

FY B.TECH
MECHANICAL ENGINEERING

COURSE SYLLABI

FOR

SEMESTER I

(w.e.f. AY 2023-24)



Member Secretary
BOS (Science & Humanities)
Government College of Engineering, Karad



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BOS (Science & Humanities)
Government College of Engineering, Karad

Government College of Engineering, Karad					
First Year (Sem – I) B. Tech. Mechanical Engineering					
ME3101: Applied Mathematics I					
Teaching Scheme			Examination Scheme		
Lectures	03 Hrs/week		MSE	20	
Tutorials	01 Hrs/week		ISE	20	
Total Credits	04		ESE	60	
			TOTAL	100	
			Duration of ESE	02 Hrs 30 Min	
Course Outcomes: After completion of the course the student will be able to					
CO1	Utilize concept of linear algebra for implementing Engineering domain problems.				
CO2	Separate real and imaginary parts of Hyperbolic functions and logarithms of complex number.				
CO3	Deal with functions of several variables, Jacobian and their applications.				
CO4	Apply vector calculus for Engineering applications.				
	Course Contents			CO	Hours
Unit 1	Solution of System of simultaneous linear equations: Rank of a matrix, Rank using normal & Echelon form, System of linear equations; consistency of homogeneous & nonhomogeneous systems, Linear dependence and independence of vectors.			CO1	(7)
Unit 2	Eigen Values and Eigen Vectors: Eigen values and Eigen vectors and their properties, Cayley-Hamilton Theorem (without proof), powers of matrix, diagonalization of matrices.			CO1	(7)
Unit 3	Complex Numbers: Demoivre's theorem, Circular functions, Hyperbolic and Inverse Hyperbolic functions, logarithms of complex number, separation into real and imaginary parts of a complex number.			CO2	(7)
Unit 4	Partial Differentiation: Partial derivatives, Homogeneous functions and Euler's theorem, Composite function, total derivative, Applications to partial differentiation; Errors and Approximations			CO3	(7)
Unit 5	Jacobian: Properties, Jacobian of implicit function, partial derivatives of implicit function using jacobian.			CO3	(7)
Unit 6	Vector Calculus: Velocity and acceleration: Tangential and normal components of acceleration, Scalar and vector point functions, Gradient of scalar point function, Directional Derivatives, Curl and Divergence of vector point functions. Solenoidal and irrotational force fields.			CO4	(7)
Tutorials: Following is tentative list of tutorials to be conducted in the tutorial class based on-					(10)
1. Rank, consistency of system of equations.					
2. Linear dependence, independence of vectors.					
3. Eigen values and Eigen vectors.					
4. Powers of matrix and Diagonalization of matrices.					
5. Separation into real and imaginary part of hyperbolic and logarithmic function.					
6. Direct differentiation and Euler's theorem.					
7. Composite function and total derivative.					
8. Errors and Approximations.					
9. Jacobian of implicit function.					
10. Directional Derivatives, Curl and Divergence of vector point function.					
Text Books					
1.	H.K.Das, S. Chand and sons, Advanced Engineering Mathematics by,22 nd edition, 2018.				
2.	Debashis Datta Textbook of Engineering Mathematics New Age International Publication,6 th edition 2006.				
3.	Ravish R..Singh, Mukul Bhatt, Engineering Mathematics A Tutorial Approach,,Tata, McGraw Hill 2010.				
Reference Books					
1.	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.				
2.	Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.				
3.	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008				

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4.	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5.	D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005
6.	B. S. Grewal, Higher Engineering Mathematics, 43 th edition, Khanna publication, New Delhi 2013.
7.	N P Bali and Dr.Manish Goyal, Textbook of Engineering Mathematics Laxmi publication 12 th edition 2020.
Useful Links	
1.	http://www.nptel.iitm.ac.in
2.	www.ocw.mit.edu

Mapping of COs and POs:

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-

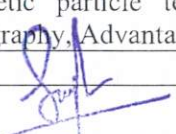
Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	-	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60


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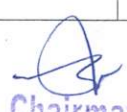

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Government College of Engineering, Karad					
First Year (Sem – I) B. Tech. Mechanical Engineering					
ME3102: Applied Physics					
Teaching Scheme			Examination Scheme		
Lectures	03 Hrs/Week		MSE	20	
Tutorials	00 Hrs/Week		ISE	20	
Total Credits	03		ESE	60	
			TOTAL	100	
			Duration of ESE	02:30 Hrs	
Course Outcomes :					
After completion of course the Students will be able to					
CO1.	Explain concepts of Crystal Structure, Quantum Physics, light for Engineering.				
CO2.	Understand physical significance and fundamental properties of crystal, light, sound, acoustics and NDT				
CO3.	Demonstrate applications of different physical phenomena in engineering and technology.				
CO4.	Compute required physical quantity from given data.				
	Course Contents			CO	Hrs
Unit 1	The structure of Crystalline Solids / Solid State Physics: Introduction (Lattice point, Space lattice, Basis, Crystalline solid), Unit cell- Primitive and non- primitive, Lattice parameters, Bravais Lattice (Seven crystal systems), Miller indices, Characteristics and examples, inter planer distance and their examples, relation between density and lattice constant, with examples, Bragg's law and spectrometer, Determination of crystal structures with X-ray diffraction spectrometer and examples.			CO1, CO2C O3	(06)
Unit 2	Wave optics Interference of light, Newton's rings, Examples, Farunhofer's diffraction from a single slit, Rayleigh criterion; Diffraction gratings and its theory, Wavelength of spectral lines, resolving power, Examples, Double Refraction, Positive and Negative crystal, Optical activity, Specific Rotation, Half Shade Polarimeter and their Examples.			CO1, CO2C O3	(07)
Unit 3	LASER Introduction, Characteristics of LASER beam, Absorption, Spontaneous Emission, Stimulated Emission, Population Inversion, Types of pumping agent, Components of LASER, Lasing action, Solid-state lasers (ruby), Diode Laser, Applications of LASER in science and engineering, Holography Techniques.			CO2, CO3, CO4	(07)
Unit 4	Acoustics and Ultrasonic Acoustics: Architectural Acoustics, Reverberation Time, Absorption, Sabine's formula, Conditions and Remedies for good acoustics, Method of design for good Acoustics problems. Ultrasonic waves: Ultrasonic waves, Characteristics of Ultrasonic waves, Magnetostriction oscillator and Piezoelectric Oscillator, Applications. Problems			CO2, CO3, CO4	(06)
Unit 5	Quantum Physics: Introduction to Quantum mechanics, Wave Particles Duality, De-Broglie waves, Properties of Matter wave, Physical significance of wave function, Heisenberg Uncertainty principle for position and momentum of particle, Compton Effect and Photoelectric Effect and their examples.			CO1, CO2	(06)
Unit 6	Non-destructive testing: Types of defect, Method of NDT, Visual Inspection, Liquid/Dye penetrant Testing, Magnetic particle testing, Eddy current testing, Ultrasonic inspection testing, x-ray radiography, Advantages.			CO2, CO3, CO4	(08)


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Text Books			
1.	Avadhanulu and Kshirsagar- Engineering Physics ,S Chand publishing		
2.	V. Rajendran -Engineering Physics,Tata McGraw-Hill Publishing Company limited		
3.			
Reference Books			
1.	S. O. Pillai, Solid State Physics: Structure & Electron Related Properties, Eastern Ltd., New Age International Ltd.		
2.	Charles Kittel, Introduction to Solid State Physics - Wiley India Pvt. Ltd.(8th Edition).		
3.	Alan Giambattista and others- Fundamentals of physics, Tata Mc. Graw Hills		
4.	B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.		
5.	R. K. Gaur & Gupta S. L, Engineering Physics -Dhanapat Rai Publication.		
6.	Arthur Beiser -Modern Physics - Tata Mc. Graw Hills		
7.	K. Thyagarajan, A. K. Ghatak- LASERS Theory and Applications ; Macmillan India Limited.		
8.	L. J. Schiff- Quantum Mechanics ; Mc-Graw Hill International Edition.		
9.	N. Subramanyam & Brijlal- Text Book of Optics ; (Vikas Publishing House Pvt.Ltd)		
Useful Links			
1.	en.wikipedia.org/wiki/ Fundamentals of Physics		
2.	www.hyperphysics.com, www.google.com		
3.	physics.info/magnetism, www.youtube.com, Nptl video		

Mapping of COs and POs

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	-	-	1	1	-	-	-	-	1	-	-
CO 2	3	2	1	-	-	1	1	-	-	-	-	1	-	-
CO 3	3	2	1	-	-	1	1	-	-	-	-	1	-	-
CO 4	3	2	1	-	-	1	1	-	-	-	-	1	-	-

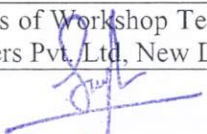
Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	20
Understand	5	4	-
Apply	5	4	10
Analyse	-	4	20
Evaluate	5	4	10
Create	-	-	-
Total	20	20	60


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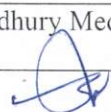

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Government College of Engineering, Karad					
First Year (Sem –I) B. Tech. Mechanical Engineering					
ME3103: Basic Mechanical Engineering					
Teaching Scheme		Examination Scheme			
Lectures	03 Hrs/week	MSE	20		
Tutorials	00 Hrs/week	ISE	20		
Total Credits	03	ESE	60		
		TOTAL	100		
		Duration of ESE	02 Hrs 30 Min		
Course Outcomes (CO):					
Students will be able to					
1	Explain thermodynamic laws, basics of IC Engines and Automobile.				
2	Describe Refrigeration and Air-Conditioning system with its different applications.				
3	Illustrate about Renewable and non-renewable energy sources and power plant.				
4	Explain Mechanical Power Transmission and different Manufacturing Processes.				
	Course Contents			CO	Hours
Unit 1	Introduction to Thermodynamics: First law of Thermodynamics - Application of first law to steady flow and non-flow processes, limitations of first law (numerical treatment), PMM-I. Second law of Thermodynamics – Statements, Carnot engine, PMM-II			CO1	(08)
Unit 2	Introduction to Automobiles: I.C. Engine : Construction and Working of C.I. and S.I. Engine, Two stroke, Four Stroke advantages and disadvantages, engine components, Air-fuel ratio. Automobile : Different chassis layouts (including electric and hybrid vehicle), Components of vehicle, Types of automobile			CO1	(07)
Unit 3	Introduction to Refrigeration and Air-Conditioning: Vapour compression and Vapour absorption system, refrigerant types and properties. Window Air Conditioning, Split Air Conditioning (descriptive treatment only). Applications of refrigeration and air conditioning			CO2	(06)
Unit 4	Energy sources and power plants: Renewable and non-renewable energy sources. Solar energy: Solar flat plate collector, concentric collector – Parabolic and cylindrical, PV cell, solar dryer, solar cooker. Wind energy. Power plants: Steam, Geothermal, Wave, Tidal, Hydro power. Bio-gas, Bio-Diesel			CO3	(06)
Unit 5	Mechanical Power Transmission: Axle, shaft, keys, pulleys, gears etc. Belt drives, gear drives and chain drives. (Simple numerical treatment on Torque, speed and power for belt and gear drive), Types of coupling, Types of bearing			CO4	(06)
Unit 6	Manufacturing Processes: Introduction to manufacturing processes: Casting process - steps involved in casting, Metal forming processes – Rolling, forging, drawing; Metal removing processes-Turning, Drilling, Milling,			CO4	(07)
Text Books					
1.	Engineering Thermodynamics, P. K. Nag, Tata McGraw Hill Publications 3rd edition, 2006				
2.	Thermodynamics and Thermal Engineering, J. Rajadurai, New age international, 1st edition 2003				
3.	Thermal Engineering, Mahesh M. Rathore Tata McGraw Hill Publications First edition, 2010				
4.	Internal Combustion Engine, V Ganeshan , Tata McGraw Hill publication 2015				
5.	Refrigeration & Air-Conditioning, C. P. Arora Tata McGraw Hill, 3 rd edition, 2010				
6.	Solar Energy, S. P. Sukhatme and J. K. Nayak, Tata McGraw-Hill, 3rd Edition 2008				
7.	Power Plant Engineering, R. K. Rajput, Laxmi Publications (P) LTD, 2008				
8.	Design of Machine Elements, V.B.Bhandari., Tata McGraw Hill Publication, 3rd Edition				
9.	Manufacturing Technology- Foundry, Forming and Welding, Vol. I, P. N. Rao Tata-McGraw-Hill, New Delhi, 3 rd edition, 2014.				
10.	Elements of Workshop Technology vol. II, S.K. Hajra Choudhury and A.K. Hajra Choudhury Media promoters and Publishers Pvt. Ltd, New Delhi, 13th Edition, 2012.				


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Reference Books				
1.	Mechanical Engineering Design, J. E. Shigley, MGH New York			
2.	Engineering Thermodynamics, J.B. Jones and Dugan , Prentice –Hall Of India, 1st edition, Reprint in India 2006			
3.	Thermodynamics – An Engineering Approach Cengel& Boles 1st edition Reprint 2000			
4.	Principles of Refrigeration, Roy J. Dossat, Wiley Eastern Limited, New Delhi,2006			
5.	Power Plant Technology, M.M.El Wakil, Tata Mc Graw Hill. Int, 2nd Edition.Reprint, (2010)			
6.	ASTM Volumes on Welding, casting, forming and material selection.			
Useful Links				
1.	http://www.nptel.iitm.ac.in			
2.	www.ocw.mit.edu			

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO 2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO 3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO 4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSC	ISC	ESE
Remember	10	10	25
Understand	05	05	20
Apply	05	05	15
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60


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Government College of Engineering, Karad			
First Year (Sem –I) B. Tech. Mechanical Engineering			
ME 3104: Applied Mechanics			
Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/week	MSE	20
Tutorials	00 Hrs/week	ISE	20
Total Credits	03	ESE	60
		TOTAL	100
		Duration of ESE	02 Hrs 30 Min

Course Outcomes :

1. Demonstrate a solid understanding of the basic concepts of mechanics.
2. Apply problem-solving techniques to analyze and solve problems related to equilibrium of rigid bodies and friction.
3. Explain the principles of trusses, including the analysis of joints and sections.
4. Utilize knowledge of centroid and moment of inertia, as well as kinematics and laws of motion, to solve practical problems.

	Course Contents	CO	Hours
Unit 1	Basic concepts and fundamental laws, force, system of forces, resolution and composition of force, resultant, Principal of transmissibility of force, Moment and couple, Varignon's theorem and law of moment, Equilibrium, free body diagram, Lami's theorem, equilibrium equations, equilibrant force.	CO1	(07)
Unit 2	Beam: Definition and types of beams, types of loads, types of supports, analysis of simple by analytical method and virtual work method to calculate support reactions. Friction: Concept of friction, angle of friction, cone of friction, angle of repose. Friction on horizontal plain and on inclined plain.	CO1	(07)
Unit 3	Analysis of Truss: Types of trusses, Assumption, Method of Joints, Method of section, Analysis of simple truss with max. 7 members. Introduction to space truss.	CO2	(07)
Unit 4	Centroid of plane and composite figures, parallel and perpendicular axis theorems, moment of inertia of standard shapes from first principle, moment of inertia of composite figures, radius of gyration, Concept of mass moment of inertia.	CO3	(07)
Unit 5	Kinematics of rectilinear motion, motion curves, Newtons motion Law, Introduction to Projectile.	CO4	(09)
Unit 6	Kinetics: - De Alembert's principle, work-energy principle, Impulse -momentum principle, Collision of elastic bodies; direct central impact, oblique impact, coefficient of restitution, loss of kinetic energy.	CO4	(05)

Text Books

1. Engineering Mechanics, S. S. Bhavikatti, New Age International Pvt. Ltd, Eighth Edition, 2021
2. Applied Mechanics, S. B. Junnerkar, Charotar Publishing House, 18 th Edition, 2015
3. Textbook of Applied Mechanics, Khurmi. R. S, Tata McGraw Hill Publishing Company, 2006
4. Engineering Mechanics (Statics and Dynamics), Palanichamy M. S., and Nagan, S., McGraw Hill Education India Pvt Ltd, 2000

Reference Books

1. Engineering Mechanics, Irving H. Shames, Prentice Hall of India, New Delhi, 2016
2. Engineering Applied Mechanics, S. N. Saluja, SatyaPrakashan, New Delhi, 1992
3. Engineering Mechanics, Irving H. Shames, Prentice Hall of India, New Delhi, 2016

Useful links

<https://nptel.ac.in/courses/122102004>

<https://archive.nptel.ac.in/courses/112/106/112106286/>

Mapping of COs and POs

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PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	1	-	1	-	-	-	-	-	-	-	-	1	-	-
CO 2	2	2	-	2	2	-	1	-	-	-	-	-	1	1	-
CO 3	2	1	-	2	2	-	1	-	-	-	-	-	1	1	-
CO 4	-	1	-	2	2	-	1	-	-	-	-	-	1	1	-

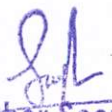
1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	MSC	ISC	ESE
Remember	10	10	25
Understand	05	05	20
Apply	05	05	15
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60


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Government College of Engineering, Karad				
First Year (Sem – I) B. Tech. Mechanical Engineering				
ME3105: Design Thinking				
Teaching Scheme		Examination Scheme		
Lectures	01 Hrs/week	MSE	--	
Practical	02 Hrs/week	ISE	50	
Total Credits	02	ESE	--	
		TOTAL	50	
Prerequisite : Professional Skills				
Course Outcomes (CO):				
Students will be able to				
1.	Compare and classify the various learning styles and apply them in their engineering education.			
2.	Develop new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing innovative products.			
3.	Prepare empathy map and journey map for problem.			
4.	Possess skills necessary to communicate design engineering ideas and design and apply innovative ideas using prototypes.			
	Course Contents		CO	Hours
Unit 1	Overview of Design Thinking Process: Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting, Design Thinking Process: Business context of innovation for applying design thinking, two models of design thinking, phases of design thinking.		CO1, CO2	(03)
Unit 2	Introduction to design thinking and its approaches: Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Origin of design thinking, understanding design thinking and its process model, Human-Centered Design (HCD) process - Empathize, Define, Ideate, Prototype and Test and Iterate or Empathize, Analyze, Solve and Test.		CO1	(04)
Unit 3	Empathize How to emphasize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, creation of user personas, customer journey mapping.		CO2, CO3	(04)
Unit 4	Analyze or Define Root cause analysis, conflict of interest, perspective analysis, big picture thinking through system operator, big picture thinking through function modelling Silent brainstorming, metaphors for ideation, CREATE and What-If tool for ideation, introduction to TRIZ, Inventive principles and their applications		CO1, CO2	(05)
Unit 5	Test (Prototyping and Validation) What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample Example, Test Group Marketing Prototyping, Assumptions during the design thinking process, Validation in the market, best practices of presentation.		CO2, CO4	(05)
Unit 6	Design Innovation Benefits of iteration in the design thinking process, taking the idea to the market, introduction to innovation management in a company.		CO4	(05)
	Laboratory Content			
Experiment 1	Understanding of Design Thinking and its process model, Principles, and tools. (Activity: Design a mind map for processes of design thinking).		CO1, CO2	
Experiment 2	How to Empathize, Role of Empathy in design thinking, Empathy Maps Design. (Activity: Construct empathy maps to provide right solution to any challenges through interviews, GD, observations, and other sources).		CO3	
Experiment 3	Methods for Empathetic Design, Creation of User Personas. (Activity: Construct Persona profile which includes user information).		CO2, CO3	

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Experiment 4	Customer Journey Mapping (Activity: Develop customer journey map to provide a roadmap visual of customers experience).	CO3
Experiment 5	Problem clarification, Understanding of the problem. (Activity: Construct worksheet for customer journey map to select best route).	CO1
Experiment 6	Problem analysis and Reformulation of the problem. (Activity: Generate summarized report for customer journey map).	CO2
Experiment 7	Case Study - students can pick one idea from their brainstorm list and use the "Sketch Prototype Worksheet" to sketch out their solution for their classmate.	CO2
Experiment 8	Root Causes Analysis, Conflict of Interest, Description of customer need.	CO4
Experiment 9	Design Cash Flow Diagram and Value Chain Analysis Diagram for weekly expenditure of person.	CO2
Experiment 10	Study the iterations in design thinking process.	CO2, CO4

Textbooks

1.	Bala Ramadurai, "Karmic Design Thinking", First Edition, 2020.
2.	E. Balaguruswamy, "Developing Thinking Skills (The way to Success)", Khanna Book Publishing Company, (2022).

Reference Books

1.	Vijay Kumar,"101 "Design Methods: A Structured Approach for Driving Innovation in Your Organization".
2.	IDEO ,"Human-Centered Design Toolkit: An Open-Source Toolkit to Inspire New Solutions in the Developing World", IDEO 2011.
3.	Marc Stickdorn and Jakob Schneider," This is Service Design Thinking: Basics, Tools, Cases", BIS Publishers,2014.
4.	Ulrich, Karl T. Design: Creation of artifacts in society, 2011.
5.	Tim Brown "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation", Harper Collins, 2009.

Useful Links

1.	https://onlinecourses.nptel.ac.in/noc22_mg32/preview By Prof. Bala Ramadurai/ IIT Madras
2.	https://youtu.be/4nTh3AP6knM
3.	https://www.tutorialspoint.com/design_thinking/design_thinking_introduction.htm

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	2	1	1	-	1	-	-	-	-	-	-	1	1
CO 2	1	1	2	2	-	-	-	1	-	-	-	-	2	1
CO 3	1	1	3	2	2	-	-	-	2	2	-	-	1	1
CO 4	1	2	2	1	1	1	-	-	-	-	-	-	2	1

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)



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Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	20	20	20	20	20	20	20	20	20	20	20
Task II	15	15	15	15	15	15	15	15	15	15	15
Task III	15	15	15	15	15	15	15	15	15	15	15
ISE											25



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First Year (Sem –I) B. Tech. Mechanical Engineering				
ME3106-Applied Physics Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/Week		ISE	25
Total Credits	1		ESE	--
			TOTAL	25
Course Outcomes :				
After the completion of the course, the students will be able to:				
CO1	Demonstrate structure of Material.			
CO2	Demonstrate a behavior of light by LASER, Ultrasonic waves and monochromatic light.			
CO3	Compute required physical quantity from given data.			
CO4	Demonstrate recent synthesis methods for engineering and technology.			
Course Contents				CO
Experiment 1	To identify symmetric elements of Cubic crystal.			CO1, CO3
Experiment 2	To identify crystal structure from X-Ray diffraction pattern.			CO1, CO3
Experiment 3	To determine the velocity of ultrasonic waves in liquid medium by interferometer.			CO2, CO4
Experiment 4	Find an object by Ultrasonic waves			CO2, CO4
Experiment 5	To calculate the divergence of LASER beam.			CO2, CO4
Experiment 6	Determination of wavelength of LASER using diffraction grating.			CO2, CO4
Experiment 7	To study interference pattern by Newton's ring Experiment.			CO2, CO4
Experiment 8	To determine the specific rotation of the given sugar solution with Polarimeter.			CO2, CO3,CO4
Experiment 9	To calculate Resolving power of Telescope			CO2, CO3
Experiment 10	To understand the quantization of energy by Frank Hertz Experiment			CO2, CO3
Experiment 11	To study Inverse Square Law.			CO2, CO3
Experiment 12	To study fundamentals of fiber optics using fiber optics trainer			CO2, CO3
Experiment 13	To understand the reconstruction of hologram by Holography			CO2, CO3
Experiment 14	To calculate the reverberation time of specific hall.			CO2, CO4
	Demonstration Experiment			
Experiment 15	To synthesize Nano particles by spray Pyrolysis/CVD method			CO4
Experiment 16	To study behavior of material with temperature by TGA/DTA.			CO4
List of Submission:				
1.	Minimum number of Experiments: 10			

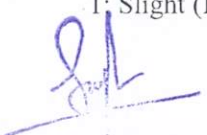
Mapping of COs and Pos:

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	3	1	-	-	1	1	-	1	-	2	2	-	-
CO 2	3	3	1	-	-	1	1	-	1	-	2	2	-	-
CO 3	3	3	1	-	-	1	1	-	1	-	2	2	-	-
CO 4	3	3	1	-	-	1	1	-	1	-	2	2	-	-

1: Slight (Low)

2: Moderate(Medium)

3: Substantial(High)


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Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
ISE											25



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Government College of Engineering, Karad				
First Year (Sem –I) B. Tech. Mechanical Engineering				
ME3107 : Basic Mechanical Engineering Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/week		ISE	50
Total Credits	1		ESE	25
			TOTAL	75
Course Outcomes (CO):				
Students will be able to				
1.	Explain IC engine components and Two stroke and Four stroke engine			
2.	Demonstration VCR, solar water heating system and components of power plant			
3.	Describe types of gears, gear trains, pump and compressor and power conversion devices			
4.	Demonstration hydraulic turbine and explain metal removal and metal joining process			
Course Contents				CO
Experiment 1	Study and demonstration of IC engine components			CO1
Experiment 2	Study and demonstration of Two stroke and Four stroke engine			CO1
Experiment 3	Study and demonstration vapour compression refrigeration and window air conditioner			CO2
Experiment 4	Study and demonstration of solar water heating system			CO2
Experiment 5	Industrial visit to steam power plant or hydroelectric power plant..			CO3
Experiment 6	Study and demonstration of diesel power plant			CO1,3
Experiment 7	Study and demonstration of types of gears and gear trains			CO3
Experiment 8	Study and demonstration of pumps and compressors			CO3
Experiment 9	Study and demonstration of hydraulic turbine			CO3
Experiment 10	Study and demonstration of metal removing process			CO4
Experiment 11	Study and demonstration metal joining process			CO4
List of Submission:				
Minimum number of Experiments: 08				

Mapping of COs and POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

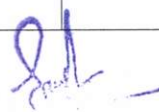
1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	20	20	20	20	20	20	20	20	20	20	20
Task II	15	15	15	15	15	15	15	15	15	15	15
Task III	15	15	15	15	15	15	15	15	15	15	15
ISE											50


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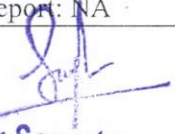
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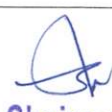
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Government College of Engineering, Karad				
First Year (Sem –I) B. Tech. Mechanical Engineering				
ME3108: Professional Communication Skills				
Laboratory Scheme			Examination Scheme	
Lecture	1Hrs/week		ISE	50
Practical	2Hrs/week		ESE	25
Total Credits	2		TOTAL	75
Course Outcomes (CO): After completion of the course student will be able to				
CO1	Provide a learning environment to practice listening, speaking, reading and writing skills.			
CO2	Assist the students to carry on the tasks and activities through guided instructions and materials			
CO3	Effectively integrate English language learning with employability skills and training.			
CO4	Provide hands-on experience through case-studies, mini-projects, group and individual presentations.			
	List of Experiments			CO
Experiment 1	Newspaper Reading, finding difficult English words to enhance the glossary. Write down the summary of News and Present it effectively.			CO1
Experiment 2	Reading Skills- Reading Book (Any book) finding difficult English words to enhance the glossary. Write down the summary of book/any Topic and Present it effectively. Self-Introduction Activity			CO1
Experiment 3	Reading Sills- Watching English Movies Write down the same to Summaries. Strategies for Creating & Editing Effective Writing -Email Writing Activity			CO2
Experiment 4	Reading Skills- Listening English podcast, (seen and the unseen) Write down the same to Summaries. Extempore Activity			CO3
Experiment 5	Reading Skills- Reading Readers Digest/India Today/Autocar/EFY. Write down the same to Summaries. Strategies for Creating & Editing Effective Writing=Blog Writing (specific/suggest topics/give topics)			CO1
Experiment 6	Watching Ted Talk and summarize it. Strategies for Creating & Editing Effective Writing -Story writing and Narration			CO3
Experiment 7	Develop a Welcome speech on the given Theme/situation /Formulate a speech for introducing a guest in the given situation. Group Discussion- Group Discussion Rules			CO3
Experiment 8	Just a Minute (JAM) -Prepare for 1 min on spontaneous topic and deliver public talk on same.Solving MNC (Company 1) Verbal Ability questions			CO4
Experiment 9	Debate: International Topic and summarize the opinion as a Country. Strategies for Creating & Editing Effective Writing -Email Writing Activity2			CO4
Experiment 10	Writing effective resumes and Cover Letters Mock Interviews (Personal HR)			CO3
Text Books				
1.	AICTE's Prescribed Textbook: English (with Lab Manual), Khanna Book Publishing Co.			
2.	Kul Bhushan Kumar, Effective Communication Skills. Khanna Book Publishing, 2022.			
3.	Practical English Usage. Michael Swan. OUP. 1995. 4. Remedial English Grammar. F.T. Wood. Macmillan.2007 5. On Writing Well. William Zinsser. Harper Resource Book. 2001 6. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006. https://www.coursera.org/specializations/improve-english			
List of Submission				
1	Total number of Experiments: Minimum 10			
2	Total number of sheets: NA			
3	Project/Dissertation Report: NA			
4	Seminar report: NA			
5	Field Visit Report: NA			


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Mapping of COs and Pos

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	1	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	10	05
Understand	15	05
Apply	15	10
Analyse	10	05
Evaluate	-	-
Create	-	-
TOTAL	50	25



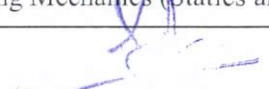
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Government College of Engineering, Karad				
First Year (Sem – I) B. Tech. Mechanical Engg.				
ME3109: Applied Mechanics Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/week		ISE	25
Total Credits	1		ESE	---
			Total:	25
Prerequisite : Applied Physics				
Course Outcomes:				
1.	Demonstrate a clear understanding of the fundamental concepts in mechanics, including the basic laws governing force, moment, and couple.			
2.	Apply the principles of Varignon's theorem, the law of moments, Lami's theorem, and the importance of free body diagrams in problem-solving.			
3.	Develop a comprehensive understanding of the behavior and analysis of simple and compound beams, as well as the utilization of the virtual work method to determine support reactions.			
4.	Apply practical techniques to calculate the mass moment of inertia (M.I.) for various objects, considering their mass distribution and shape.			
Course Contents				
Experiment 1	To verify the polygon Law forces. Objective: Study basic concepts and fundamental laws, force, moment and couple.			CO1
Experiment 2	To understand the nature of forces in the members of jib crane. Objective: Study resolution and composition of force, system of forces, resultant			CO1
Experiment 3	To verify law of moments using Bell crank lever Objective: Study Varignon's theorem and law of moments, Lami's theorem, and free body diagram.			CO1, CO2
Experiment 4	To determine the reaction for simply supported beam. Objective: Analysis of simple and compound beams, virtual work method for support reactions			CO1, CO3
Experiment 5	To determine mass moment of inertia of Flywheel. Objective: To determine Moment of inertia of a Flywheel.			CO1, CO4
Experiment 6	To calculate the efficiency of simple screw jack. Objective: Study of simple lifting machine using screw jack.			CO1
Experiment 7	To determine the mechanical advantages, velocity ratio & efficiency of a differential wheel and axle.			CO1
Experiment 8	To determine the coefficient of restitution for different materials. Objective: To determine the coefficient of restitution for a given pair of materials.			CO4
Experiment 9	Drawing sheet: To find resultant - 3 problems			CO1
Experiment 10	Drawing sheet: To find support reactions - 3 problems			CO1
List of Submission:				
Minimum number of Experiments: 08				

Text Books
Engineering Mechanics, S. S. Bhavikatti, New Age International Pvt. Ltd. ,2021
Engineering Mechanics, R. K. Bansal and Sanjay Bansal, Jain Bros. Publishers, Delhi ,2015
Textbook of Applied Mechanics, Ramamrutham. S, Dhanpat Rai Publications, 2016
Engineering Mechanics (Statics and Dynamics), Palanichamy M. S., and Nagan, S., McGraw Hill Education India Pvt Ltd,


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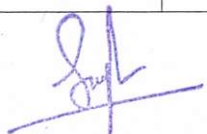
Reference Books
Vector Mechanics for Engineers Vol.-I and II, F. P. Beer and E. R. Johnston, Tata Mc- Graw Hill Publication, 2017
Engineering Mechanics, Irving H. Shames, Pearson Education India, 4 th Edition, 2005
Engineering Mechanics, S. N. Saluja, Satya Prakashan, New Delhi, 2 nd Edition, 1970
Useful Links
https://nptel.ac.in/courses/122102004
https://archive.nptel.ac.in/courses/112/106/112106286/
https://eerc01-iiith.vlabs.ac.in/List%20of%20experiments.htm

Mapping of COs and Pos:

PO → CO ↓	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	-	-	1	-	-	-	-	-	-	-	-	-	1	-
CO 2	1	2	-	1	-	1	1	-	-	-	-	-	1	-	-
CO 3	-	1	2	2	1	1	-	-	-	-	-	-	2	-	-
CO 4	-	1	2	1	-	1	1	-	-	-	-	-	2	-	-

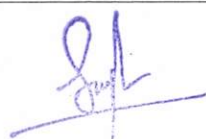
Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15
Task II	05	05	05	05	05	05	05	05	05	05	05
Task III	05	05	05	05	05	05	05	05	05	05	05
CA											25


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Government College of Engineering, Karad				
First Year (Sem – I) B. Tech. Mechanical Engineering				
ME3110 : Yoga				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/Week		ISE	50
Total Credits	1		ESE	--
			TOTAL	50
Course Outcomes(CO): After completion of the course students will be able to				
CO1	Understand basic skills associated with yoga which builds up physical, mental strength, flexibility, balance and coordination.			
CO2	Learn breathing exercises and healthy fitness activities.			
CO3	Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.			
CO4	Develop understanding of psychological problems associated with the age and lifestyle. Also apply injury prevention principles related to yoga.			
Course Contents				CO
Following list of topics and practical's is only the guidelines to the instructor:				CO1
- योगाचा इतिहास: योगसूत्र ग्रंथ, पतंजली मुनी. - अष्टांग योग: १. यम: अहिंसा, सत्य, अस्तेय, ब्रम्हचर्य, अपरिग्रह २. नियम: शौच, संतोष, तपास, स्वाध्याय, ईश्वरप्रणीधान ३. आसन: विविध स्थितीतील आसने ४. प्राणायाम : विविध प्रकार ५. प्रार्थना ६. धारणा: एकाग्र चित्त ७. ध्यान ८. समाधी - वरील अष्टांग योगाचे थोडक्यात महत्व - सूर्यनमस्कार: महत्व व फायदे - प्रात्यक्षिक : प्रार्थना, सूर्यनमस्कार, आसने, प्राणायाम व ध्यान याचा सराव				CO2
				CO3
				CO4
Reference Books:				
1.	Nagendra, H. R. & Nagarathna, R. (2002). Samagra Yoga Chikitse. Bengaluru: Swami Vivekananda Yoga Prakashana.			
2.	Kumar, Ajith. (1984) Yoga Pravesha. Bengaluru: Rashthrothanna Prakashana.			
3.	D.M Jyoti, Yoga and Physical Activities (2015) lulu.com3101, Hillsborough, NC27609, United States.			
4.	Uppal, A.K. (1992). Physical Fitness. New Delhi : Friends Publication.			



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Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	2	2	3	2	-	-	-	-
CO2	-	-	-	-	-	2	2	2	3	2	-	-	-	-
CO3	-	-	-	-	-	2	2	2	3	2	-	-	-	-
CO4	-	-	-	-	-	2	1	2	1	1	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

The evaluation will be done on the basis of participation and performance of students in practical hours. The consistency and accuracy in yoga, intrinsic goodness, right attitude, happiness and joyous way of doing things will be observed by yoga teacher.



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Government College of Engineering, Karad				
First Year (Sem – I) B. Tech. Mechanical Engineering				
ME 3111 : Workshop Practice - I				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/Week		ISE	50
Total Credits	1		ESE	50
			TOTAL	100
Prerequisite :				
Course Outcomes (CO):				
Students will be able to				
1.	Remember use of marking tools, hand tools, measuring instruments (mechanical and electrical) and to work to prescribed dimensions/tolerances			
2.	Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint & Make accurate engineering product to ensure work pieces fitting.			
3.	Make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder			
4.	Understand soldering & Brazing processes which are commonly employed in the industry, to fabricate components using different materials.			
Course Contents			CO	Hours
Experiment 1	Safety Measures & Maintenance		CO1	04
Experiment 2	Carpentry Shop		CO2	04
Experiment 3	Fitting Shop		CO2	04
Experiment 4	Tin Smithy Shop		CO3	04
Experiment 5	Soldering & Brazing		CO4	04
List of Submission:				
1.	Minimum number of Experiments: 05			

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)


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Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Avg
Task I	20	20	20	20	20	20
Task II	15	15	15	15	15	15
Task III	15	15	15	15	15	15
ISE						50



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FY B.TECH
MECHANICAL ENGINEERING

COURSE SYLLABI
FOR

SEMESTER II
(w.e.f. AY 2023-24)



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Government College of Engineering, Karad					
First Year (Sem –II) B. Tech. Mechanical Engineering					
ME3201: Applied Mathematics II					
Teaching Scheme			Examination Scheme		
Lectures	03 Hrs/week		MSE	20	
Tutorials	01 Hrs/week		TA	20	
Total Credits	04		ESE	60	
			TOTAL	100	
			Duration of ESE	02 Hrs 30 Min	
Course Outcomes: After completion of the course the student will be able to					
CO1	Solve ODEs arising in Engineering domain using analytic approach. Learn 3D geometry.				
CO2	Apply advance integral functions and technique.				
CO3	Express any periodic function in terms of series expansion.				
CO4	Calculate area enclosed by simple curves and volume of solid with the knowledge of higher order integrals.				
	Course Contents			CO	Hours
Unit 1	First Order Ordinary Differential Equations: Exact differential equations, Integrating Factor, Equations reducible to Exact, linear and reducible to linear differential equations, Applications: Rate of decay and growth, Newton's law of cooling, Conduction of heat.			CO1	(7)
Unit 2	Introduction to Three Dimensional Geometry: Sphere:-Equation of a sphere whose diameter is the line joining two given points, Equation of sphere passing through four points, Cylinder: - Equation of a cylinder with given axis and guiding curves, Right Circular Cylinder, Cone:-Equation of a cone with its vertex at origin, Equation of a cone with given vertex and guiding curve, Right Circular Cone.			CO1	(7)
Unit 3	Differential and Integral Calculus: Gamma function, Beta function and its properties, Differentiation under integral sign, Leibnitz rule.			CO2	(7)
Unit 4	Fourier series: Dirichlet's conditions, Fourier series in the range $(0, 2l)$ and $(-l, l)$ where l is arbitrary, Even and odd function, Half range sine and cosine series in the range $(0, l)$ where l is arbitrary.			CO3	(7)
Unit 5	Surface Integral and Applications: Evaluation of double integration in cartesian and polar coordinates, Change of order of integration, change of variable, Area enclosed by plane curves.			CO4	(7)
Unit 6	Volume Integral and Applications: Evaluation of Triple integration in Cartesian, spherical polar and cylindrical polar coordinates, volume of solids by triple integral.			CO4	(7)
Tutorials: Following is tentative list of tutorials to be conducted in the tutorial class based on- 1. Exact, reducible to exact, linear and reducible to linear differential equations. 2. Applications to differential equations. 3. Sphere and Cylinder. 4. Cone and right circular cone. 5. Beta and Gamma function. 6. Differentiation under integral sign. 7. Fourier series. 8. Half range Fourier series. 9. Surface integration and its applications. 10. Volume integration and its applications.					(10)
Text Books					
1.	H.K.Das, S. Chand and sons, Advanced Engineering Mathematics by, 22 nd edition, 2018.				
2.	Debashis Datta Textbook of Engineering Mathematics New Age International Publication, 6 th edition 2006.				
3.	Ravish R..Singh, Mukul Bhatt, Engineering Mathematics A Tutorial Approach, Tata, McGraw Hill 2010.				

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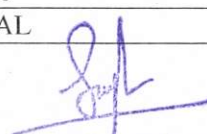
Reference Books	
1.	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2.	Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3.	W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4.	S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5.	E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6.	J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGrawHill, 2004.
7.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
Useful Links	
1.	http://www.nptel.iitm.ac.in
2.	www.ocw.mit.edu

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 3	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	5	4	10
Understand	-	4	10
Apply	5	4	15
Analyse	5	4	10
Evaluate	5	4	15
Create	-	-	-
TOTAL	20	20	60


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Government College of Engineering, Karad					
First Year (Sem –II) B. Tech. Mechanical Engineering					
ME3202- Applied Chemistry					
Teaching Scheme		Examination Scheme			
Lectures	03 Hrs/Week	MSE	20		
Tutorials	00 Hrs/Week	ISE	20		
Total Credits	03	ESE	60		
		TOTAL	100		
		Duration of ESE	02:30 Hrs		
Course Outcomes (CO): After completion of course the Students will be able to					
CO1	Understand fundamental of Chemistry relevant to Engineering field.				
CO2	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.				
CO3	Equipped with basic knowledge of polymer reinforced composites, applications of semiconductor conducting polymers in energy harnessing.				
CO4	Acquire Basic knowledge of Nanochemistry to appreciate its applications in the field of Medicine, data storage devices and electronics.				
CO5	Understand the causes of corrosion, its consequences and methods to minimize corrosion to improve industrial designs.				
	Course Contents			CO	Hrs
Unit 1	Energy Science: Fuels: Fuel, classification, characteristics of good fuel, comparison between solid, liquid, gaseous fuel. Calorific value, low and high calorific value, units of calorific value, determination of calorific value by Bomb and Boy's calorimeter. Energy storage Systems: Battery technology: Introduction, Classification, characteristics, construction, working and applications of Li-ion battery. Solar Energy: Introduction, construction, working and applications of photovoltaic cell. Green fuel: Hydrogen-oxygen fuel cell. Construction, working and applications			CO1 CO3 CO4	(07)
Unit 2	Corrosion and it's Prevention: Introduction, Electrochemical theory of corrosion, Types of corrosion - Differential metal and differential aeration – (pitting and water line) caustic embrittlement. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of corrosion product, nature of metals, pH, conductivity and temperature. Corrosion control: Cathodic protection - sacrificial anode and impressed current methods, Metal coatings – Galvanization and tinning, Anodizing – Anodizing of aluminum, Organic coatings: Paint and varnishes. Metal finishing: Introduction, Technological importance. Principles of electroplating of chromium. Metal cladding and Metal spraying.			CO1 CO5	(07)
Unit 3	Engineering Advanced Materials Composites: Introduction, constitution, classification. Types: Particle, fiber, fiber glass, hybrid and reinforced Composites with applications. Lubricants: Introduction, Classifications, functions, Properties- Viscosity index, Flash point, and applications of lubricants. Cement: Types of cement, constituents, properties of cement. Polymers: Introduction, Synthesis and applications of Polyurethane, polycarbonates, araldite (Epoxy resin). Conducting Polymers: Synthesis & Mechanism of conduction in polyacetylene. Biodegradable polymers: Introduction and their requirements. Synthesis and properties of Poly lactic acid. Applications of biodegradable polymers in medical industry.			CO1 CO3	(07)
Unit 4	Environmental & Green Chemistry: Introduction, definition, Major environmental pollutants, Air, water and noise pollution.			CO1 CO2 CO3	(07)

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	Optimum levels of pollution. Significance and determination of COD and BOD. Solid waste treatment of collection of NKP. Greenhouse effect and global Warming. eWaste. Radioactive pollution. Basic principles of green chemistry. Various green chemical approaches – Microwave synthesis, Bio catalyzed reactions, Phase transfer catalysis.	CO4	
Unit 5	Water technology: Introduction, sources and impurities in water, portable water; meaning and specifications (as per WHO standards), Hardness of water, types, determination of hardness using EDTA titration, softening of hard water by ion- exchange process. Numerical problems on hardness of water. Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD) Determination of COD of industrial waste water. Purification of water for town supply. Instrumental methods of analysis: Introduction, Theory, Instrumentation and applications Flame Photometry.	CO1 CO2	(07)
Unit 6	Nanomaterials: Introduction, Nanomaterials- preparation of CNT by different methods, CNT properties and applications, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nano materials: Top down and bottom up approaches,, Carbon nano tubes and graphenes – properties and applications. Characterization method for Nano materials, SEM (Scanning Electron Microscope), AFM (Atomic Force Microscopy), STM (Scanning Tunnelling Microscopy)	CO1 CO3 CO4	(07)
Course Outcomes (CO): After successful completion of course the Students will be able to			
CO1	Understand fundamental of Chemistry relevant to Engineering field.		
CO2	Differentiate hard and soft water; solve the related numerical problems on water purification and its significance in industry and daily life.		
CO3	Equipped with basic knowledge of polymer reinforced composites, applications of semiconductor conducting polymers in energy harnessing.		
CO4	Acquire Basic knowledge of Nanochemistry to appreciate its applications in the field of Medicine, data storage devices and electronics.		
CO5	Understand the causes of corrosion, its consequences and methods to minimize corrosion to improve industrial designs.		
Text Books			
1.	F. W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 15th Edition, 2020.		
2.	B. K. Sharma- A text book of Industrial Chemistry. 15th Edition, 2020. G.A. Ozin & A.C. Arsenault, “Nanotechnology A Chemical Approach to Nanomaterials”. RSC Publishing, 5th Edition, 2020.		
Reference Books			
1.	Uppal M.M, Jain and Jain. Engineering Chemistry, Khanna Publishers, 45th Edition, 2020.		
2.	P.C. Jain and Monica Jain, A test Book of Engineering Chemistry, Dhanpat Rai Publications, New Delhi, 20th Edition, 2020.		
3.	S SDara -A Text book of Engineering Chemistry, S Chand & Company Ltd., 15th Edition, 2020.		
4.	B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpalyengar.,- “Chemistry for Engineering Students”, Subash Publications, Bangalore. 10th Edition, 2020.		
Useful Links			
1.	https://www.youtube.com/watch?v=3O6OfCaVadI&list=PLm_MSClsnwm9p_yaZ8zIW1LxkK7_n98gD		
2.	https://www.youtube.com/watch?v=kID3n_-kees		
3.	https://www.youtube.com/watch?v=EvoN6vmiCfI&list=PLKSeO-scpOo33zdDN0i2uw1Xh3zh_UfGO		



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Mapping of COs and Pos

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	-	-	-	2	2	-	-	-	-	1	-	-
CO 2	3	2	-	-	-	2	2	-	-	-	-	1	-	-
CO 3	3	2	-	-	-	2	2	-	-	-	-	1	-	-
CO 4	3	2	-	-	-	2	2	-	-	-	-	1	-	-
CO 5	3	2	-	-	-	2	2	-	-	-	-	1	-	-

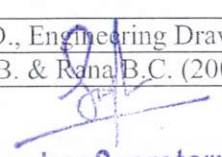
Assessment Pattern: (with revised Bloom's Taxonomy)

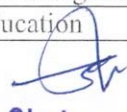
Knowledge Level	MSE	ISE	ESE
Remember	5	8	20
Understand	5	4	10
Apply	5	4	10
Analyse	5	4	20
Evaluate	-	-	-
Create	-	-	-
Total	20	20	60


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Government College of Engineering, Karad			
First Year (Sem – II) B. Tech. Mechanical Engineering			
ME3203: Engineering Graphics			
Teaching Scheme		Examination Scheme	
Lectures	03 Hrs/Week	MSE	20
Tutorials	00 Hrs/Week	ISE	20
Total Credits	03	ESE	60
		TOTAL	100
		Duration of ESE	3 hrs
Prerequisite: Nil			
Course Outcomes (CO):			
Students will be able to			
1.	Understand theory of projections and apply it for communication shape and size of geometric element using appropriate projection method		
2.	Draw different engineering curves using various methods, and know the application in engineering field		
3.	Analyze visually and draw projection of points, straight lines, planes, solids		
4.	Appreciate use of Orthographic & isometric drawing, sections of solids, and development of surfaces		
	Course Contents	CO	Hrs
Unit 1	Introduction to Engineering Drawing & Engineering Curves: Principles of Engineering Graphics and its significance, usage of Drawing instruments and accessories, layout of drawing sheets, different types of lines used in drawing practice, lettering, Introduction to SP46: 2003, Dimensioning system as per BIS, Geometric constructions. Engineering Curves: Construction of regular polygons, Conic sections; Construction of Ellipse –(Focus- Directrix method, Rectangle method, arcs of circle, four center method), Parabola - (Focus- Directrix method, Rectangle Method), hyperbola – (Focus-Directrix method); Cycloidal curves, (including Epicycloid, Hypocycloid), and Involute, Methods to draw tangent and normal for above engineering curves. Applications of curves in engineering.	CO1, CO2	(07)
Unit 2	Theory of Projections: Principles & theory of Projections, projection systems, projection methods, First angle & third angle method of projection, relative positions of different view, symbol of first angle and third angle; Auxiliary planes; AIP, AVP, views on auxiliary planes. Projection of Points & Lines: Projections of Points situated in any quadrant, notation system. Projection of straight line; parallel, inclined and oblique w.r.t. reference planes (RP's). Traces of lines, (Lines only in first quadrant)	CO1, CO3	(08)
Unit 3	Projections of Regular Planes: Types of planes, Projections of planes, positioned - parallel, inclined, and oblique w.r.t. HP & VP planes.	CO1, CO3	(05)
Unit 4	Projections of Regular Solids: Types of Solids, Projection of simple solids; Prisms, Pyramids, and cylinder, cone inclined to both reference planes. Projections of Regular Sectional Solids: Sections and Sectional views of right angular Solids; Prism, Cylinder, Pyramid, Cone – Auxiliary Views; finding true shape of a section.	CO1, CO3, CO4	(09)
Unit 5	Isometric Projections: Principles of Isometric projection – Terminology, Isometric Scale, Isometric Views of standard shapes & standard solids.	CO1, CO4	(05)
Unit 6	Development of Surfaces: Introduction, methods of development, parallel line development, Radial line development only.	CO4	(06)
In semester Evaluation (ISE) shall be done on punctuality, interactive participation in class, laboratory work done and oral assessment			
Text Books			
1.	Bhatt N.D., Engineering Drawing: Plane & Solid Geometry, 54 th edition, 2023, Charotar Publishing House		
2.	Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education		


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3.	Basant Agrawal, C M Agrawal, Engineering Graphics, 3 rd edition (2019)TMH Publication
4.	Dhananjay A Jolhe, Engineering Drawing with an introduction to AutoCAD, TMH Publication, (2010)
Reference Books	
1.	Cencil Jenson, Jay D. Helsel, D. R. Short, Engineering Drawing & Design, 7 th ed, 2015 TMH Pub
2.	M. L. Dabhade, Engineering Graphics, Vision Publication
3.	Kristie Plantenberg, Engineering Graphics Essentials, 5 th ed, 2015 University of Detroit Mercy, SDC Publication
Useful Links	
1.	https://nptel.ac.in/courses/112103019/
2.	https://archive.nptel.ac.in/courses/112/102/112102304/
3.	https://archive.nptel.ac.in/courses/112/105/112105294/

Mapping of COs and POs

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2			2			3	2	2		2	1	1
CO 2	2	1			2			2	2	3		1	1	1
CO 3	3	3			3			2	2	3		2	1	1
CO 4	2	2			3			2	2	3		3	1	1

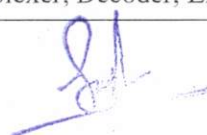
Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	4	4	12
Understand	4	4	12
Apply	4	4	12
Analyse	4	4	12
Evaluate	4	4	12
Create	-	-	-
Total	20	20	60


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Government College of Engineering, Karad					
First Year (Sem –II) B. Tech in mechanical Engineering					
ME3204 : Basic Electrical and Electronics					
Teaching Scheme			Examination Scheme		
Lectures	03 Hrs/week		MSE	20	
Tutorials	--		ISE	20	
Total Credits	03		ESE	60	
			TOTAL	100	
			Duration of ESE	02 Hrs 30 Min	
Course Outcomes (CO)					
Students will be able to					
1	Students will be able to analyze DC and AC circuits.				
2	Students shall understand construction and working of electric machines such as DC motors and induction motors				
3	Students will get general idea about semi-conductor devices				
4	Students shall understand principle of working of various sensors, transducers and actuators				
	Course Contents			CO	Hours
Unit 1	DC circuits: Ohm's law and Kirchhoff's laws Types of sources, dependent and independent sources, source transformation, voltage division and current division, Mesh and Nodal analysis, star-delta transformation			CO1	7
Unit 2	AC Circuits: Representation of Sinusoidal waveform, Phasor representation, average value, RMS value, form factor, peak factor of sinusoidal voltage and currents, Analysis of ac circuits with R,L,C & RL,RC,RLC circuits with phasor diagrams .Real power ,reactive power ,apparent power and power factor.			CO2	7
Unit 3	Introduction to Electrical Drive: Three phase induction motor: -Rotating magnetic field concept, Construction, principle of operation, Equivalent Circuit, Torque-slip diagram, Types- squirrel cage and wound rotor, Starters- Different types , Starting methods, DC motors: - Starting, construction, working principle, Speed control, motor selection factors of DC shunt motor and Series motor.			CO2	7
Unit 4	Digital Electronics: Arithmetic operation and Minimization Techniques: Number conversion, Arithmetic's operation, Logic gates, Minimization Techniques: - Boolean postulates and laws. De Morgan Theorem, Principle of Duality, Minimization of Boolean expressions: - SOP, POS, Karnaugh map. Semiconductor Devices : Semiconductor fundamentals, Diode. Transistors: BJT, MOSFET, their structures and principle of operations; Amplifiers: Functionality, specifications (voltage gain, current gain, input resistance, output resistance, dynamic range, bandwidth, linearity, power efficiency etc.) Rectifiers:- Half & full wave rectifiers circuits.			CO3	7
Unit 5	Sequential Circuits and Combinational Circuits:- Sequential Circuits: Latches, Flip flop :- SR, JK ,D,T and Master Slave, Characteristic Table and equation, Edge triggering, Level triggering, Synchronous and Asynchronous counters. Combinational Circuits: Half Adder, Half Subtractor, Full Subtractor, Parallel binary adder/subtractor, Carry look ahead adder, Serial adder/subtractor, BCD adder, Multiplexer, Demultiplexer, Decoder, Encoder.			CO3	6


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Unit 6	Sensors, Transducers, Actuators:- Sensors:- Proximity , Pressure, Accelerometer, Motion detector, Capacitive sensing, Position, Infrared, Photoelectric, Image sensor, Temperature, Ultrasound, Humidity, Infrared Transducers:- , Active, Passive, Mechanical, Electrical, Photoelectric. Actuators :- Linear actuators, Rotary actuators, Pneumatic actuators, Hydraulic ,Electric actuators, Magnetic and thermal actuators, Mechanical actuators	CO4	6
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Text Books	
1	“Electric Machines”, Nagrath and Kothari, Tata McGraw-Hill.
2	“Electric Machinery”, Fitzgerald, Kingslay, Umans, Tata McGraw-Hill.
3	“Electric Machinery Fundamentals”, Chapman, McGraw-Hill Higher Education.
4	Morris Mano M.,Digital logic and Computer design,Pearson Education India,First Edition,2016.
5.	“Modern Digital Electronics” ,R.P. Jain, Tata McGraw-Hill.
References	
1.	Dr.Murugesh Kumar.K.”DC Machines and Transformers”,Vikas Publishing House Pvt Ltd.
2.	Kumar Anand,Fundamentals of Digital Circuits,Prentice Hall,3 rd Edition,2014.
3.	Salivahanan.S.,Pravin Kumar.S.,Digital Electronics,Vikas Publishing House,2011.
Useful Links	
1.	https://onlinecourses.nptel.ac.in/noc21_ee73/preview
2.	https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-ee59
3.	https://archive.nptel.ac.in/courses/108/105/108105053/
4.	https://archive.nptel.ac.in/noc21_ee73/
5.	https://www.iitbbs.ac.in/curriculum_doc/ece_btech.pdf
6.	https://www.iitk.ac.in/eeold/Assets/docs/btech.pdf
7.	http://www.schandpublishing.com

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO 2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO 3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO 4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

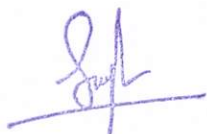
Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSC	ISC	ESE
Remember	10	10	25
Understand	05	05	20
Apply	05	05	15
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60


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Government College of Engineering, Karad				
First Year (Sem –II) B. Tech. Mechanical Engineering				
ME3205: Indian Knowledge Systems (MOOC)				
Teaching Scheme			Examination Scheme	
Lectures	-		ISE	-
Tutorials	-		ESE	100
Total Credits	02		TOTAL	100
Course Outcomes (CO):Students will be able to				
CO1	Understand and appreciate the rich heritage that resides in our traditions			
CO2	Inculcate an understanding of the mind/voice dynamic and its function in Indian knowledge systems			
CO3	Learn to appreciate the need and importance of Sanskrit in getting to the roots of the philosophical concepts			
CO4	Being primed for practices that will prepare one for the inner-journey to discover the Self			
Course Contents				
Student should complete any one of the MOOC course certification of Indian Knowledge System and submit the copy of certificate to Head of Department prior to ESE.				
Guidelines:				
• Duration for completion of MOOC course certification is minimum 8 Weeks. • Platform: NPTEL or Swayam • Assessment Guideline:- End semester evaluation will be based on the score secured in NPTEL or Swayam certification and Presentation conducted by Panel of Faculty members. • 60% weightage will be given for score secured in NPTEL or Swayam certification and 40% weightage will be given for presentation. • If students fail to complete the NPTEL or Swayam certification, student can complete it from other platforms with the prior permission of Head of department.				

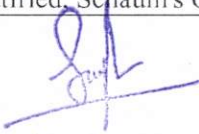


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Government College of Engineering, Karad					
First Year (Sem –II) B. Tech. Mechanical Engineering					
ME3206: Programming for Problem Solving					
Teaching Scheme		Examination Scheme			
Lectures	03 Hrs/week	MSE	20		
Tutorials	00 Hrs/week	ISE	20		
Total Credits	03	ESE	60		
		TOTAL	100		
		Duration of ESE	02 Hrs 30 Min		
Course Outcomes (CO):					
Students will be able to					
1	Understand the basics of C programming language, including syntax, data types, and control structures.				
2	Demonstrate the ability to write and execute C programs using integrated development environments (IDEs)				
3	Apply problem-solving techniques using C programming by writing algorithms and translating them into code.				
4	Develop debugging and testing skills to identify and resolve errors in C programs.				
	Course Contents			CO	Hours
Unit 1	Introduction to Programming Introduction to components of a computer system. Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples			CO1	(05)
Unit 2	Introduction to C language Importance of C Language, Structure of C Program, Constants, variables and data types. Operators and expressions, managing input / output operations, Decision making, branching and loop statements, Storage classes, Functions, elements of User defined functions, return values and their types, methods of parameter passing, recursive functions.			CO1	(07)
Unit 3	Arrays and String Declaration and initialization of arrays, one dimensional and two-dimensional arrays, operations on array, multidimensional arrays, Declaring and initializing string variables, string handling functions, passing array and string to function			CO2	(07)
Unit 4	Structure Defining and declaring structure, accessing structure members, structure initialization, array of structures, nesting of structure structures and functions, union and enumeration			CO3	(07)
Unit 5	Pointer Defining and declaring pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, pointer as a function argument, pointer expressions, pointers to arrays, strings and structure, Dynamic memory allocation			CO4	(07)
Unit 6	File Handling File Operations, Character I/O, String I/O, Formatted I/O, Block I/O, Random File Operations			CO4	(07)
Text Books					
	E. Balguruswami, “Programming in ANSI C”, 6 th editions, Tata McGraw Hill				
	Let us C by Yashvant Kanetkar- BPB publications				
Reference Books					
1.	The C Programming Language, By B.W. Kernigghan and D. M. Ritchie, Pearson Education.				
2.	Programming And Problem Solving Using C Language, ISRD Group, McGraw-Hill Publications				
3.	Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill				


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Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO 2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO 3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO 4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	MSC	ISC	ESE
Remember	10	10	25
Understand	05	05	20
Apply	05	05	15
Analyse	-	-	-
Evaluate	-	-	-
Create	-	-	-
TOTAL	20	20	60



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Government College of Engineering, Karad				
First Year (Sem –II) B. Tech. Mechanical Engineering				
ME3207-Applied Chemistry Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/Week		ISE	25
Total Credits	1		ESE	--
			TOTAL	25
Course Outcomes (CO): After completion of course the Students will be able to				
CO1	Analyze & generate experimental skills.			
CO2	Learn and apply basic techniques used in chemistry laboratory for preparation, purification and identification.			
CO3	Employ the basic techniques used in chemistry laboratory for analyses such as PH Metry, IR spectroscopy, volumetric titrations.			
CO4	learn safety rules in the practice of laboratory investigations			
Course Contents			CO	
Experiment 1	To Determine the total hardness of water.		CO1,CO3,CO4	
Experiment 2	To Determine Calorific Value of Coal sample.		CO1,CO3,CO4	
Experiment 3	To determine the chloride content from water		CO1,CO3,CO4	
Experiment 4	Preparation of urea formaldehyde		CO1,CO2,CO3,CO4	
Experiment 5	Preparation of phenol formaldehyde		CO1,CO2,CO3,CO4	
Experiment 6	To Determine the amount of dissolved oxygen in water		CO1,CO2,CO3,CO4	
Experiment 7	Preparation of Paracetamol as antipyretic drug.		CO1,CO2,CO3,CO4	
Experiment 8	Determination of % of Zinc in brass using standard EDTA Solution.		CO1,CO3,CO4	
	Demonstration Experiment			
Experiment 09	Verification of Lambert's-Beer's law.		CO1,CO2,CO3,CO4	
Experiment 10	Determination of pH of solution		CO1,CO2,CO3,CO4	
Experiment 11	Determination of functional group in organic compound by IR spectroscopy.		CO1,CO2,CO3,CO4	
List of Submission:				
1.	Minimum number of Experiments: 10			

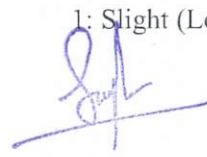
Mapping of COs and Pos:

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	-	-	-	2	2	-	1	-	-	1	-	-
CO 2	3	2	-	-	-	2	2	-	1	-	-	1	-	-
CO 3	3	2	-	-	-	2	2	-	1	-	-	1	-	-
CO 4	3	2	-	-	-	2	2	-	1	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)


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Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	
ISE											



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Government College of Engineering, Karad				
First Year (Sem –II) B. Tech. Mechanical Engineering				
ME3208: Engineering Graphics Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/Week		ISE	50
Total Credits	1		ESE	--
			TOTAL	50
Prerequisite : Nil				
Course Outcomes (CO):				
Students will be able to				
1.	Acquire skills sets to use engineering drawing instruments, symbols, conventions, title block in engineering drawing, to communicate his ideas, information and instructions.			
2.	Dimension and annotate two-dimension & three dimensional engineering drawings			
3.	Plan and prepare neat engineering drawing of various engineering curves, orthographic drawings of points, straight lines, planes, solids, and section of solids, isometric views, development of surfaces			
4.	Develop a skill of visualization to understand and read the engineering drawing			
Course Contents			CO	
Dwg Sheet no. 1	Engineering Curves		CO1, CO2, CO3	
Dwg Sheet no. 2	Projection of Points & Lines		CO1, CO2, CO3, CO4	
Dwg Sheet no. 3	Projection of Planes		CO1, CO2, CO3, CO4	
Dwg Sheet no. 4	Projection of Solids		CO1, CO2, CO3, CO4	
Dwg Sheet no. 5	Projection of Section of Solids		CO1, CO2, CO3, CO4	
Dwg Sheet no. 6	Isometric Projection of Simple solids		CO1, CO2, CO3, CO4	
Dwg Sheet no. 7	Development of Surfaces		CO1, CO2, CO3, CO4	
Dwg Sheet no. 8	Orthographic Projection of Simple components (optional)		CO1, CO2, CO3, CO4	
ESE will be based on Oral examination on submission work of Drawing sheets, Quiz etc				
List of Submission:				
1.	Minimum number of Experiments: 6			

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			3			1		2		1	1	1
CO2	2	2			2			2		3		2	1	1
CO3	3	3			3			2		3		2	1	1
CO4	2	2			2			2		3		2	1	1

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)


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Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Avg
Task I	20	20	20	20	20	20	20
Task II	15	15	15	15	15	15	15
Task III	15	15	15	15	15	15	15
ISE							50



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Government College of Engineering, Karad				
First Year (Sem –II) B. Tech. Mechanical Engineering				
ME3209 : Programming for problem solving Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	2 Hrs/week		CA	25
Total Credits	1		ESE	-
			TOTAL	25
Course Outcomes (CO):				
Students will be able to				
1.	Understand the basics of C programming language, including syntax, data types, and control structures.			
2.	Demonstrate the ability to write and execute C programs using integrated development environments (IDEs)			
3.	Apply problem-solving techniques using C programming by writing algorithms and translating them into code.			
4.	Develop debugging and testing skills to identify and resolve errors in C programs.			
Course Contents				CO
Experiment 1	Introduction to various components of programming environment.			CO1
Experiment 2	Implement a program by using decision making statements.			CO1
Experiment 3	Implement a program by using loop statements.			CO2
Experiment 4	Implement a program by passing argument to a functions.			CO2
Experiment 5	Implement a program for 1-D and 2-D array and operations on array.			CO3
Experiment 6	Implement a program for string using string handling functions.			CO1,3
Experiment 7	Implement a program for array of structure.			CO3
Experiment 8	Implement a program for call by value and call by reference.			CO3
Experiment 9	Implement program for dynamic memory allocation using various functions.			CO3
Experiment 10	Implement program to perform file handling operations.			CO4
Experiment 11	Implement C graphics program to draw different objects.			
Experiment 12	Implement C graphics program to demonstrate animation.			
List of Submission:				
Minimum number of Experiments: 10				

Mapping of COs and POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	
ISE											

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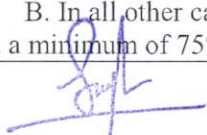
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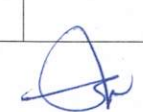
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Government College of Engineering, Karad				
First Year (Sem – II) B. Tech. Mechanical Engineering				
ME3210: National Cadet Corps				
Teaching Scheme		Examination Scheme		
Lectures	04 Hrs/Week	MSE	-	
Tutorials	-	ISE	50	
Total Credits	1	ESE	-	
		TOTAL	50	
Prerequisite: Nil				
Course Outcomes (CO): Students will be able to				
1.	Develop sense of discipline, character, and brotherhood, the spirit of adventure and ideals of selfless service.			
2.	Understand grace and dignity in the performance of foot drill.			
3.	Understand the importance of a weapon its detailed safety precautions necessary for prevention of accidents.			
4.	Develop awareness about different types of terrain and how it is used in battle craft.			
	Course Contents			CO
Unit 1	Following list of topics and practical's are to be covered during NCC training sessions. • National Integration & Awareness • Personality Development and Leadership • Disaster Management • Social Awareness & Community Development • Health & Hygiene • Environment Awareness and Conservation • Drill • Weapon Training • Adventure Training • Introduction to Armed Forces • Obstacle Training • Military History • Introduction to Infantry Weapons and Equipment • Communication • Map reading • Field Craft and Battle Craft			CO1, CO2, CO3, CO4,
Min. 75% attendance is mandatory. NCC training will start in Semester I				
Eligibility Criteria for NCC certificate A Exam 1. The Cadet must have attended a minimum of 75% of total training periods laid down in the syllabus for the first and second years of Junior Division/Wing NCC (All Wings). 2. In order to count his previous tenure, the break in the NCC Training Tenure of the cadet prior to his appearing in the exam should not exceed more than 12 months at one time. 3. In case the break exceeds 12 months the following procedure will be followed :- a. A. If he has been on the unit rolls for a minimum of two years before his discharge and had attended 75% of the total periods during his NCC Tenure he will need another 36 periods of training to become eligible to appear for Certificate A examination. b. B. In all other cases, where above conditions are not fulfilled, the cadet must attend a minimum of 75%				


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	periods of the first and second years of training. 4. Must have attended one Annual Training Camp. 5. NCC training activity will be covered in Semester I & II.	
Text Books		
1.	"Cadet Hand Book" published by Directorate General of NCC, New Delhi under the Ministry of Defence, Govt. Of India.	
2.	"NCC Red Book", published by Directorate General of NCC, New Delhi under the Ministry of Defence, Govt. of India.	
Reference Books		
1.	"NCC Coffee Table Book", published by Directorate General of NCC, New Delhi under the Ministry of Defence, Govt. of India.	
Useful Links		
1.	https://indiancc.nic.in/	
2.	https://indiancc.mygov.in/	

Mapping of COs and POs

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1						2		2	1			1			1
CO 2									2			1			
CO 3								1	1						
CO 4									1			1			1

Assessment Pattern:

Marks obtained in NCC certificate 'A' exam will be converted into equivalent In-Semester Evaluation marks.
Certificate A exam will be conducted by National Cadet Corps.

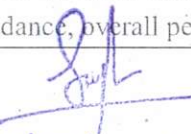


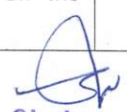
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Government College of Engineering, Karad					
First Year (Sem – II) B. Tech. Mechanical Engineering					
ME3210: National Service Scheme (NSS)					
Teaching Scheme		Examination Scheme			
Lectures	00 Hrs/Week	ISE	50		
Practical	02 Hrs/Week	ESE	-		
Total Credits	01	TOTAL	50		
Course Outcomes (CO):Students will be able to					
1.	Understand the community in which they work and their relation				
2.	Identify the needs and problems of the community and involve them in problem-solving				
3.	Develop capacity to meet emergencies and natural disasters				
4.	Practice national integration and social harmony.				
5.	Utilize their knowledge in finding practical solutions to individual and communityproblems.				
	Course Contents			CO	Hrs
	National Service Scheme:			CO1	(30)
	The NSS activities and allotted hours are mentioned below:			CO2	
	1. Blood donation Camp	8 Hrs.		CO3	
	2. Tree Plantation	4 Hrs.		CO4	
	3. Internal Cleanliness Drive	8 Hrs.		CO5	
	4. External Cleanliness Drive	8 Hrs			
	5. Arranging Lectures on Social Issues in schools or villages	4 Hrs.			
	6. Demonstration of Street Plays on Social issues	4 Hrs.			
	7. Demonstration of Street Plays on Safety issues	4 Hrs.			
	8. Arranging Rally on Social issues	4 Hrs			
	(Anti-Tobacco, Vysan Mukti etc.).				
	9. Celebration of National Days (As per NSS list)	4 Hrs.			
	10. Arrangement of free medical checkup camp in villages	4 Hrs.			
	11. Arrangement of environment protection awareness camp	4 Hrs.			
	12. Arrangement of veterinary awareness camp	4 Hrs.			
	13. Participation in disaster management training	8 Hrs.			
	14. Arrangement of water conservations awareness camp	8 Hrs.			
	15. Arrangement of rain water harvesting awareness camp	8 Hrs.			
	16. Assisting local administration for law and order,	8 Hrs.			
	regulation, social issues.				
	17. Any other activity as decided by Hon. Principal / Program Officer	8 Hrs			
	from time to time .				
	Instructions:				
	1) The Students will have to complete for a total period of 30 hours activities (in one Semester) OR Participation in seven days residential camp with completion certificate of NSS camp.				
	2) NSS Volunteer has to complete 30 hours NSS activities mentioned in above curriculum. NSS volunteer has to prepare and submit NSS activity report of 30 hours to NSS Coordinator.				
	3) The In Sem Evaluation (ISE) will be conducted by NSS Coordinator based on the attendance, overall performance and the report.				


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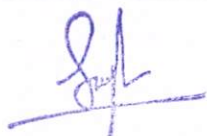
Reference Books:			
1.	National Service Scheme Manual, Government of India.		
2.	Training Programme on National Programme scheme, TISS.		
3.	Orientation Courses for N.S.S. Programme officers, TISS.		
4.	Case material as Training Aid for field workers, <i>Gurmeet Hans</i> .		
5.	Social service opportunities in Hospitals, <i>Kapil K. Krishan</i> , TISS.		
6.	Social Problems in India, <i>Ram Ahuja</i> .		
7.	National Service Scheme Manual (Revised), 2006 Government of India, Ministry of Youth Affairs and Sports, New Delhi.		
8.	University of Mumbai National Service Scheme Manual, 2009		
9.	Avhan Chancellor's Brigade - NSS Wing, Training Camp on Disaster Preparedness Guidelines, March, 2012.		
10.	Rashtriya Seva Yojana Sankalpana - Prof. Dr. Sankey Chakane, Dr. Pramod / Pabrekar, Diamond Publication, Pune.		
11.	National Service Scheme Manual for NSS District Coordinators, National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya.		
12.	Annual Report of National Service Scheme (NSS) published by Dept. of Higher and Technical Education, Mantralaya.		
13.	NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA - Socio and Cultural Guidelines.		
14.	Purushottam Sheth, Dr. Shailaja Mane, National Service Scheme		
Useful Links			
1.	https://www.youtube.com/watch?v=3o40NbNLoWQ		
2.	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_lIESHogw-coZo7PQdYliF-msj		
3.	https://www.youtube.com/watch?v=paJK5X6zqI8&list=PLp4YWOW_lIESHogw-coZo7PQdYliF-msj&index=1		

Mapping of COs and POs

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO 2	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO 3	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO 4	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO 5	1	1				1	1	1	1				1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	20
Understand	-	-	10
Apply	-	-	10
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	-	-	50

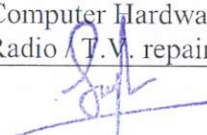


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Government College of Engineering, Karad			
First Year (Sem – II) B. Tech. Mechanical Engineering			
ME3210: Community Service and Practices (CSP)			
Teaching Scheme		Examination Scheme	
Lectures	00 Hrs/Week	ISE	50
Practical	02 Hrs/Week	ESE	-
Total Credits	01	TOTAL	50
Course Outcomes (CO):			
After successful completion of course the Students will be able to			
CO1	understand the community needs in which they are living.		
CO2	identify the problems of the community and help to solve them.		
CO3	apply technical knowledge of respective field to train local community.		
CO4	practice national integration and social harmony.		
Course Contents			
Community Service and Practices (CSP): 1. Student has to register for CSP with department coordinator. 2. He/she has to complete one of the following two modules. 3. He/she has to obtain certificate of participation from Head of the department to that effect.			
MODULE I: The institute has signed MoU with NASSCOM for implementation of digital literacy program (under NDLM - National Digital Literacy Mission). The program shall cover training of school children or village youths on one of the 7 modules designed by NASSCOM such as internet, mobile banking, e-commerce, e-business, use of media like WhatsApp/ linkedin etc. The course details are provided by NASSCOM. The course work of each module consists of presentation of readymade power point slides as a theory and separate practice sessions. The module shall be followed by test and joint certification of successful candidates (institute and NASSCOM). The theory sessions shall be conducted in the respective schools and the practical may be conducted in schools subject to availability of computational facility OR in the computer centre of our institute on weekend. The total duration of the course shall be between 40 to 60 hours. The students shall visit schools covering 20 km surrounding area (rural and municipal schools) and register the school students. The target for each student shall be delivery and certification of one of the modules to a group of 6 school students. Travelling allowance for travel by bus (bus ticket) or sleeper class shall only be admissible to the students at actual subject to prior sanction of Hon. Principal for the activity.			CO1, CO2, CO3, CO4 40 to 60
MODULE II He/she should participate in all/few of the following activities and complete at least 60 hours of activities for technology transfer to community within 20 km. The activities shall be declared by respective Head of the department. The list of different CSP activities to be conducted under this module shall be but not limited to the following. The activity has to be conducted under the institute banner and counting of its equivalent duration shall be as Indicated against each. He/she should collect total 60 Hours from CSP activities. 1. Two wheeler maintenance 16 Hrs. 2. Motor cycle repairing 16 Hrs. 3. Electrical wiring 16 Hrs. 4. Plumbing 16 Hrs. 5. Carpentry 16 Hrs. 6. Computer Hardware maintenance 16 Hrs. 7. Radio / T.V. repair 16 Hrs.			CO1, CO2, CO3, CO4 60


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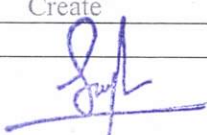
	8. Rain water harvesting 16 Hrs. 9. Roof water harvesting 16 Hrs. 10. Electric safety 16 Hrs. 11. Electrical Safety 16 Hrs. 12. Constructional Safety 16 Hrs.		
Reference Books:			
1.	Community Service and Practices Manual, Government of India.		
2.	Training Programme on National Programme scheme, TISS.		
3.	Case material as Training Aid for field workers, <i>Gurmeet Hans.</i>		
4.	Social service opportunities in Hospitals, <i>Kapil K.Krishan</i> , TISS.		
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9.	Rashtriya Seva Yojana Sankalpana - Prof. Dr. Sankey Chakane, Dr. Pramod / Pabrekar, Diamond Publication, Pune.		
10.	National Service Scheme Manual for NSS District Coordinators, National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya.		
11.	Annual Report of National Service Scheme (NSS) published by Dept. of Higher and Technical Education, Mantralaya.		
12.	NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA - Socio and Cultural Guidelines.		
13.	Purushottam Sheth, Dr. Shailaja Mane, National Service Scheme		
Useful Links			
1.	https://www.youtube.com/watch?v=3o40NbNLoWQ		
2.	https://www.youtube.com/watch?v=paJK5X6zql8&list=PLp4YWOW_IIESHogw-coZo7PQdYliF-msj		
3.	https://www.youtube.com/watch?v=paJK5X6zql8&list=PLp4YWOW_IIESHogw-coZo7PQdYliF-msj&index=1		

Mapping of COs and POs

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1		1	-	-	-		1	1		1	-	-	1	1
CO 2	1	1	-	-	-	1	1	1	1	1	-	-	1	1
CO 3	1	1	-	-	-	2	1	1	1	1	-	-	1	1
CO 4	1	1	-	-	-	1	1	1	1	1	-	-	1	1
CO 5	1	1				1		1	1				1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	10
Understand	-	-	10
Apply	-	-	20
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	-	-	50


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First Year (Sem – II) B. Tech. Mechanical Engineering
ME3210: E-Cell

Teaching Scheme		Examination Scheme	
Lectures	00 Hrs/Week	ISE	50
Practical	02 Hrs/Week	ESE	-
Total Credits	01	TOTAL	50

Course Outcomes (CO): Students will be able to

- | | |
|----|--|
| 1. | Understand various schemes supporting entrepreneurship. |
| 2. | Use various entrepreneurship models. |
| 3. | Identify qualities of entrepreneurs. |
| 4. | Utilize their knowledge in finding practical solutions to individual and community problems. |

Course Contents		CO	Hrs
E-Cell Activities: The E-Cell activities and allotted hours are mentioned below: 1. Orientation and Motivation 2. Opportunity assessment 3. Kick-starting the Entrepreneurial campus 4. Business Planning workshops 5. Prototype to commercialization- drafts preparation 6. Market Analytics 7. Team Building 8. Managing funds/ entrepreneurship finance 9. Social Entrepreneurship locally in the area		CO1 CO2 CO3 CO4 CO5	(30)

Instructions:

- 1) The Students will have to complete for a total period of 30 hours activities (in one Semester).
- 2) The In Sem Evaluation (ISE) will be conducted by Coordinator based on the attendance, overall performance and the report.
- 3) E- Cell consist of faculty member's act as the facilitator and students as the active members. The student's members for the E-cell will be selected on the basis of their interest and their willingness to work for E-cell voluntarily. E-cell team will prepare an activities mentioned above for the semester.

Reference Books:

- | | |
|----|--|
| 1. | Dr. Gupta and Dr. Srinivasan, Entrepreneurship development in India, 2022. |
| 2. | Vasant Desai, Dynamics of Entrepreneurial Development and Management, 2001. |
| 3. | Sarugadharan and Resia Begum, Women Entrepreneurship; institutional support and problems. |
| 4. | M.W.Deshpande, Entrepreneurship of small Scale Industries. |
| 5. | D.L. Saxon and RW Smilor (eds), The Art and Science of Entrepreneurs. |
| 6. | Venkateshwara Rao and Udai Pareek,(Eds)Developing Entrepreneurship-A Handbook. |
| 7. | Ravi J. Mathai, Rural Entrepreneurship A Frame Work in Development Entrepreneurship –A handbook. |

Useful Links

- | | |
|----|---|
| 1. | https://gpdaman.in/entrepreneurship-development-cell-edc/ |
| 2. | https://www.ecell.in/2020/ IIT Bombay. |
| 3. | https://www.ecelliitk.org/ IIT Kanpur |

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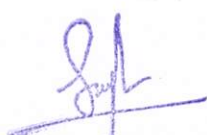

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Mapping of COs and POs

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO 2	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO 3	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO 4	1	1	-	-	-	1	1	1	1	-	-	-	1	1
CO5	1	1				1	1	1	1				1	1

Assessment Pattern: (with revised Bloom's Taxonomy)

Knowledge Level	MSE	ISE	ESE
Remember	-	-	20
Understand	-	-	10
Apply	-	-	10
Analyse	-	-	10
Evaluate	-	-	-
Create	-	-	-
Total	-	-	50


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Government College of Engineering, Karad			
First Year (Semester – II) B. Tech. Mechanical Engineering			
ME 3211 : Workshop Practice - II			
Laboratory Scheme:		Examination Scheme:	
Practical	2 Hrs/Week	ISE	25
Total Credits	1	ESE	25
		TOTAL	50

Course Outcomes (CO):

Students will be able to

1. Design and model various basic prototypes in the trade of Welding such as Lap joint, Lap Tee joint, Edge joint, Butt joint and Corner joint
2. Apply patternmaking principles to create various pattern used in manufacturing industry & to create basic blacksmithing projects, such as hooks, nails, bottle openers, and small decorative items.
3. Learn how to set up the Plastic Moulding machines, adjust parameters such as temperature and pressure, and control the moulding process effectively and safely.
4. Understand different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Course Contents		CO	Hours
Experiment 1	Welding Shop	CO1	04
Experiment 2	Pattern Making	CO2	04
Experiment 3	Black Smithy Shop	CO2	04
Experiment 4	Plastic Moulding Shop	CO3	04
Experiment 5	Turning, Drilling, Milling Shop	CO4	04

List of Submission:

Minimum number of Experiments: 05

Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

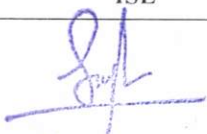
1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Avg
Task I	15	15	15	15	15	15
Task II	05	05	05	05	05	5
Task III	05	05	05	05	05	5
ISE						


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FY EXIT COURSE SYLLABI

ONLY APPLICABLE

FOR STUDENTS OPTING FOR EXIT

AFTER FY B.TECH MECHANICAL ENGINEERING



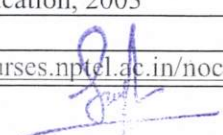
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Government College of Engineering, Karad				
First Year (Sem –I) B. Tech. Mechanical Engineering				
ME-EC-0102: Machine Maintenance Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	8 Hrs/week		ISE	50
Total Credits	4		ESE	50
Course Outcomes:				
1.	Students will be able to apply fundamental maintenance principles and techniques			
2.	Students will be able to analyse machine conditions and diagnose issues			
3.	Students will be able to propose and execute appropriate maintenance actions			
4.	Students will be able to follow safety protocols and maintain documentation			
Course Contents				CO
Part A				
Experiment 1	Belt Tension Measurement			CO1
Experiment 2	Oil Debris Analysis			CO2
Experiment 3	Bearing Inspection and Replacement			CO2, CO3
Experiment 4	Vibration Analysis			CO2
Experiment 5	Shaft Alignment			CO2, CO3,
Experiment 6	Electrical and Electronics Component Testing			CO1, CO3,
Experiment 7	Hydraulic and Pneumatic System Troubleshooting			CO2, CO3,
Experiment 8	Preventive Maintenance Task Execution			CO3, CO4
Experiment 9	Failure Analysis and Root Cause Identification			CO2, CO4
Experiment 10	Perform Calibration of Measurement Devices			CO1
Part B				
Experiment	Visit to any manufacturing Industry.			
List of Submission:				
Perform any 8 experiments from part A.				
Compulsory to perform experiment of Part B				

Text Books	
1.	K. Venkatraman "Maintenance Engineering and Management", PHI Learning, 1 st Edition, 2020.
2.	A. W. Bathelor and G. W. Stachowiak " Engineering Tribology", Elsevier, 4th Edition, 2013
3	Denis Green "Industrial Maintenance and Troubleshooting" Amer Technical, 1 st Edition, 2018
4	Heinz P. Bloch and Fred K. Geitner "Machinery Components Maintenance and Repairs", Gulf Professional Publishing ,Volume 3, 2019
References	
1.	Lindley R. Higgins and R. Keith Mobley "Maintenance Engineering handbook", McGraw-Hill Education, 8 Edition, 2014
2.	Ricky Smith and R. Keith Mobley "Industrial Machinery Repair: Best Maintenance Practices", McGraw-Hill Education, 2003
Useful Links	
https://onlinecourses.nptel.ac.in/noc22_me60/preview	


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https://va-coep.vlabs.ac.in/exp/tuned-vibration-absorber/theory.html
http://vlabs.iitkgp.ac.in/mbfd/#
https://pc-coep.vlabs.ac.in/exp/pneumatic-cylinder-load-speed/
https://pc-coep.vlabs.ac.in/exp/direct-single-acting-cylinder/
https://pc-coep.vlabs.ac.in/exp/direct-double-acting-cylinder/
https://em-coep.vlabs.ac.in/exp/load-test-dc-motor/theory.html
https://em-coep.vlabs.ac.in/exp/speed-control-dc-motor/
https://em-coep.vlabs.ac.in/exp/no-load-test-induction-motor/
https://em-coep.vlabs.ac.in/exp/load-test-phase-alternator

Mapping of COs and POs:

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

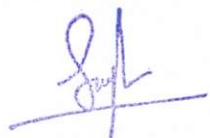
1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	20	20	20	20	20	20	20	20	20	20	20
Task II	15	15	15	15	15	15	15	15	15	15	15
Task III	15	15	15	15	15	15	15	15	15	15	15
ISE											50



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Government College of Engineering, Karad				
First Year (Sem –I) B. Tech. Mechanical Engineering				
ME-EC-0103: Vehicle Maintenance Lab				
Laboratory Scheme:			Examination Scheme:	
Practical	8 Hrs/week		ISE	50
Total Credits	4		ESE	50
Course Objectives :				
Students will be able to				
1.	Students will be able to understand maintenance of engine and vehicle			
2.	Students will be able to Interpret and evaluate pollution measurement results			
3.	Students will be able to familiar with wheel alignment and balancing			
4.	Students will be able to understand vehicle body maintenance and interior			
Course Contents				CO
Part A				
Experiment 1	Study of different types of vehicle maintenance			CO1
Experiment 2	Maintenance of Engine: Engine dismantling and overhauling			CO1
Experiment 3	Pollution measurement-NOx Meter, etc			CO2
Experiment 4	Maintenance of Clutch and Gear Box.			CO1
Experiment 5	Steering system alignment and maintenance.			CO3
Experiment 6	Wheel and tyre balancing and alignment			CO3
Experiment 7	Electrical and electronic system maintenance for vehicle			CO1
Experiment 8	Maintenance of fuel supply system			CO1
Experiment 9	Maintenance of vehicle lubrication system			CO1
Experiment 10	Maintenance of vehicle body and interior			CO4
Part B				
Experiment 1	Experiment on wheel alignment			CO3
Experiment 2	Visit to Service station			
Perform any 8 experiments from part A.				
Compulsory to perform experiment of Part B				

Text Books	
1.	Dr. Kirpal Singh (Vol. I and II) , "Automobile Engineering", Standard Publishers, New Delhi 13 th Edition 2014
2.	R. B. Gupta, "Automobile Engineering", Satya Prakashan, 2014.
3	G.B.S. Narang, "Automobile Engineering", Khanna Publication, 3rd Edition, 1995
4	P. S. Kohali, "Automobile Electrical Equipment", Tata McGraw Hill Publishing House, 1999.
References	
1.	N. K. Giri, "Automobile Mechanics", Khanna Publishers, 2014.
2.	Heitner J., Automotive Mechanics, 2nd ed., East-West Press, 1999
3.	K. Newton and W. Seeds, T.K. Garrett, "Motor Vehicle", 13th Edition, Elsevier publications, 1996
4.	N. K. Giri, "Automobile Mechanics", Khanna Publishers, 2014.
Useful Links	
https://archive.nptel.ac.in/courses/107/106/107106088/	
http://vlabs.iitkgp.ernet.in/rvlab/exp3/index.html#	
http://vlabs.iitkgp.ernet.in/rvlab/exp6/index.html	

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<http://vlabs.iitkgp.ernet.in/rtvlas/exp7/index.html>

<http://vlabs.iitkgp.ernet.in/rtvlas/exp8/index.html>

Mapping of COs and POs:

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

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Avg
Task I	20	20	20	20	20	20	20	20	20	20	20
Task II	15	15	15	15	15	15	15	15	15	15	15
Task III	15	15	15	15	15	15	15	15	15	15	15
ISE											50

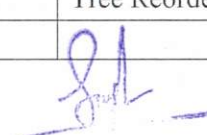


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Exit Course after First Year B. Tech. Mechanical Engineering			
ME-EC-0104: Modelling & Drafting Lab			
Laboratory Scheme:		Examination Scheme:	
Practical	8 Hrs/Week	ISE	50
Total Credits	4	ESE	50
Prerequisite :			
Course Outcomes (CO):			
Students will be able to			
1.	Familiar with the CATIA V5 user interface, including toolbars, menus, and various navigation techniques.		
2.	To apply geometric and dimensional constraints to sketches and convert them into detailed drawings with annotations and dimensions.		
3.	To use different features and commands for extrusion, revolution, fillets, chamfers, patterns, and holes to create complex parts with accurate geometry.		
4.	To define relationships between parts, apply constraints, and analyse assembly constraints and clearances.		
Course Contents			
		CO	Hours
Experiment 1	Introduction:- CATIA as CAD software: - Concept of Parametric Modelling, Feature Based Modelling, User Interface, Mouse operations, File types and Management, drawing profiles. Major user industries of CATIA.	CO1	04
Experiment 2	Sketcher:- Profile toolbar, operation (corner, chamfer, re-limitations, transformations, and project 3D element), constraints, types of constraints, workbench, sketch tools, tools (Sketch solving status, sketch analysis, output feature), visualization toolbar, and user selection filter.	CO2	04
Experiment 3	Modelling of Machined Component (Part Modelling) :- Modelling of Machined component, Advance Design features, Multi-section solid, Removed multi-section solid, Introduction To Multi-body concept, Transformation, Multi-body concept:- Slandered example, Advance Features.	CO2	04
Experiment 4	Drafting :- Introduction To Drafting & Detailing Theory, Views, Annotations, Surfacing Modeling based Plastic Component, Surfacing, and Advanced Surfacing.	CO3	04
Experiment 5	Wire-frame Modeling:- Point, Line, Planes, Curves, Circle-Conic, Standard Examples. Use of wire frame modeling,	CO3	04
Experiment 6	Assembly & Mechanism :- Introduction to Assembly:- Types of assembly approach, Types of Constrains and DOF, placement of components in the Assembly, Manipulating Components, BOTTOM UP Approach, TOP DOWN Approach, Assembly Drafting:- Scene(Exploded View), Bill of material, Ballon creation, Graph Tree Reordering.	CO4	04


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Mapping of COs and Pos:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO2	2	2	-	2	2	-	1	-	-	-	-	-	1	1
CO3	2	1	-	2	2	-	1	-	-	-	-	-	1	1
CO4	-	1	-	2	2	-	1	-	-	-	-	-	1	1

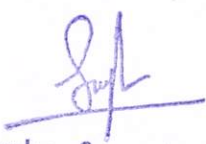
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2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 5	Avg
Task I	20	20	20	20	20	20	20
Task II	15	15	15	15	15	15	15
Task III	15	15	15	15	15	15	15
ISE							50


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Government College of Engineering, Karad				
First Year (Sem- I) B. Tech				
FEXXXX: Makers Space Laboratory I				
Laboratory Scheme			Examination Scheme	
Practical	04 Hrs/week		ISE	75
			ESE	25
Total Credits	02			
Prerequisite: Basic concepts of Physics, Chemistry and Mathematics				
Course Outcomes (CO): Students will be able to				
CO1	Use basic engineering tools and laboratory equipment.			
CO2	Integrate mechanical, electrical, electronic, civil, and computing concepts.			
CO3	Prepare technical documentation and engineering reports.			
CO4	Work collaboratively in multidisciplinary teams.			
Course Contents				
Module 1 (Civil Domain)		Concrete testing equipment Soil testing equipment Aggregate testing tools Surveying instruments (Total station) , Rebar bending & cutting , Model making materials , Water flow & structure models ,Structural model making , Material testing , Surveying practice , Transportation models , Water resource models , Sustainable construction , BIM basics (3D models)		
Module 2 (Mechanical Domain)		Mechanical fabrication Assembly practice , Structural model making, Mechanism development , Maintenance practice, Handheld tools, CAD/CAM software, 3D printers, Prototype fabrication, Model development , Product iteration , Component manufacturing , Rapid testing		
Module 3 (Electrical Domain)		Electrical Safety, Tools and Basics Circuits, Electrical Machines and Drives, Solar kits, Wind turbine models, Energy monitoring systems, EV components, Battery testing systems, Renewable energy experiments , Energy audits, Sustainable product design, EV prototype development , Green building models		
Module 4 (E&TC Domain)		Arduino kits , Raspberry Pi boards , Sensors & actuators Breadboards , Oscilloscopes , Soldering stations, Power supplies, Embedded systems, PCB designing (Power supply designing), IoT basics , Sensor interfacing, Embedded systems, Smart automation		
Module 5 (IT Domain)		Programming systems, AI software tools, MATLAB / Python environment, Simulation software, High-performance PCs, Coding practice, AI model development , Data visualization, Algorithm development, Digital twin simulation		
Module 6 (Project Management, Sustainability, and IPR)		Introduction to Agile methodologies, teamwork, and project management tools, Importance of documentation in engineering projects,Fundamentals of sustainability, sustainability leadership, and carbon footprint analysis. Overview of Intellectual Property Rights (IPR), including patents, copyrights, and trademarks.		


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Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	3	1	1	1	3	1	1	--	1	--	--
CO2	3	3	2	2	2	1	2	--	2	1	--
CO3	1	1	1	2	2	--	1	1	1	3	2
CO4	--	1	1	--	1	--	1	2	3	3	2

Guideline for Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	ISE	ESE
Remember	-	-
Understand	15	5
Apply	20	5
Analyse	10	5
Evaluate	10	5
Create	20	5
TOTAL	75	25

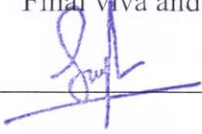


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First Year (Sem- II) B. Tech			
FEXXXX: Makers Space Laboratory II			
Laboratory Scheme		Examination Scheme	
Practical	04 Hrs/week	ISE	50
		ESE	50
Total Credits	02		
Prerequisite: Makers Space Laboratory I			
Course Outcomes (CO): Students will be able to			
CO1	Apply engineering knowledge to execute multidisciplinary projects.		
CO2	Demonstrate effective teamwork and engineering management skills.		
CO3	Develop and implement real-world engineering solutions.		
CO4	Analyze and solve practical engineering problems using multidisciplinary approaches.		
Course Contents			
The main aim of this course is to develop among students the essential qualities of creativity, innovation, critical thinking, collaborative learning, leadership, and engineering problem-solving skills through hands-on multidisciplinary projects and prototype development. Students shall work in groups consisting of a maximum of FIVE students. The groups are encouraged to be multidisciplinary and may include students from different engineering branches. Each group shall identify a real-life or societal problem and develop an innovative technological solution in the form of a prototype, model, system, software, process, or product. The developed solution must demonstrate novelty, practical utility, sustainability, and engineering application. The steps involved in completion of the project shall include, but are not limited to: 1. Problem Identification and Need Analysis: Through, Observation of day-to-day problems, Field visits and surveys, Literature review, Interaction with users/community, Identification of societal, environmental, industrial, or technological challenges 2. Ideation and Concept Development: Including, Brainstorming and idea generation, Design thinking methodologies, Feasibility analysis, Conceptual design and workflow preparation, Selection of suitable materials/components/tools 3. Design and Prototype Development: Engineering design and planning, CAD modeling/sketching/block diagrams, Fabrication and assembly, Programming and system integration, Sensor interfacing and automation, Development of software/hardware systems, Testing of subsystems 4. Testing, Validation and Improvement: Prototype testing and debugging, Performance evaluation, Validation through experimentation, User feedback and modifications Optimization and refinement 5. Presentation and Documentation: Preparation of technical report, Cost estimation and feasibility study, Prototype demonstration, Poster and presentation preparation, Final viva and exhibition			


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Task	Activity
Task 1	Introduction to multidisciplinary project development, team formation, identification of societal and industrial problem statements.
Task 2	Literature survey, problem analysis, brainstorming sessions, and selection of project theme.
Task 3	Requirement analysis, preparation of functional block diagram, project planning, and task allocation among team members.
Task 4	Conceptual design development, selection of components, feasibility analysis, and preparation of preliminary design report.
Task 5	Mechanical system design, CAD modeling, and structural planning of the proposed system.
	Electrical and electronic subsystem design including sensors, actuators, power supply, and interfacing circuits.
	Embedded system development, microcontroller programming, communication protocol implementation, and software architecture design.
	Procurement of components, fabrication planning, PCB preparation, and hardware assembly initiation.
	Prototype fabrication, subsystem integration, wiring, assembly, and implementation of software modules.
Task 6	Testing of individual modules, debugging, calibration, troubleshooting, and validation of subsystem functionality.
Task 7	Complete system integration, multidisciplinary coordination, and implementation of automation or IoT features.
Task 8	Performance evaluation, optimization, testing under different operating conditions, and reliability assessment.
Task 9	Preparation of technical documentation, project report, presentation slides, posters, and student portfolio compilation.
Task 10	Final project demonstration, viva voce examination, prototype exhibition, and evaluation by faculty/industry experts.

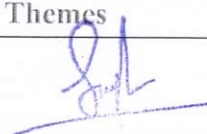
Experiment Completion Reports

Each experiment report shall contain:

1. Project Title
2. Domain Introduction
3. Motivation
4. Design Methodology
5. Implementation and Modeling
6. Testing and Development
7. Conclusion
8. Reference
9. Presentation
10. Viva Questions

Maker Lab II – Common Multidisciplinary Project

Project Themes


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1. Industry 4.0
2. Smart Agriculture
3. Smart Energy Systems
4. Smart Campus
5. Sustainable Infrastructure
6. Healthcare Devices
7. Robotics and Automation
8. Smart Transportation
9. Disaster Management Systems

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO1	3	2	3	2	2	1	1	--	2	1	1
CO2	1	1	1	1	1	1	1	2	3	3	3
CO3	3	3	3	3	2	2	2	1	2	2	2
CO4	3	3	2	3	2	1	2	1	2	1	1

Guideline for Assessment Pattern (with revised Bloom's Taxonomy)

Rubrics for Practical Evaluation

Criteria	Excellent	Good	Average	Poor
Preparation	4	3	2	1
Technical Execution	4	3	2	1
Safety Practices	4	3	2	1
Observation and Analysis	4	3	2	1
Documentation	4	3	2	1

Rubric-Based Evaluation Sheet

Evaluation Parameter	Max Marks	Obtained	Remarks
Preparation	10		
Execution	10		
Observation	10		
Documentation	10		
Viva	10		
Total	50		

Evaluation Scheme

Knowledge Level	ISE	ESE
Remember	-	-
Understand	10	10
Apply	10	10
Analyse	10	10
Evaluate	10	10
Create	10	10
TOTAL	50	50


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