
Prerequisite/s			--
Teaching Scheme: Lecture/Tutorial/Practical			00/00/02
Credits			01
Evaluation Scheme	**P**	**ISE/ESE**	25/00

Course Outcomes (COs) : The students will be able to:	
2MECC221_1	**Solve** problems based on HCF, LCM, Interest, Clock, Cubes and Puzzles
2MECC221_2	**Solve** problems based on Coding and Decoding, Seating Arrangements and Venn diagrams.
2MECC221_3	**Solve** problems based on Ratio Proportion, Partnership, Allegation, Divisibility and Number Theory
2MECC221_4	**Demonstrate** presentations using concepts delivered on confidence building and time management skills.

Course Contents:		**Hrs.**
Unit 1	HCF LCM, Simple Interest, Compound Interest	4
Unit 2	Coding- Decoding, Seating Arrangement Venn Diagrams	4
Unit 3	Clocks, Cubes, Puzzles,	4
Unit 4	Ratio Proportion, Partnership	4
Unit 5	Confidence Building, Time Management	4
Unit 6	Allegation, Divisibility and Number Theory	4
	Self-Study Module	6

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	R.S. Agarwal (Quantitative aptitude)	R.S.Agarwal	S Chand	-	2019
02	R.S. Agarwal (Verbal & Non-verbal Reasoning)	R.S.Agarwal	S Chand	-	2010
03	Wren & Martin (Verbal, Grammar)	P.C.Wren	S Chand	-	2017

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	APTIPEDIA (Quantitative, Logical, Verbal Aptitude)	Face	Wiley	-	2017
02	Wiley (Quantitative Aptitude)	P.A.Anand	Maestro	-	2015
03	Arun Sharma (Verbal Ability)	Meenakshi Upadhyay	McGraw Hill	-	2020

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Annasaheb Dange College of Engineering and Technology, Ashta

An Autonomous Institute

F.Y. B. Tech.
Curriculum

MECHANICAL ENGINEERING

SEMESTER I - II
W.e.f. 2022-23

Department of Mechanical Engineering

ANNASAHEB DANGE COLLEGE OF ENGINEERING AND TECHNOLOGY, ASHTA
(An Autonomous Institute)
Department of Mechanical Engineering

Teaching and Evaluation Scheme
F. Y. B. Tech Semester I

Course Code	Course Name	Teaching Scheme				THEORY							PRACTICAL						GRAND TOTAL
						ISE		MSE+ ESE					ISE		ESE				
		L	T	P	Credits	Max	Min	MSE	ESE	Min	Total	Min	Max	Min	Max	Min	Total	Min	
2MEBS101	Applied Chemistry	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEBS102	Applied Mathematics-I	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEES103	Engineering Graphics	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEES104	Basic Electrical & Electronics Engineering	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEBS105	Applied Chemistry Laboratory	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEES106	Engineering Graphics with CAD Laboratory	-	-	4	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2MEVS107	Computer Programming Laboratory	2	-	2	2	-	-	-	-	-	-	-	50	20	50	20	100	40	100
2MEPC108	Workshop Practice-I	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEHS109	Value added Course	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
		13	1	12	19														650
	Total Contact Hours	26																	

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEBS101, Applied Chemistry**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes: Upon successful completion of this course, the students will be able to:	
2MEBS101_1	**Apply** principles of water testing to identify water quality parameters and methods of water softening using fundamental laws.
2MEBS101_2	**Classify** fuels and analytical methods to identify their characteristics using basic principles of chemistry.
2MEBS101_3	**Select** engineering, ceramic materials on the basis of its properties and applications using their chemical composition.
2MEBS101_4	**Apply** the methods of prevention of corrosion to a given metal considering it's types and factors affecting corrosion.
2MEBS101_5	**Compute** the values of hardness of water and calorific values of fuels using fundamental equations.

Course Contents:		Hrs.
Unit 1	**Water Technology:** Introduction, impurities in natural water, Water Testing: acidity, alkalinity and chlorides, hardness of water (definition, causes and significance), Calculations of total hardness, disadvantages of hard water in domestic and industrial applications. Scales and sludges: Formation in boilers and removal, Treatment of hard water by ion- exchange process, Zeolite process, Desalination of brackish water by Reverse Osmosis.	07
Unit 2	**Chemical and Instrumental Techniques:** Chemical analysis, its types, Different ways to express concentration of solution. Numerical problems. Standards and its types. **p^H-metry:** Introduction, pH measurement using glass electrode and applications. **Spectrometry:** Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's law). Instrumentation and applications of UV-Visible spectrophotometer, **Chromatography:** Introduction, Principle, instrumentation and applications of gas-liquid chromatography (GLC).	07
Unit 3	**Engineering Materials:** **A) Polymers:** Introduction, plastics, thermo-softening and thermosetting plastics, industrially important plastics like phenol-formaldehyde, urea formaldehyde. Conducting polymers, biodegradable polymers (properties and applications), composites, FRP and glass reinforced plastics (GRP). **B) Lubricants:** Introduction, classification of lubricants (solid, semisolid and liquid), lubrication and it's types, characteristics of lubricants: viscosity, viscosity index, flash point, fire point, cloud point and pour point	07

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Unit 4	**Fuels and Non-conventional Energy Sources:** **Fuels:** Introduction, classification, characteristics of good fuels, comparison between solid, liquid and gaseous fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericals on Bomb and Boy's calorimeter. **Batteries:** Introduction, Characteristics of a battery, Rechargeable Li- ion batteries (Diagram, charging-discharging reactions, advantages and applications). **Fuel Cells:** Introduction, H_2-O_2 Fuel cell (Construction, working and applications), applications of fuel cells.	**07**
Unit 5	**Corrosion & Green Chemistry:** **Corrosion:** Introduction, causes, types, Atmospheric corrosion (oxidation corrosion), Electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion. Prevention of corrosion by proper design and material selection, hot dipping (galvanizing and tinning), cathodic protection method, electroplating, metal cladding. **Green Chemistry:** Definition, Twelve principles of green chemistry, Research and industrial applications.	**07**
Unit 6	**Metallic & Ceramic Materials:** **Alloys:** Introduction, alloy definition and classification, purposes of making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high). Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy (Duralumin and Alnico). **Ceramic Materials:** Introduction, types of ceramics, types of cement & their applications, Manufacture of Portland Cement by wet process, Composition of Portland Cement & their functions- a) Chemical composition, b) Compound composition, Setting & hardening of Portland Cement.	**07**

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	A Text Book of Engineering Chemistry	S. S. Dara	S. Chand & Co. Ltd., New Delhi.	11th	2008
02	A Text book of Engineering Chemistry	ShashiChawala	DhanpatRai Publishing Co. New Delhi.	3rd	2007
03	A Test Book of Applied Chemistry	Ziyauddin D. Sande, Vijayalaxmi M. Vairat, Pratapsingh V. Gaikwad	Wiley Publications	1st	2018
04	A Textbook for Engineers and Technologists	Oleg Roussak, H. D. Gesser	Kindle Edition, Springer	2nd	2021

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Chemistry	Jain & Jain	DhanpatRai Publishing Co., New Delhi.	16th	2015
02	Industrial Chemistry	B. K. Sharma	Goel publication (P) Ltd.	10th	1999
03	Fundamentals of Engineering Chemistry	S. K. Singh	New Age International (P) Ltd, New Delhi.	1st	2009
04	Instrumental Methods of Chemical Analysis	Chatwal and Anand	Himalaya Publishing House, Mumbai.	5th	2005
05	Engineering Chemistry	Wiley India	Wiley India Pvt. Ltd., New Delhi.	1st	2012

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEBS102, Applied Mathematics I**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	03/01/00
Credits	04
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEBS102 _1	**Solve** the system of linear equations by using matrix method.
2MEBS102 _2	**Calculate** Eigen values and Eigen vectors.
2MEBS102 _3	**Compute** various measures of central tendencies, dispersion and to interpret them.
2MEBS102 _4	**Fit** the curves for bivariate data by applying least square techniques.
2MEBS102 _5	**Apply** Taylor series to find the expansion of functions.
2MEBS102 _6	**Compute** the nth power and roots of the complex number by using De-Moivre's Theorem.

Course Contents:		Hrs.
Unit 1	**Matrices and Solution of Linear System Equations:** Rank of a matrix, Normal form of a matrix, echelon form, Consistency of linear system of equations (system of homogeneous and non- homogeneous linear equation).	07
Unit 2	**Eigen Values and Eigen Vectors:** Vectors, Linear dependence and linear independence of vectors, Eigen values, Properties of Eigen values, Eigen vectors, Properties of Eigenvectors.	06
Unit 3	**Measures of Central Tendency and Dispersion:** Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Partition values: Quartiles, Deciles and Percentiles, Standard Deviation and Variance.	07
Unit 4	**Curve fitting and Statistics:** Method of Least Squares, Fitting of Straight Line, Fitting of Parabola, Fitting of exponential curves, Lines of Regression.	07
Unit 5	**Expansion of Functions and Indeterminate Forms:** Taylor's series, Maclaurin's series, Standard expansions, Expansion of function using Standard series, Indeterminate forms.	07
Unit 6	**Complex Numbers:** De Moivre's theorem, Roots of a complex number, Expansion of sin(nx) and cos(nx) in powers of sinx and/or cosx, Circular functions of a complex variable, Hyperbolic functions, relation between circular and hyperbolic functions, Inverse Hyperbolic functions.	08

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	A Text Book of Engineering Mathematics	N. P. Bali, Manish Goyal	Laxmi Publications(P) Ltd	8th	2011
02	Advanced Engineering Mathematics	H. K. Das	S. Chand	22nd	2018
03	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw Hill Publ.	6th	2010
04	Probability and Statistics for Engineers	PHI Learning private limited	Richard A. Johnson	8th	2014

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers	44th	2018
02	Advanced Engineering Mathematics	N. P. Bali, Manish Goyal	Infinity science press	7th	2010
03	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley Publishers	10th	2017
04	Probability and Statistics for Engineers	Dr. J. Ravichandran	Wiley	1st	2012

List of Tutorials:

Sr. No.	Title of Tutorials
01	Matrices and Solution of Linear System Equations
02	Matrices and Solution of Linear System Equations
03	Eigen Values and Eigen Vectors.
04	Measures of Central Tendency and Dispersion
05	Measures of Central Tendency and Dispersion
06	Curve fitting and Statistics
07	Curve fitting and Statistics
08	Expansion of Functions and Indeterminate Forms

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEES103, Engineering Graphics**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes: After successful completion of this course, the student will be able to:	
2MEES103_1	**Sketch** projection of simple geometries [point, line, planes].
2MEES103_2	**Sketch** projection of solids inclined to reference plane
2MEES103_3	**Produce** the orthographic projection.
2MEES103_4	**Produce** the isometric projection.
2MEES103_5	**Prepare** sectional view of solids.

Course Contents:		Hrs.
Unit 1	**Fundamentals of Engineering Graphics and Engineering Curves** **A) Fundamentals of Engineering Graphics:** Introduction to Drawing instruments and their uses. Different types of lines used in drawing practice, Dimensioning system as per BSI (Theoretical treatment only) **B) Engineering curves:** Construction of regular Polygons up to hexagon). Ellipse, Parabola, Hyperbola, Involute, Archimedean spiral, Cycloid.	04
Unit 2	**Projection of lines:** Introduction to First angle and third angle methods of projection. Projections of points on regular and auxiliary reference planes. Projections of lines (horizontal, frontal, oblique and Profile lines) on regular and auxiliary reference planes. The true length of a line, Point View of a line, angles made by the line with reference planes. Projections of intersecting lines, Parallel lines, perpendicular lines, and skew lines. grade and bearing of a line.	04
Unit 3	**Projection of plane:** Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes), Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Projection of plane figure inclined to both the plane. (Circle and regular polygon).	04
Unit 4	**Projection of solid:** Projection of solids such as Prisms, Pyramids, Cylinder and Cones inclined to both reference plane (excluding frustum and sphere).	06
Unit 5	**Sections of solids:** Prisms, Pyramids, Cylinders and Cones, in simple positions and inclined to one reference plane and parallel to others.	04
Unit 6	**Development of plane and curved surfaces:** Prisms, Pyramids, Cylinders and Cones along with cutting planes.	04

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Drawing & Graphics	K. Venugopal	New Age Publication	5th	2012
02	Engineering Drawing	M. B. Shaha and B. C. Rana	Pearson Education	2nd	2012
03	ABC's of Auto CAD	George Omura	BPB Publication.	--	--
04	Engineering graphic with Auto CAD 2002,	Bethune	Pearson Publication	--	--

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Drawing	N D Batt & V M Panchal	Charotor Publication House, Bombay	50th	2010
02	Engineering Drawing	Dhananjay A Jhole	Tata Mc-Graw Hill	5th	2011
03	Fundamentals of Engineering Drawing	Warren. J. Luzadder	Prentice-Hall of India.	11th	1999
04	Engineering Drawing	P S Gill	Katson books	9th	2012

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEES104, Basic Electrical & Electronics Engineering**
Prerequisite/s	Simultaneous Linear Equations & Semiconductor Physics
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEES104 _1	**Solve** the DC circuits with independent sources using Kirchhoff's laws and Network Theorems.
2MEES104 _2	**Analyze** A. C. circuits with an interpretation of the relationship between voltage, current, and power.
2MEES104 _3	**Explain** the construction and working principle of electrical machines, and their applications.
2MEES104 _4	**Discuss** the working principles and characteristics of semiconductor devices
2MEES104 _5	**Construct** sequential logic circuits and combinational logic circuits.
2MEES104 _6	**Explain** the transducer to measure the physical quantities and their applications

Course Contents:		Hrs.
Unit 1	**DC Circuits:** Electrical circuit elements, KCL and KVL. Star- delta conversion, voltage, and current sources. Thevenin, Norton, and Superposition.	07
Unit 2	**AC Circuits:** Sinusoidal waveforms, peak, average, RMS values, phasor representation, real, reactive, and apparent power. Analysis of single-phase, AC circuits consisting of R, L, C, RL, RC, RLC circuits, and three-phase balanced circuits. Voltage and current relations in star and delta.	07
Unit 3	**Electrical Machines:** Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single-Phase Transformer, and Single-Phase Induction Motor. Applications of Stepper, Servo, and Universal Motors. Introduction to Fuse & Circuit breakers	07
Unit 4	**Semiconductor Devices and Applications:** Introduction - Characteristics of PN Junction Diode, Zener Effect – Zener Diode and its Characteristics – Half Wave and Full Wave Rectifiers – Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics	07
Unit 5	**Digital Electronics:** Binary Number System – Boolean Algebra theorems– Digital circuits - Introduction to sequential Circuits– Flip-Flops – Registers and Counters – A/D and D/A Conversion	07
Unit 6	**Transducers & Applications:** Transducers for Displacement, level, temperature pressure speed measurement range specifications, Applications of transducers in Digital thermometer, weighing machine, washing machine, microwave oven, and mobile handset.	07

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Principles of Electrical Engineering and Electronics	V. K. Mehta	S. Chand & Co., Publications, New Delhi	3rd	2010
02	Basic Electrical and Electronics Engineering	D.P. Kothari	TMH, New Delhi	2nd	2014
03	Electrical Circuit Theory and Technology	John Bird	Routledge	5th	2013
04	Sensors and Transducers	D. Patranabi	PHI Learning Pvt. Ltd	2nd	2003

Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Integrated Electronics	Millman and Halkias	McGraw Hill	2nd	2010
02	Electrical Technology", Vol.–II	A.K. Thereja and B.L.Thereja,	S. Chand & Co., Publications	2nd	2007
03	Basic Electrical Engineering	U. Bakshi and A. Bakshi	Technical Publications, Pune	1st	2005
04	Electronic Principles	Albert Malvino, David Bates	McGraw Hill Education	7th	2017

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEBS105, Applied Chemistry Laboratory**
Prerequisite/s	--
Teaching Scheme:Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme: ISE/ESE	25/00

Course Outcomes: Upon successful completion of this course, the students will be able to:

2MEBS105_1	**Determine** the hardness acidity, alkalinity, chloride content using appropriate methods of titration for given sample of water.
2MEBS105_2	**Estimate** rate of corrosion in acidic and alkaline medium by depreciation of weight.
2MEBS105_3	**Use** pH meter to determine pH value of given solution and validate the findings with suitable optical method (photo-colorimeter) and graphical methods.
2MEBS105_4	**Analyze** coal sample, lubricants and aqueous solutions to get the percentage compositions using appropriate methods.
2MEBS105_5	**Communicate** effectively about laboratory work both orally and writing.

List of Experiments:

Expt. No.	Title of the Experiment
01	Determination of acidity of water sample. (Neutralization Titration)
02	Determination of alkalinity of water sample. (Acid- Base Titration).
03	Determination of chloride content of water by Mohr's method. (Precipitation Titration).
04	Determination of total hardness of water sample by EDTA method.
05	Determination of moisture, voltile and ash content in a given coal sample. (Proximate analysis)
06	Preparation of Urea-formaldehyde resin.
07	Determination of viscosity of lubricating oil.
08	Estimation of zinc in brass solution (Displacement Titration)
09	Estimation of copper in brass solution (Displacement Titration)
10	Determination of rate of corrosion of aluminum in acidic and basic medium
11	Determination of pH of sample solution by pH meter
12	Determination of calorific value of fuel using Bomb calorimeter.
13	Demonstration of Photo-colorimeter.

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	A Text Book of Engineering Chemistry	S. S. Dara	S. Chand & Co. Ltd., New Delhi.	11th	2008
02	A Text book of Engineering Chemistry	ShashiChawala	DhanpatRai Publishing Co. New Delhi.	3rd	2007
03	A Test Book of Applied Chemistry	Ziyauddin D. Sande, Vijayalaxmi M. Vairat, Pratapsingh V. Gaikwad	Wiley Publications	1st	2018
04	A Textbook for Engineers and Technologists	Oleg Roussak, H. D. Gesser	Kindle Edition, Springer	2nd	2021

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Chemistry	Jain & Jain	DhanpatRai Publishing Co., New Delhi.	16th	2015
02	Industrial Chemistry	B. K. Sharma	Goel publication (P) Ltd.	10th	1999
03	Fundamentals of Engineering Chemistry	S. K. Singh	New Age International (P) Ltd, New Delhi.	1st	2009
04	Instrumental Methods of Chemical Analysis	Chatwal and Anand	Himalaya Publishing House, Mumbai.	5th	2005
05	Engineering Chemistry	Wiley India	Wiley India Pvt. Ltd., New Delhi.	1st	2012

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEES106, Engineering Graphics with CAD Laboratory**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	00/00/04
Credits	02
Evaluation Scheme: ISE/ESE	50/00

Course Outcomes: After successful completion of this course, the student will be able to:	
2MEES106_1	**Prepare** drawing of Points, lines, Planes using Auto Cad.
2MEES106_2	**Plot** projection of solids.
2MEES106_3	**Produce** the orthographic projection.
2MEES106_4	**Plot** the isometric projection.
2MEES106_5	**Prepare** sectional view of solids.

Course Contents: Theory

1. Basic command to draw 2- D objects like line, point, circle, arc, ellipse, polygon, Polyline, spline etc.
2. Editing: Erase, extension, breaking, fillet, chamfer, trimming, scaling etc.
3. Viewing and other: Zoom pan, mirroring, rotating, moving objects, arrange blocks, Offset etc.
4. Hatching of sections.
5. Use of layers in drawing
6. Plotting of drawing

Course Contents: Laboratory

Sr. No.	Title
01	Computer aided drafting of Line, circle and polygon (upto Hexagon only).
02	Computer aided drafting of orthographic vies of simple 3d objects.
03	Computer aided drafting of Isometric view.
04	Plotting of sectional views of given solids or small 3D machine components.

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Drawing	N D Batt & V M Panchal	Charotor Publication House, Bombay	50th	2010
02	Engineering Drawing	Dhananjay A Jhole	Tata Mc-Graw Hill	5th	2011
03	Engineering Drawing	P S Gill	Katson books	9th	2012
04	ABC's of Auto CAD	George Omura	BPB Publication.		
05	Engineering graphic with Auto CAD 2002,	Bethune	Pearson Publication		

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Drawing & Graphics	K. Venugopal	New Age Publication	5th	2012
02	Engineering Drawing	M. B. Shaha and B. C. Rana	Pearson Education	2nd	2012

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEVS107, Computer Programming Laboratory**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	02/00/02
Credits	02
Evaluation Scheme: ISE /ESE	50/50

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEVS107_1	**Write,** compile and debug programs in C language.
2MEVS107_2	**Make** use of different data types and operators to solve various civil Engineering problems.
2MEVS107_3	**Make** use of conditional expressions and looping statements to solve civil Engineering problems associated with conditions and repetitions.
2MEVS107_4	**Demonstrate** C Programs for various problem statements.
2MEVS107_5	**Practice** C program for various Mechanical Engineering problem statements.

Course Contents: Theory		Hrs.
Unit 1	**Computer Fundamentals with Basics of Programming** Introduction to Computer, Computer System Hardware, Input and Output Devices, The meaning of algorithms, Flowcharts, Pseudo codes, Writing algorithms and drawing flowcharts for simple exercises, Memory concepts, C Program development environment.	05
Unit 2	**C Fundamentals** Importance of 'C' Language, History, Structure of 'C' Program, Sample 'C' Program, Constants, variables and data types. Operators and expressions, Managing input / output operations, Control statements-Decision making, Case control & Looping Constructs.	04
Unit 3	**Array** Array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading , writing and manipulation of above types of arrays, multidimensional arrays. Strings-Declaring and initialing character array, reading and writing string to/from terminal, arithmetic operations on characters, putting strings together, and string handling functions.	06
Unit 4	**Functions** Need of user defined functions, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, methods of parameter passing, Scope rule of functions, user defined and library functions.	04
Unit 5	**Structure & Pointers** Need of Structure, Defining a structure, declaring and accessing structure variables, structure initialization, copying and comparing structure variables, array of structures, structures and functions, Unions. Difference between	04

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	Structure & Union Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, pointer expressions, pointers and arrays, pointer and character strings, pointer and structure	
Unit 6	**File Handling** Defining and opening a file, closing a file, input/output operations on files, file handling modes, error handling during I/O operations, random access files.	05

Course Contents: Laboratory

For completion of the Term Work student should have to perform following experiments:

- Write an algorithm and draw flowchart for given problem statement.
- Implement a program using different data types and operators in C.
- Implement a C program using Decision control statement.
- Implement a C program using Repetitive control statement.
- Implement a Program to demonstrate one dimensional and two dimensional Array.
- Implement a program to demonstrate String handling functions
- Implement a Program to demonstrate user-defined function in C.
- Implement a Program to demonstrate recursion in C(factorial, Fibonacci).
- Implement a program to demonstrate pointer and pointer arithmetic in C.
- Implement program to demonstrate structure and union in C
- Implement a program to demonstrate file handling in C.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Programming And Problem Solving Using C Language	ISRD Group	McGraw-Hill Publications	2nd	2012
02	Let Us C	Yashwant Kanetkar	BPB	3rd	2011
03	C How to Program	Harvey M. Deitel, Paul J. Deitel, Abbey Deitel	Pearson	2nd	2009
04	Programming in ANSI C	E. Balguruswamy	Tata Mc-Graw Hill	4th	2008

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Reference Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	C: The Complete Reference	Herb Schildt	McGraw Hill Education	4th	2018
02	Modern C for Absolute Beginners: A Friendly Introduction to the C Programming Language	Slobodan Dmitrović	Apress	1st	2021
03	Introduction to C programming	Oxford University Press	Oxford University Press	2nd	2014
04	Introduction to computers and C programming.	S.K. Bajpai	Newagepublishers	1st	2002

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEPC108, Workshop Practice - I**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme: ISE/ESE	25/00

Course Outcomes : Upon successful completion of this course, the student will be able to:	
2MEPC108_1	**Identify** basic engineering practices and safety measures.
2MEPC108_2	**Select** appropriate measuring instruments and tools used in fitting, sheet metal and pipe fitting operations
2MEPC108_3	**Create** a male-female joint by carrying out different fitting operations.
2MEPC108_4	**Produce** a component using different sheet metal operations and tools.
2MEPC108_5	**Work** effectively in team to accomplish the assigned task.

Course Content:

1. Introduction to industrial safety, fire hazards, causes of accidents, safety precautions while working in shop, safety equipments and their uses.
2. Assignment on industrial safety.
3. Brief introduction to measuring instruments like – Steel rule, Calipers, Vernier Caliper, Micrometer, Vernier height Gauge etc. Least counts, common errors and care while using them, Use of marking gauge, 'V' block and surface plate.
4. Assignment on measuring instruments and their applications.
5. Dismantling, inspection and assembly of different products (e.g. three jaw chuck, hydraulic jack, screw jack, engine sub assembly etc.) using different tools and measuring instruments.
6. Study of various tools like- files, drills, taps, dies, fitting operations.
7. Assignment on different fitting tools and operations, types of files, tap, dies, drills.
8. Demonstration of die threading processes, pipe fittings with different joints (G.I. and PVC)
9. One job Male/Female fitting with operations- Marking, cutting, drilling, tapping, filling, etc. (One job per student)
10. Introduction to sheet metal work, specifications of metal sheet, working tools, sheet metal working operations like- cutting, bending, punching, riveting, joining by brazing and soldering.
11. Assignment on sheet metal work, tools and their operations.
12. One job like dust pan, tray, box, dust bin, book stopper in a group of 3 to 4 students.

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Workshop Technology - I & II	SK Hajara Choudhury, AK Hajara Choudhury, Nirjhar Roy	MMP Pvt. Ltd.	14th	2003
02	Workshop Technology	Gupta and Kaushik,	New Heights	5th	2011
03	Workshop Practice	R. K. Rajput	Laxmi Publicatios Pvt. Ltd.	2nd	2008
04	Workshop Technology	Khurmi and Gupta	S. Chand Publications	1st	2006

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Workshop Technology, Vol-I	B.S.Raghuvanshi	DhanpatRai and Sons	9th	2007
02	Workshop Practice	H.S.Bawa	TMH Publications, New Delhi	2nd	2012
03	Production Technology	P. C. Sharma	S. Chand Publications	11th	2011
04	Workshop Practice	Surendra D Ghatol Smith M Solanki	Nirali Prakashan	1st	2017

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	2MEHS109_A, Badminton
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS109_A1	**Improve** physical fitness.
2MEHS109_A2	**Understand** the basic rules and how they can play the game of badminton.
2MEHS109_A3	**Provide** opportunities for playing modified games to promote student learning
2MEHS109_A4	**Develop** students' critical thinking skills, problem solving skills, self-management skills, collaboration skills, risk assessment etc.
2MEHS109_A5	**Learn** various technical motor skills in badminton and how you can move better in the court.
2MEHS109_A6	**Acquiring** a satisfactory level of knowledge and experience of the sport, to enable students to play by themselves for recreation.

Course Contents:		Hrs.
Unit 1	Introduction to badminton – Aim – Objectives – Short reference in Badminton history Understand the basic rules and how they should play normal game.	04
Unit 2	Skills - Service, Net shot, Clear, Drop, Smash. Skills - Service Forehand & Backhand, Net shot, Drive (Presentation and practice to the court)	06
Unit 3	Skills – Clear, Drop, Smash Implementation of singles rules	05
Unit 4	Footwork 1 Footwork 2	05
Unit 5	Implementation of doubles rules. Forehand strokes. Motor skills practice 1	06
Unit 6	Motor skills practice 2 Motor skills practice 3 Motor skills practice 4	04

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEHS109_B,Volley Ball**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes:	Upon successful completion of this course, the student will be able to:
2MEHS109_B1	**To** send the ball over the net, according to the regulations, to the ground on the opponents ground
2MEHS109_B2	**The** ball is put into play through the service right back player within the service zone
2MEHS109_B3	**The** Ball must hit with one hand or one arm and directly send over the net opponent's court.
2MEHS109_B4	**To** valley the ball over the net before it touches on the ground
2MEHS109_B5	**The** players use their hands to volley the ball.

Course Contents:		Hrs.
Unit 1	Introduction & Understand basic volleyball rules, terminology, and scoring procedures.	04
Unit 2	Demonstrate basic skills associated with volleyball, including passing, setting, serving, attacking (spiking), and blocking.	06
Unit 3	Demonstrate the ability to perform individual offensive and defensive skills and strategies.	05
Unit 4	Demonstrate an understanding of the typical game sequencing: serve, pass, attack, defense, transition, and defense.	05
Unit 5	Understand and apply the knowledge of basic rules of volley ball. Skill Practice	06
Unit 6	Demonstrate proper etiquette and good sportsmanship. And Skill related Practice. Skill Practice	04

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEHS109_C, Kabaddi**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS109_C1	**Acquire,** analyze and interpret basic skills
2MEHS109_C2	**Appraise** the rules and regulation.
2MEHS109_C3	**Demonstrate** and assess various basic skills/techniques and game strategies.
2MEHS109_C4	**Develops** confidence, concentration and tolerance in players.
2MEHS109_C5	**This** game also Provides an opportunity for healthy competitions among equal players and help them make friends.

Course Contents:		Hrs.
Unit 1	Introduction to Kabaddi – Aim – Objectives – Short reference in Kabaddi history Understand the basic rules and how they should play normal game.	04
Unit 2	Demonstrate basic skills associated with Kabaddi, including pushing, Bonus, Tackling, attacking, and blocking	06
Unit 3	Demonstrate an understanding of the typical game sequencing: service, Bonus, attack, defense, Raiding and defense.	05
Unit 4	Demonstrate the ability to perform individual offensive and defensive skills and strategies. Stepping Practice.	05
Unit 5	Skill Demo – Stepping, Bonus, Foot touch, Toe touch, Thrust, Squat leg, Kicks & Practice.	06
Unit 6	Skill Practice And Shadow Practice	04

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEHS109_D, Foot Ball**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS109_D1	**By** applying these principles through active participation, students develop the necessary Skills and knowledge to play football.
2MEHS109_D2	**Provides** students with opportunities to improve physical fitness acquire knowledge of fitness concepts and practice positive personal and social skills.
2MEHS109_D3	**Students** will gain an understanding of how a wellness lifestyle affects one's health, fitness and physical performance

Course Contents:		Hrs.
Unit 1	Introduction to Football – Aim – Objectives – Short reference in Football history Understand the basic rules and how they should play normal game.	04
Unit 2	Introduce students to the basic skills and knowledge associated with football. Understand basic football rules, terminology, and safety concerns.	06
Unit 3	Demonstrate the basic football skills of passing, three point stance, catching, blocking, hand-offs, punting, the carry and kicking & Practice.	05
Unit 4	Demonstrate the ability to perform individual offensive and defensive skills and strategies.	05
Unit 5	Improve personal fitness through participation in yoga, muscular strength, muscular endurance, and flexibility activities & Practice.	06
Unit 6	Successfully participates in skill improvement and offensive game strategies & Practice	04

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEHS109_E, Bharatnatyam Classical Dance**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS109_E1	**Interpolation** of Indian classical dance forms & basic types of Bharatnatyam.
2MEHS109_E2	**Subdivide** bharatnatyam in terms of Nrutt, Nrutya & Nattya.
2MEHS109_E3	**Show** the perform base on signal & combine hand posture in terms of Ganesh Vandana & Mahalaxmi Ashtak

Course Contents:		Hrs.
Unit 1	History of Bharatnatyam Dance style & information about all Indian classical dance forms.	01
Unit 2	Basic types of Bharatnatyam: - Tatty Advu, Natty advu, Vishruadvu, Kuddit Mettadvu, Mettadvu, tattikudditmettadvu & Tirmanam (small). Study of Navras Abhinay. Single Hand posture, Footwork, Shirobhed (head movement),	10
Unit 3	Combine Hand posture. Meaning of Guruvandna, Ganesh, mahalaxmi shlok. Definition of Nrutt, Nrutya & Nattya.	06
Unit 4	Practical session of Ganeshvandna Shlok in classical music.	06
Unit 5	Practice Sessions. & Presentation of Ganesh vandna	07
Unit 6	History of Bharatnatyam Dance style & information about all Indian classical dance forms.	01

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEHS109_F, Harmonium Classical Music**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS109_F1	**Outline** in History Harmonium & different Ragas.
2MEHS109_F2	**Perform** on different songs
2MEHS109_F3	**Role** plays the different music by means of harmonium.

Course Contents:		Hrs.
Unit 1	History & Introduction of Harmonium.	02
Unit 2	Harmonium presentation of Raag:-Bhoopraag / Bhimpalash raag.	12
Unit 3	Practice sessions.	03
Unit 4	Practice song notations & Harmonium Dhoon (percussion)	08
Unit 5	Practice sessions & students presentations	05
Unit 6	History & Introduction of Harmonium.	02

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	**2MEHS109_G, Indian Folk Dance**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS109_G1	**Discuss** different types in Indian Folk dance.
2MEHS109_G2	**Demonstrate** Navras Abhinay, Tribal dance, Dhangari & Lavni dance.
2MEHS109_G3	**Compose** dance on different folk dance style.

Course Contents:		Hrs.
Unit 1	Introduction to Indian Folk dance & its forms.	02
Unit 2	Basic steps of folk dance styles.	03
Unit 3	Importance of expressions (Acting) in dance, Navras Abhinay & its types. (9 type of navras)	03
Unit 4	Tribal dance, & its different styles.	06
Unit 5	Practice sessions.	04
Unit 6	History of Dhangari & Lavni dance. Types of dhangari & lavni dance.	01
Unit 7	Steps (dance composition) of Dhangari & Lavni dance.	07
Unit 8	Practice sessions & Students performance	04

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Course Details:

Class	F.Y. B.Tech: Semester-I
Course Code and Course Title	2MEHS109_H, Karaoke Singing.
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS109_H1	**Understand** notation of the songs.
2MEHS109_H2	**Perform** happy, sad, love deviational, patriotic songs.
2MEHS109_H3	**Compose** songs in many variations.

Course Contents:		Hrs.
Unit 1	Song Notation	04
Unit 2	Happy song / Sad song (classical & semi classical)	08
Unit 3	Love song / Deviational song / Patriotic songs	08
Unit 4	Song composition	05
Unit 5	Practice session & students presentation	05

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Teaching and Evaluation Scheme
F. Y. B. Tech Semester II

Course Code	Course Name	L	T	P	Credits	THEORY ISE Max	ISE Min	MSE	ESE	MSE+ESE Min	Total	Min	PRACTICAL ISE Max	ISE Min	ESE Max	ESE Min	Total	Min	GRAND TOTAL
2MEBS110	Applied Physics	3	-	-	3	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEBS111	Applied Mathematics-II	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEES112	Applied Mechanics	3	1	-	4	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEVS113	Computer Programming Using C++	2	-	-	2	40	16	30	30	24	100	40	-	-	-	-	-	-	100
2MEHS114	Professional Communication Skill Laboratory	-	-	4	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2MEBS115	Applied Physics Laboratory	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEVS116	Computer Programming Using C++ Laboratory	-	-	2	1	-	-	-	-	-	-	-	25	10	25	10	50	20	50
2MEPC117	Workshop Practice-II	-	-	2	1	-	-	-	-	-	-	-	25	10	-	-	25	10	25
2MEES118	Design Thinking Laboratory	1	-	2	2	-	-	-	-	-	-	-	50	20	-	-	50	20	50
2MEHS119	Value added Course	-	-	2	1	-	-	-	-	-	-	-	50	20	-	-	50	20	50
		12	2	14	21														650
	Total Contact Hours	28																	

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	**2MEBS110, Applied Physics**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	03/00/00
Credits	03
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes : Upon successful completion of this course, the student will be able to :	
2MEBS110_1	**Apply** suitable optical theory to determine wavelength and divergence of monochromatic and polychromatic sources of light using relevant optical methods of testing.
2MEBS110_2	**Calculate** the interplaner spacing, lattice constant and properties of unit cell for a given crystal system based on the crystallographic study using laws of material science.
2MEBS110_3	**Use** concept of Nanotechnology to express Production technique and tools of nano material using different synthesis methods and microscopes.
2MEBS110_4	**Solve** engineering problems based on Architectural acoustics and Ultrasonic's using appropriate theories and formulae.
2MEBS110_5	**Apply** principles of Quantum mechanics to analyze observables on known wave functions using fundamental quantum mechanical processes in nature.

Course Contents:		**Hrs.**
Unit 1	**Wave Optics :** **Diffraction:-**Introduction, construction of plane diffraction grating, Diffraction at multiple slits, Determination of wavelength of particular colour using plane diffraction grating, Resolving power of grating, Numericals. **Polarization:-**Polarization of light, Polarization by double refraction, Positive and Negative crystals, Optical activity, Laurent's half shade Polarimeter, Numericals.	07
Unit 2	**Laser and Fiber Optics :** **Laser:** Introduction to laser, Laser and ordinary light, Interaction of radiation with matter- Absorption, Spontaneous emission, Stimulated emission, Pumping(Three level and four level), Population inversion, Metastable state, Laser beam Characteristics, Solid State laser (Ruby Laser), Industrial and medical applications of laser, Holography- Difference between ordinary photography and Holography, Construction and reconstruction of Hologram. **Optical fiber:** Introduction, Basic principle (total internal reflection), Structure of optical fiber, Propagation of light through optical fiber, Acceptance angle and acceptance cone (no derivation), Fractional refractive index change, Numerical aperture (no derivation), Classification of optical fiber, Advantages and disadvantages of optical fiber, Applications of optical fibers, Numericals.	07

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Unit 3	**Structure of Solids and its Characterization:** Crystalline state, Lattice, Space lattice, Basis and crystal structure, Unit cell, lattice parameters, Crystal system in brief,(Cubic, Monoclinic…Triclinic), Fourteen Bravais lattices, Properties of unit cell (number of atoms per unit cell, coordination number, atomic radius, packing fraction), Calculation of lattice constant(Relation between lattice constant and density), Symmetry elements in cubic crystal, Miller indices:- Procedure, Features and Sketches for different planes. **X-ray diffraction** (Laue method), Bragg's law, Bragg's X-ray diffractometer, Numericals.	08
Unit 4	**Nano Physics:** Introduction, Concept of nanotechnology, Production techniques:- Top-down (eg. Ball milling) and Bottom-up (eg. Sol-gel process), Tools – Scanning Electron Microscope (SEM) and Atomic Force Microscope (AFM), Applications of nano- materials, Carbon Nano Tube (CNT):- Structure, two types, properties and applications.	06
Unit 5	**Architectural acoustics and Ultrasonic :** **Architectural Acoustics:** Introduction, Basic requirements for acoustically good hall, Reverberation, Time of Reverberation, Sabine's formula (no derivation),Absorption coefficient, Factors affecting the architectural acoustics and their remedy, , Numericals. **Ultrasonic waves:** Introduction, Properties of ultrasonic waves, Production of ultrasonic waves by magneto striction method, Determination of wavelength and velocity of ultrasonic waves by using acoustic diffraction method, Detection of ultrasonic waves, Applications of ultrasonic waves, Numericals. **Microwaves-** Properties, Advantages, Disadvantages and its applications.	08
Unit 6	**Quantum Physics:** Introduction to Quantum mechanics, Plank's Quantum Theory, Photoelectric Effect, Compton Effect with theory, Wave Particles Duality, Matter waves, Properties of Matter wave, Heisenberg Uncertainty principle for position and momentum of particle, Problems.	06

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Physics	G Vijayakumari	Vikas Pub. House (P) Ltd	3rd	2009
02	A Text Book of Engineering Physics	M.N.Avadhanulu& P. G. Kshirsagar	S. Chand Publication.	12th	2006
03	Engineering Physics	P. K. Palanisamy	Sci Tech pub. (P) Ltd.	2nd	2009
04	Introduction to Nano science and Nanotechnology:	K.K. Chattopadhyay and A.N. Banerjee,	PHI Learning	3rd	2009

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Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Physics	ResnickHalliday, Krane,	John Wiley & Sons Pub.	8th	2008
02	Engineering Physics	R. K. Gaur & Gupta S. L	Dhanapat Rai Publication	8th	2008
03	Solid State Physics:	S. O. Pillai	New Age International Ltd.	6th	2007
04	Introduction to Solid State Physics	Charles Kittle,	Wiley India Pvt. Ltd	7th	2008
05	Materials Science and Engineering –	V. Raghvan,	PHI Learning.	5th	2006

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	**2MEBS111, Applied Mathematics-II**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	03/01/00
Credits	04
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEBS111_1	**Solve** problems on partial derivatives by using fundamental concepts of derivative and apply it to find Jacobian, Maxima and Minima of functions of
2MEBS111_2	**Solve** Ordinary Differential Equation by using analytical method and numerical techniques.
2MEBS111_3	**Apply** the concept of Special Functions to evaluate improper integrals.
2MEBS111_4	**Evaluate** proper and improper type of multiple integrals by using fundamental concepts of integration and apply it to find Area and Mass of a given region.
2MEBS111_5	**Solve** problems in probability theory using distributions.

Course content		Hrs.
Unit 1	**Partial Differentiation and Its Applications:** Function of two or more variables, Partial derivatives, Euler's theorem, Change of variables, Jacobin, Maxima and minima of functions of two variables.	08
Unit 2	**Ordinary Differential Equation (First order and First degree):** Linear differential equation, Equation reducible to linear differential equation, Exact differential equation, Equation reducible to exact equation, Simple electrical circuits.	07
Unit 3	**Numerical Solution of Ordinary Differential Equation (First order and First degree):** Picard's method, Taylor's series method, Euler's method, modified Euler's method, Runge-Kutta method.	06
Unit 4	**Finite Differences and Interpolation:** Finite differences, Newton's Interpolation formulae, central difference interpolation formulae (stirling formula), interpolation with unequal interval (Lagrange's formula)	06
Unit 5	**Special Functions:** Gamma function, Properties of Gamma function, Beta function, Properties of Beta function, Relation between Beta and Gamma functions.	08
Unit 6	**Multiple Integral and Its Applications:** Double Integrals, Triple integral, Change of Order of Integration, Change to polar, Applications to Area and Mass of plane lamina.	07

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Higher Engineering Mathematics	Dr. B. S. Grewal	KhannaPublishers	44th	2018
02	Advanced Engineering Mathematics	N. P. Bali, Manish Goyal	Infinity science press	7th	2010
03	Probability and Statistics for Engineers	Dr. J. Ravichandran	Wiley	1st	2012
04	Numerical Methods in Engineering & Science	Dr. B. S Grewal	KhannaPublishers	9th	2010

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	A textbook of Applied Mathematics	P. N. Wartikar & J. N. Wartikar	Pune VidyarthiGrihaPrakashan	1st	2008
02	Higher Engineering Mathematics	B. V. Ramana	Tata McGraw Hill Publ.	6th	2010
03	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley Publishers	10th	2017
04	Numerical Methods	Dr. P. Kandasamy, Dr. K.Thilagavathy, Dr. K. Gunavathi	S. Chand	1st	2010

List of Tutorial:

Sr. No.	Title of Tutorials
01	Partial Differentiation and Its Applications
02	Partial Differentiation and Its Applications
03	Ordinary Differential Equation
04	Ordinary Differential Equation
05	Numerical Solution of Ordinary Differential Equation
06	Special functions
07	Special functions
08	Multiple Integrals

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	**2MEES112, Applied Mechanics**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	03/01/00
Credits	04
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes: Upon successful completion of this course, the student will be able to:

2MEES112_1	**Interpret** the resultant force for a force system based on concepts of resolution and composition.
2MEES112_2	**Sketch** shear force and bending moment diagram for a beam under different loading conditions.
2MEES112_3	**Calculate** the forces in members of roof truss under point load by using analytical methods.
2MEES112_4	**Compute** moment of inertia for a composite plane lamina by using parallel and perpendicular axis theorem.
2MEES112_5	**Apply** the concept of dynamic equilibrium to analyze rigid bodies by using equations of motion.

Course Contents:

		Hrs.
Unit 1	**Introduction to Engineering mechanics:** Basic concept - Particle, rigid body, force system, types of force system, law of transmissibility of force, resolution of a force, composition of forces, resultant force, moment of force, Varignon's theorem.	07
Unit 2	**Beam in Equilibrium:** Concept of Equilibrium- equations of equilibrium of coplanar force system Beam: Types of beam, types of support for beam, types of load acting on beam, reactions at support, shear force, bending moment, relation between load, shear force and bending moment, shear force and bending moment diagram for statistically determinate beam (simply supported, cantilever, overhanging beam) subjected to different loading conditions.	08
Unit 3	**Analysis of Truss :** Introduction of roof truss, Types of Trusses, Determinacy of a Truss, Assumptions for analysis of truss, Analysis of truss using method of Joint and method of Section.	06
Unit 4	**Centroid and Moment of Inertia :** Introduction to centroid and center of gravity, centroid of plain lamina, moment of inertia of standard shapes from first principle, parallel and perpendicular axis theorem, Moment of inertia of composite section, radius of gyration.	07

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Unit 5	**Kinematics of linear and circular motion :** Introduction to dynamics, kinematics of linear motion, Newton's 2nd law of motion, motion under gravity, motion under variable acceleration, kinematics of circular motion, super elevation, angle of banking.	07
Unit 6	**Kinetics of linear and circular motion:** Kinetics of linear motion, D'Alembert's principle and its applications in plane motion and connected bodies, work - energy principle, work done by spring, impulse – momentum principle, friction force, torque, Newton's law for rotary motion, power.	07

Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Mechanics	S. Ramamrutham	Dhanpat Rai Publishing Company (P). Ltd	9th	2010
02	Engineering Mechanics	R.S. Khurmi	S. Chand	3rd	2006
03	Engineering Mechanics	R. K. Bansal and Sanjay Bansal	Laxmi Publications Pvt. Ltd.	6th	2013
04	Engineering Mechanics	S. B. Junnarkar	Charotar Publications	16th	2011
05	Engineering Mechanics	S.S. Bhavikatti	New Age International Pvt. Ltd.	4th	2012
06	Strength of Materials	R. K. Bansal	Laxmi Publications	6th	2011

Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Mechanics	Irving H. Shames	Prentice Hall of India, New Delhi	5th	2011
02	Vector Mechanics for Engineers Vol.-I and II	F. P. Beer and E. R. Johnson	Tata McGraw Hill Education	6th	2011
03	Strength of Materials	B. K. Sarkar	McGraw Hill Pub.	2nd	2007
04	Engineering Mechanics: Statics & Dynamics	Ferdinand Singer	Harper and Row Publications	9th	2009

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	**2MEVS113, Computer Programming Using C++**
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	02/00/00
Credits	02
Evaluation Scheme: ISE/MSE/ESE	40/30/30

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEVS113_1	**Explain** object-oriented programming concept.
2MEVS113_2	**Illustrate** the concept of class and object in programs.
2MEVS113_3	**Explain** concept of Inheritance for reusability.
2MEVS113_4	**Define** concept of overloading and polymorphism for solving the task in C++.
2MEVS113_5	**Apply** their knowledge and programming skills to solve various graphical and mechanical problems.

Course Contents:		Hrs.
Unit 1	**Introduction to Object Oriented Programming** Introduction to object-oriented structure, Basic concepts of object oriented language, Difference between structured and Object oriented language, Benefits and applications of Object oriented programming.	04
Unit 2	**Classes and Objects** Introduction of class, Declaration of class, Defining object of class, Data members and member functions, Accessing members of class, Friend function, friend Class.	04
Unit 3	**Inheritance** Single Inheritance, multilevel Inheritance, multiple Inheritance, hybrid Inheritance, hierarchical Inheritance.	04
Unit 4	**Overloading and Polymorphism** Concept of overloading: Operator overloading, function overloading, •Virtual functions, Pure virtual function, Virtual base classes, Abstract classes, Early vs. Late binding.	05
Unit 5	**File and Streams:** Overview of C++ Stream classes, File handling modes, Read File using stream classes, Write into file using stream classes.	04
Unit 6	**Programming on Computer graphics and Mechanical applications** Introduction to computer graphics, Draw line, circle, triangle, rectangle, 2D transformation and 3D transformation, programming on Newton Rapson Method, RungeKutta Method, Euler's Method.	07

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill	5th	2011
02	Let us C++	Yashwant Kanitkar	BPB Publication	2nd	2010
03	Computer Graphics	Hearn and Baker	Dorling Kindersley pvt. Ltd.	2nd	1997
04	Object-Oriented Programming in C++	Rajesh K. Shukla	Wiley India Pvt. Ltd.	1st	2008

Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Object oriented programming in C++	Robert Lafore	Pearson Education	4th	2008
02	Programming with C++	D. Ravichandran	Tata McGraw Hill	2nd	2008
03	The C++ programming Language	BjarneStroustrup	Pearson Education	3rd	2008
04	The Complete Reference: C++	Herbert Schildt	Tata McGraw Hill	4th	2008
05	Professional C++	Marc Gregoire	Wiley India Pvt. Ltd.	3rd	2015

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Course Details:

Class	F.Y. B.Tech- Semester-II
Course Code and Course Title	**2MEHS114, Professional Communication Skill Laboratory**
Prerequisite/s	12th Standard English Grammar
Teaching Scheme: Lecture/Practical	00/00/04
Credits	02
Evaluation Scheme: ISE/ESE	50/00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS114_1	**Exhibit** the skill of sentence construction considering the frame of English language rules accurately for effective and sound communication.
2MEHS114_2	**Present** their portfolio confidently considering SWOT analysis by using digital tools convincingly as per the corporate expectations.
2MEHS114_3	**Write** formal letters proficiently by following required techniques that helps in maintaining professional affairs at workplace.
2MEHS114_4	**Produce** professional presentations proficiently on assigned topics in convincing manner using necessary tools and techniques.
2MEHS114_5	**Justify** own role in communicative events with balanced zeal, in well-organized manner.

Course Contents:

01 Checking My English Communication
02 Self - Introduction
03 Presenting my Career Choices
04 Preparing my Portfolio
05 Understanding Sentence Pattern
06 Avoiding Common Errors
07 Presenting My Portfolio
08 Note Making
09 Getting Smart with Technical Description of charts/ Images/ Processes
10 Delivering Professional Presentation
11 Application and Resume Writing
12 Email Writing
13 GD (General)
14 Introducing Guest/ Friend
15 Extempore
16 GD (Technical)
17 Mock Interview
18 Organizing Event

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Textbook

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	The Professional: Defining the New Standard of Excellence at Work	Subroto Bagchi	Penguin Books India Pvt. Ltd.	1st	2011
02	Cambridge Guide to IELTS	Pauline Cullen, Amanda French	Cambridge University Press	2nd	2017
03	A Practical Course in Effective English Speaking Skills	J. K. Gangal	PHI Learning Private Limited, New Delhi	5th	2012
04	Personality Development and Soft Skills	Barun K. Mitra	Oxford University Press, New Delhi, India	7th	2012

Reference Books

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	High-school English Grammar and Composition	Wren and Martin	S. Chand and Co., New Delhi	1st	2015
02	The Ace of Soft Skills	AjaiChowdary, BalaBalchandran	Pearson Publication, Delhi	8th	2013
03	Effective Technical Communication	M. Ashraf Rizvi	McGraw Hill Education, Chennai	2nd	2017
04	Business Communication	HorySankarMukerjee	Oxford University Press, New Delhi, India	2nd	2013

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Course Details

Class	F.Y. B.Tech- Semester-II
Course Code and Course Title	2MEBS115, Applied Physics Laboratory
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme: ISE/ESE	25/00

Course Outcomes : Upon successful completion of this course, the student will be able to:	
2MEBS115_1	**Build** an experimental set up to Calculate wavelength and angular Divergence of different sources of light accurately using appropriate optical methods in organized manner.
2MEBS115_2	**Calculate** band gap energy and Specific rotation for a given semiconductor and sugar solution using appropriate theories and formulae.
2MEBS115_3	**Demonstrate** Symmetries, planes and properties of unit cell for a given crystal system based on the crystallographic study using laws of material science.
2MEBS115_4	**Communicate** effectively about laboratory work both orally and writing.
2MEBS115_5	**Practice** professional and ethical behavior to carry forward in their life.

Course Contents:

Expt. No.	Title of the Experiment
01	Plane Diffraction Grating
02	Resolving power of Grating
03	Resolving power of telescope
04	Laurent's Half Shade Polarimeter
05	Kund's tube for determination of velocity of sound
06	Divergence of The LASER Beam
07	Wavelength of LASER
08	Inverse Square Law
09	Band Gap energy
10	Seven Crystal System
11	Symmetry Element of Cube
12	Numerical aperture of optical fibre
13	Double Refraction
14	Material Characterization using ultrasound.

Minimum **EIGHT** experiments should be perform from the above list.

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Engineering Physics	G Vijayakumari	Vikas Pub. House (P) Ltd	3rd	2009
02	A Text Book of Engineering Physics	M.N. Avadhanulu & P. G. Kshirsagar	S. Chand Publication.	12th	2006
03	Engineering Physics	P. K. Palanisamy	Sci Tech pub. (P) Ltd.	2nd	2009
04	Introduction to Nano science and Nanotechnology:	K. K. Chattopadhyay and A.N. Banerjee,	PHI Learning	3rd	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Fundamentals of Physics	Resnick Halliday and Walker	John Wiley & Sons Pub.	9th	2011
02	Concepts of Modern Physics	A Besir	McGraw Hill International	5th	2003
03	Solid State Physics:	S. O. Pillai	New Age International Ltd.	6th	2007
04	Introduction to Solid State Physics	Charles Kittle,	Wiley India Pvt. Ltd	7th	2008
05	Optics	Ajoy Ghatak	Tata McGraw Hill	5th	2012
06	Engineering Physics:	D.K. Bhattacharya and A. Bhaskaran,	Oxford University Press	6th	2010

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Course Details:

Class	F.Y. B. Tech, Semester - II
Course Code and Course Title	**2MEVS116, Computer Programming Using C++ Laboratory**
Prerequisite/s	0MEES105, 0MEES153
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme: ISE/ESE	25/25

Course Outcomes (COs): Upon successful completion of this course, the student will be able to:	
2MEVS116_1	**Explain** the basic concept of object-oriented programming.
2MEVS116_2	**Apply** the concepts of class, object, inheritance, overloading, polymorphism and transformation in C++.
2MEVS116_3	**Develop** programming skills to solve problems using object-oriented concept in Turbo C++.
2MEVS116_4	**Communicate** effectively, both orally and in writing journals and complete assigned tasks in team.
2MEVS116_5	**Follow** given instructions during practical performance.
2MEVS116_6	**Engage** in independent and life-long learning in the programming domain.

Course Contents:
For completion of the Term Work student should have to perform following experiments:
- Simple programs on C++, Creation of source files, Compile and Linking.
- Programs on implementation of class object and structure.
- Program on constructor and destructor.
- Program on friend function.
- Program on friend class
- Programs on single inheritance, multilevel inheritance and multiple inheritance.
- Programs on Hierarchical Inheritance & Hybrid Inheritance.
- Programs on function overloading and operator overloading.
- Programs on Virtual Function and Virtual Class concept.
- Program for File Handling. (Read Write Operations)
- Simple programs to draw line, circle, triangle etc.
- Programs on 2D, 3D transformation like scaling, translation, rotation.
- Programs on solving mechanical problems 1(Newton Raphson Method).
- Programs on solving mechanical problems 2(RungeKutta and Euler's Method).

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Object-Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill	5th	2011
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03	The C++ programming Language	BjarneStroustrup	Pearson Education	3rd	2008
04	The Complete Reference: C++	Herbert Schildt	Tata McGraw Hill	4th	2008
05	Professional C++	Marc Gregoire	Wiley India Pvt. Ltd.	3rd	2015

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Course Details:

Class	F.Y. B.Tech- Semester-II
Course Code and Course Title	**2MEPC117, Workshop Practice-II**
Prerequisite/s	2MEES254
Teaching Scheme: Lecture/Tutorial/Practical	00/00/02
Credits	01
Evaluation Scheme: ISE/ESE	25/00

Course Outcomes : Upon successful completion of this course, the student will be able to:	
2MEPC117_1	**Identify** basic engineering practices and safety measures.
2MEPC117_2	**Select** appropriate measuring instruments and tools used in welding, carpentry and smithy.
2MEPC117_3	**Prepare** different jobs using electric arc welding and smithy.
2MEPC117_4	**Produce** a wooden job using different carpentry operations and tools.
2MEPC117_5	**Work** effectively in team to accomplish the assigned task.

Course Content:

1. Introduction to types of welding, gas welding, electric arc welding, resistance welding, welding equipment's, welding of various metals, electrodes classification and coding, welding joints.

2. Assignment on types of welding, types of joints.

3. Hands on practice on TIG/MIG welding for different materials.

4. One job on arc welding – Lap, butt, L joint (For individual student) or table, shoe stand, bag stand (In a group of 4 to 6 students)

5. Introduction to carpentry – classification of wood, carpentry tools – marking tools, cutting tools, striking tools, carpentry operations – marking, sawing, chiseling, grooving, etc, carpentry joints.

6. Assignment on carpentry tools, carpentry operations and joints.

7. One composite job involving dovetail joint, T joint, cross halving joint, pen stand etc. (For individual student) or Table, Teapot, stool etc. (In a group of 4 to 6 students).

8. Introduction to smithy operations like bending, forming, upsetting, drawing, smithy tools – hammer, hot and cold chisel flatter, tongs, anvil, etc.

9. Assignment on smithy tools and operations.

10. One job in smithy involving upsetting, drawing, bending such as – hooks, square headed bolt etc.

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Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Workshop Technology-I & II	S.K Hajara Choudhury, A.K Hajara Choudhury, Nirjhar Roy	MMP Pvt. Ltd.	14th	2003
02	Workshop Technology	Gupta and Kaushik,	New Heights	1st	2005
03	Workshop Practice	R. K. Rajput	LaxmiPublicatios Pvt. Ltd.	2nd	2008
04	Workshop Technology	Khurmi and Gupta	S. Chand Publications	1st	2006

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Workshop Technology, Vol-I	B. S. Raghuvanshi	DhanpatRai and Sons	9th	2007
02	Workshop Practice	H.S. Bawa	TMH Publications, New Delhi	2nd	2012
03	Production Technology	P. C. Sharma	S. Chand Publications	11th	2011
04	Workshop Technology, Part -1	W A J Chapman	CBS	5th	2016

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Course Details

Class	F.Y. B.Tech- Semester-II
Course Code and Course Title	2MEES118, Design Thinking Laboratory
Prerequisite/s	--
Teaching Scheme: Theory/Tutorial/Practical	01/00/02
Credits	02
Evaluation Scheme: ISE/ESE	50

Course Outcomes: After successful completion of this course the students will be able to	
2MEES118_1	Apply the design thinking techniques to empathize the customer through arranging survey and/or interviews.
2MEES118_2	Identify and formulate the solution for real world problem using design thinking technique.
2MEES118_3	Create a Prototype for defined problem using design thinking approach.
2MEES118_4	Test developed prototype to meet user's requirements through customer feedback or prototype exhibitions.
2MEES118_5	Adapt ethical practices and professional skills to provide a reliable solution for defined real world problem through participating in team activities.

Course Content:

Course Contents		Hrs.
Unit 01	Introduction to Design Thinking, Design Thinking Process	02
Unit 02	Empathize Phase: Empathy and Ethics, User Perspective, Activities – Empathy Map, Planning, Persona building.	02
Unit 03	Customer Journey Mapping, Observation of stakeholders, Defining and Conceptualization of problem	02
Unit 04	Ideation, Activities –5 Whys & 1 How, Story boarding, Brainstorming.	02
Unit 05	Prototype – Types, Mindsets, Tools.	02
Unit 06	Testing – Scenario, Methods, Refinements &Recommendations.	02

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Text Books:

Sr. No.	Title	Author	Publisher	Edition	Year of Edition
01	Understanding Design Thinking, Lean, and Agile	Jonny Schneider	O'Reilly	---	2017
02	Introduction to Design Thinking	S.Salivahanan, S.Suresh Kumar, D.Praveen Sam,	Tata McGraw Hill,	---	2019
03	Karmic Design Thinking - A Buddhism-Inspired Method to Help Create Human-Centered Products & Services	Prof. BalaRamadurai,	Self-Published	--	2020
04	Design: Creation of Artifacts in Society	Prof. Karl Ulrich, U. Penn	University of Pennsylvania	--	2011

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
01	Design for How People Think	John Whalen	O'Reilly	---	2019
02	Change by Design	Tim Brown	HarperCollins	---	2009
03	Creative Confidence: Unleashing the Creative Potential Within Us All	Kelley, D. & Kelley, T	New York: William Collins	---	2014
04	Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days	Jack Knapp and others	Simon & Schuster	---	2009

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	**2MEHS119_A, Table –Tennis**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS119_A1	The students define table tennis game.
2MEHS119_A2	Willingly participates in Table Tennis as a component of an active lifestyle.
2MEHS119_A3	The students explain foot- work in forehand and backhand spin.

Course Contents:		Hrs.
Unit 1	Introduction & Understand basic Table Tennis rules, terminology, safety concerns, and scoring procedures.	04
Unit 2	Demonstrate proper court etiquette and good sportsmanship.	06
Unit 3	Demonstrate basic skills associated with table tennis including forehand, backhand, spins, grips & serves.	05
Unit 4	Demonstrate Exposition and Applying forehand and backhand straight strike.	05
Unit 5	Assess current personal fitness levels & Practice.	06
Unit 6	Use a variety of stroke placements to keep opponent moving during a table tennis match Practice.	04

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	2MEHS119_B, Kho-Kho
Prerequisite/s	--
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:

2MEHS119_B1	Helps In Motor Development.
2MEHS119_B2	It helps in social and mental development of the student
2MEHS119_B3	Kho-Kho helps the student to off depression, anxiety, stress and, increase self-esteem.
2MEHS119_B4	It develops team spirit and leadership skill.
2MEHS119_B5	It improves physical fitness.

Course Contents:		Hrs.
Unit 1	Introduction to Kho-Kho – Aim – Objectives – Short reference in Kho-Kho history Understand the basic rules and how they should play normal game.	04
Unit 2	Demonstrate basic skills associated with Kho-Kho, including Fundamental Skills. Chasing Skills- a)Giving Kho b) Taking Direction c) Sudden Change d) Tapping	06
Unit 3	Demonstrate basic skills associated with Kho-Kho, including Fundamental Skills. Chasing Skills-e)Turning Round the Post f) Trapping g) Diving h) Fake Kho i) Late kho & Practice.	05
Unit 4	Demonstrate basic skills associated with Kho-Kho, including Running Skills a)Position on the court b) Avoiding Trapping c) Positioning near poşt d) Dodging	05
Unit 5	Demonstrate basic skills associated with Kho-Kho, including Running Skills e)Front Dodge f) Back Dodge c) Round the post dodge & Practice	06
Unit 6	Kho-Kho Skills Practice & Matches.	04

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	2MEHS119_C, Basket Ball
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:

2MEHS119_C1	**Introduce** students to the basic skills and knowledge associated with basketball.
2MEHS119_C2	**By** applying these principles through active participation, students develop the necessary skills and knowledge to play basketball.
2MEHS119_C3	**Provides** students with opportunities to improve physical fitness, acquire knowledge of fitness concepts and practice positive personal and social skills
2MEHS119_C4	Students will gain an understanding of how a wellness lifestyle affects one's health, fitness and physical performance.

Course Contents:		Hrs.
Unit 1	Introduction & Understand basic basketball rules, terminology, and safety concerns.	04
Unit 2	Demonstrate the six basic basketball skills of a) Running b) Jumping c) Passing d) catching e) Dribbling and f) Shooting.	06
Unit 3	Demonstrate the ability to perform individual offensive and defensive skills and strategies.	05
Unit 4	Understand and apply the knowledge of basic rules of basketball. Skills Practice.	05
Unit 5	Demonstrate proper etiquette and good sportsmanship. Successfully participates in skill improvement and offensive game strategies.	06
Unit 6	Identify and apply injury prevention principles related to aerobic activities. Practice & Matches.	04

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	2MEHS119_D, Hand Ball
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS119_D1	The student has a basic knowledge of the team values of sports games
2MEHS119_D2	Acquainting with the characteristics and trends in the development of the discipline.

Course Contents:		Hrs.
Unit 1	Introduction & Understand basic Handball rules, terminology, and safety concerns.	04
Unit 2	Health and safety rules. Rules for obtaining credit for the course, Reminder of the history, methodology and basic rules of the game, Exercises to improve passing, grips and throws. The game. Reminder of the refereeing rules.	06
Unit 3	Improving the technique of passing and grips in a team setting. Individual ways of freeing oneself from the opponent and the organization of positional attacks with their use	05
Unit 4	Exercises improving feints and individual defense technique. Everyone's defense system. Principles of individual defense & Practice.	05
Unit 5	Improving the technique of passing and grips in a team setting. Individual ways of freeing oneself from the opponent and the organization of positional attacks with their use. The game & Practice.	06
Unit 6	Identify and apply injury prevention principles related to aerobic activities. Practice & Matches	04

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	2MEHS119_E, Katthak Classical Dance
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS119_E1	**Explain** Importance of katthak with respect to Indian culture.
2MEHS119_E2	**Demonstrate** Guruvandana, Tatkar.
2MEHS119_E3	**Compose** Katthak dance with consideration of classical & semi classical music.

Course Contents:		Hrs.
Unit 1	Introduction to Classical dance Katthak & its importance.	01
Unit 2	Guruvandana & Tatkaar.(teen taal)	03
Unit 3	Chakri & Hast-sanchalan	03
Unit 4	Tode (Tigida-tigdig-thai)	03
Unit 5	Practice sessions.	02
Unit 6	Paran & Tihaei	05
Unit 7	Classical dance on Song	05
Unit 8	Practice sessions.	08

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	2MEHS119_F,Tabla Classical instruments
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS119_F1	**Discover** History of table wadan.
2MEHS119_F2	**Demonstration** of different Taal in table wadan.
2MEHS119_F3	**Develop** notation on new music with help of table wadan.

Course Contents:		Hrs.
Unit 1	History& Introduction to Tabla Wadan.	01
Unit 2	Tabla presentation of Taal. Tritaal/ Dadra/ Zaptaal/ Kerwa/ Bhajni	05
Unit 3	Practice sessions.	06
Unit 4	Practice with notation ,& Set one song with tabla	08
Unit 5	Practice sessions & students presentations.	10

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	**2MEHS119_G, Western Dance**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS119_G1	**Describe** History of Western dance & basic of western dance.
2MEHS119_G2	**Organize** western dance individually as well as group with help of western music.
2MEHS119_G3	**Compose** western dance on songs.

Course Contents:		Hrs.
Unit 1	History of Western dance style & information about western dance.	02
Unit 2	Basic types of western dance: - worm-up, Hand- legs movements.	04
Unit 3	Teaching Basic style (focus on dance / music / movements, how to control body, emotion/feeling of music/ dance.)	06
Unit 4	Training western dance with music (original dance form of western, free style dance)	08
Unit 5	Dance composition.	05
Unit 6	Practice session , & Students Presentation	05

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Course Details:

Class	F.Y. B.Tech: Semester-II
Course Code and Course Title	**2MEHS119_H, Yoga**
Prerequisite/s	---
Teaching Scheme: Lecture/Tutorial/Practical	00 / 00 / 02
Credits	01
Evaluation Scheme: ISE/ESE	50 / 00

Course Outcomes: Upon successful completion of this course, the student will be able to:	
2MEHS119_H1	Discus importance of Yoga with respect to different forms of exercise.
2MEHS119_H2	Perform Different styles of Yoga.

Course Contents:		Hrs.
Unit 1	**Introduction** , importance of yoga, Basic exercise, sun salutation, shavasana taught yogic & excises types	06
Unit 2	**Omkar** & sleeping position seats (aasan yogic excise type) to teach omkar in a scientific way, to teach mercatasan , makrasan, setubandhan.	04
Unit 3	**Opposite** sleeping position. Shalabhasan, chakras an, Bhungasan, Makrasan. Pranayam: - Anulom-Vilom, Bhasarika, Sheetkari, Bhramari, shitali pranayam. Rapid respiration (jaladshwasan)	05
Unit 4	**Practice** sessions	05
Unit 5	**Seats** in the sitting position: - padmasan, Wajrasan, Wakrasan, Ardh-machindrasana, Urshtrasan.	04
Unit 6	**Seats** in Fine Position. (Dandstithi):-Ekpaadvrukrashasan, Veerasan, Patangasan, Trikonasan.	06

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