SUDHARSAN ENGINEERING COLLEGE
(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Sathiyamangalam, Kulathur(TK), Pudukkottai District-622 501
Ph: 04339-240830, 240840 Fax: 04339-240205
Website: www.sec.ac.in Email: principal@sec.ac.in

` DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAMME: B.E MECHANICAL ENGINEERING

COURSE OUTCOMES (COs)

Semester	01
Subject Code	HS3152
Subject Name	PROFESSIONAL ENGLISH I
Course Outcome	• To use appropriate words in a professional context • To gain understanding of basic grammatical structures and use them in right context. • To read and infer the denotative and connotative meanings of technical texts • To read and interpret information presented in tables, charts and other graphic forms • To write definitions, descriptions, narrations and essays on various topics

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
2	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
3	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
4	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
5	2	3	3	3	-	3	3	3	2	3	-	3	-	-	-
AVg.	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

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Semester	01
Subject Code	MA3151
Subject Name	MATRICES AND CALCULUS
Course Outcome	• Use the matrix algebra methods for solving practical problems. • Apply differential calculus tools in solving various application problems. • Able to use differential calculus ideas on several variable functions. • Apply different methods of integration in solving practical problems. • Apply multiple integral ideas in solving areas, volumes and other practical problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-

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Semester	01
Subject Code	PH3151
Subject Name	ENGINEERING PHYSICS
Course Outcome	• Understand the importance of mechanics. • Express their knowledge in electromagnetic waves. • Demonstrate a strong foundational knowledge in oscillations, optics and lasers. • Understand the importance of quantum physics. • Comprehend and apply quantum mechanical principles towards the formation of energy bands

CO's	**PO's**												**PSO's**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	2	1	1	1	-	-	-	-	-	-	-	-	-
2	3	3	2	1	2	1	-	-	-	-	-	-	-	-	-
3	3	3	2	2	2	1	-	-	-	-	-	1	-	-	-
4	3	3	1	1	2	1	-	-	-	-	-	-	-	-	
5	3	3	1	1	2	1	-	-	-	-	-	-	-	-	-
AVG	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-

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Sem	01
Subject Code	CY3151
Subject Name	ENGINEERING CHEMISTRY
Course Outcome	• To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water. • To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications. • To apply the knowledge of phase rule and composites for material selection requirements. • To recommend suitable fuels for engineering processes and applications. • To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	1	-	1	1	-	-	-	-	1	-	-	-
2	2	-	-	1	-	2	2	-	-	-	-	-	-	-	-
3	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
4	3	1	1	-	-	1	2	-	-	-	-	-	-	-	-
5	3	1	2	1	-	2	2	-	-	-	-	2	-	-	-
Avg.	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**	**-**	**-**

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Sem	01
Subject Code	GE3151
Subject Name	PROBLEM SOLVING AND PYTHON PROGRAMMING
Course Outcome	• Develop algorithmic solutions to simple computational problems. • Develop and execute simple Python programs. • Write simple Python programs using conditionals and looping for solving problems. • Decompose a Python program into functions. • Represent compound data using Python lists, tuples, dictionaries etc. • Read and write data from/to files in Python programs.

CO's	PO's												PSO's		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	3	3	2	-	-	-	-	-	2	2	3	3	-
2	3	3	3	3	2	-	-	-	-	-	2	2	3	-	-
3	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	-
5	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
AVg.	2	2	-	-	2	-	-	-	-	-	1	-	2	-	-

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Sem	01
Subject Code	GE3171
Subject Name	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY
Course Outcome	• Develop algorithmic solutions to simple computational problems • Develop and execute simple Python programs. • Implement programs in Python using conditionals and loops for solving problems.. • Deploy functions to decompose a Python program. • Process compound data using Python data structures. • Utilize Python packages in developing software applications.

CO's	PO's												PSO's	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	3	3	3	3	-	-	-	-	-	3	2	3	3
2	3	3	3	3	3	-	-	-	-	-	3	2	3	-
3	3	3	3	3	2	-	-	-	-	-	2	-	3	-
4	3	2	-	2	2	-	-	-	-	-	1	-	3	-
5	1	2	-	-	1	-	-	-	-	-	1	-	2	-
6	2	-	-	-	2	-	-	-	-	-	1	-	2	-
AVg.	**2**	**3**	**3**	**3**	**2**	-	-	-	-	-	**2**	**2**	**3**	**3**

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Sem	01
Subject Code	BS3171
Subject Name	PHYSICS LABORATORY
Course Outcome	• Understand the functioning of various physics laboratory equipment. • Use graphical models to analyze laboratory data. • Use mathematical models as a medium for quantitative reasoning and describing physical reality. • Access, process and analyze scientific information. • Solve problems individually and collaboratively.

CO's	**PO's**												**PSO's**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
AVG	3	2.4	2.6	1	1										

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Sem	01
Subject Code	BS3171
Subject Name	CHEMISTRY LABORATORY
Course Outcome	• To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO. • To determine the amount of metal ions through volumetric and spectroscopic techniques • To analyse and determine the composition of alloys. • To learn simple method of synthesis of nanoparticles • To quantitatively analyse the impurities in solution by electro analytical techniques

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
2	3	1	2	-	-	1	2	-	-	-	-	1	-	-	-
3	3	2	1	1	-	-	1	-	-	-	-	-	-	-	-
4	2	1	2	-	-	2	2	-	-	-	-	-	-	-	-
5	2	1	2	-	1	2	2	-	-	-	-	1	-	-	-
Avg.	**2.6**	**1.3**	**1.6**	**1**	**1**	**1.4**	**1.8**	**-**	**-**	**-**	**-**	**1.3**	**-**	**-**	**-**

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Sem	01
Subject Code	GE3172
Subject Name	ENGLISH LABORATORY
Course Outcome	• To listen to and comprehend general as well as complex academic information • To listen to and understand different points of view in a discussion • To speak fluently and accurately in formal and informal communicative contexts • To describe products and processes and explain their uses and purposes clearly and accurately • To express their opinions effectively in both formal and informal discussions

CO's	**PO's**												**PSO's**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
2	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
3	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
4	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
5	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
AVg.	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	-	-	-

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Sem	02
Subject Code	HS3252
Subject Name	PROFESSIONAL ENGLISH - II
Course Outcome	• To compare and contrast products and ideas in technical texts. • To identify and report cause and effects in events, industrial processes through technical texts • To analyse problems in order to arrive at feasible solutions and communicate them in the written format. • To present their ideas and opinions in a planned and logical manner • To draft effective resumes in the context of job search.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
2	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
3	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
4	3	3	3	3	2	3	3	3	2	3	3	3	-	-	-
5	-	-	-	-	-	-	-	-	**3**	**3**	**3**	**3**	-	-	-
AVg.	**3**	**3**	**3**	**3**	**2.75**	**3**	**3**	**3**	**2.2**	**3**	**3**	**3**	-	-	-

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Sem	02
Subject Code	MA3251
Subject Name	STATISTICS AND NUMERICAL METHODS
Course Outcome	• Apply the concept of testing of hypothesis for small and large samples in real life problems. • Apply the basic concepts of classifications of design of experiments in the field of agriculture. • Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems. • Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations. • Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

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Sem	02
Subject Code	PH3251
Subject Name	MATERIALS SCIENCE
Course Outcome	• Know basics of crystallography and its importance for variedmaterials properties • Gain knowledge on the electrical and magnetic properties ofmaterials and their applications • Understand clearly of semiconductor physics and functioning ofsemiconductor devices • Understand the optical properties of materials and workingprinciples of various optical devices • Appreciate the importance of functional nanoelectronic devices.

CO's	PO's												PSO's		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	1	2	1	1	-	-	-	-	-	-	-	-	-
2	3	2	1	1	2	1	1	-	-	-	-	-	-	-	-
3	3	2	2	2	2	1	-	-	-	-	-	-	-	-	-
4	3	2	2	1	2	2	-	-	-	-	-	1	-	-	-
5	3	2	2	1	2	1	-	-	-	-	-	-	-	-	-
AVG	3	2	1.6	1.4	1.8	1.2	1	-	-	-	-	1	-	-	-

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Sem	02
Subject Code	BE3251
Subject Name	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
Course Outcome	• Compute the electric circuit parameters for simple problems • Explain the working principle and applications of electrical machines • Analyze the characteristics of analog electronic devices • Explain the basic concepts of digital electronics • Explain the operating principles of measuring instruments

Mapping of COs with POs and PSOs

COs/POs&PSOs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	2	2	1					1				2			1
CO2	2	2	1					1				2			1
CO3	2	1	1					1				2			1
CO4	2	2	1					1				2			1
CO5	2	2	1					1				2			1
CO/PO & PSO Average	2	1.8	1					1				2			1
1 – Slight, 2 – Moderate, 3 – Substantial															

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Sem	02
Subject Code	GE3251
Subject Name	ENGINEERING GRAPHICS
Course Outcome	• Use BIS conventions and specifications for engineering drawing. • Construct the conic curves, involutes and cycloid. • Solve practical problems involving projection of lines. • Draw the orthographic, isometric and perspective projections of simple solids. • Draw the development of simple solids

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	2		2					3		2	2	2	
2	3	1	2		2					3		2	2	2	
3	3	1	2		2					3		2	2	2	
4	3	1	2		2					3		2	2	2	
5	3	1	2		2					3		2	2	2	
Avg.	3	1	2		2					3		2	2	2	
Low (1) ; Medium (2) ; High (3)															

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Sem	02
Subject Code	GE3271
Subject Name	ENGINEERING PRACTICES LABORATORY
Course Outcome	• Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work. • Wire various electrical joints in common household electrical wire work. • Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work. • Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2			1	1	1					2	2	1	1
2	3	2			1	1	1					2	2	1	1
3	3	2			1	1	1					2	2	1	1
Avg.	3	2			1	1	1					2	2	1	1
Low (1) ; Medium (2) ; High (3)															

Sem	02
Subject Code	BE3271
Subject Name	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY
Course Outcome	• Use experimental methods to verify the Ohm's and Kirchhoff's Laws. • Analyze experimentally the load characteristics of electrical machines • Analyze the characteristics of basic electronic devices • Use DSO to measure the various parameters

Mapping of COs with POs and PSOs

COs/POs&PSOs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	2	1	1			1.5	2						1
CO2	3	3	2	1	1			1.5	2						1
CO3	3	3	2	1	1			1.5	2						1
CO4	3	3	2	1	1			1.5	2						1
CO5	3	3	2	1	1			1.5	2						1
CO/PO & PSO Average	3	3	2	1	1			1.5	2						1

1 – Slight, 2 – Moderate, 3 – Substantial

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Sem	02
Sub Code	GE3272
Sub Name	COMMUNICATION LABORATORY
Course Outcome	• Speak effectively in group discussions held in formal/semi formal contexts. • Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions • Write emails, letters and effective job applications. • Write critical reports to convey data and information with clarity and precision • Give appropriate instructions and recommendations for safe execution of tasks

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
2	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
3	2	2	3	3	1	3	3	3	3	3	3	3	-	-	-
4	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
5	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
AVg.	**2.4**	**2.8**	**3**	**3**	**1.8**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**

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Sem	03
Sub Code	MA3351
Sub Name	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
Course Outcome	• Understand how to solve the given standard partial differential equations. • Solve differential equations using Fourier series analysis which plays a vital role in engineering applications. • Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations. • Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering. • Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO2	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO3	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO4	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
CO5	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
Avg	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-

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Sem	03
Sub Code	ME3351
Sub Name	ENGINEERING MECHANICS
Course Outcome	• Illustrate the vectorial and scalar representation of forces and moments • Analyse the rigid body in equilibrium • Evaluate the properties of distributed forces • Determine the friction and the effects by the laws of friction • Calculate dynamic forces exerted in rigid body

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	2	1	2							2	3	1	1
2	3	2	2	1	2							2	3	1	1
3	3	2	3	1	2							2	3	1	2
4	3	2	3	1	2							2	3	1	2
5	3	2	3	1	2							2	3	1	2
Low (1); Medium (2); High (3)															

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Sem	03
Sub Code	ME3391
Sub Name	ENGINEERING THERMODYNAMICS
Course Outcome	• Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems. • Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations. • Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart • Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations. • Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	2	1								2			
2	3	3	2	1								2			
3	3	3	2	1					1		1	2	3		3
4	3	3	2	1		1			2		1	2	3	2	
5	3	3	2	1		1			2		1	2	3	2	3
Low (1) Medium (2) ; High (3)															

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E-Box Colleges

Sem	03
Sub Code	CE3391
Sub Name	FLUID MECHANICS AND MACHINERY
Course Outcome	• Understand the properties and behaviour in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics • Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel. Also, to understand the concept of boundary layer and its thickness on the flat solid surface. • Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies • Explain the working principles of various turbines and design the various types of turbines. • Explain the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	2	2	1	2	2	1	2	1	1	2	3	2	3
2	3	3	3	2	1	2	2	1	2	1	1	2	3	2	3
3	3	3	3	3	1	2	2	1	2	1	1	2	3	3	3
4	3	3	3	3	1	2	2	1	2	1	1	3	3	2	2
5	3	3	3	3	1	2	2	1	2	1	1	3	3	2	2
Low (1); Medium (2) ; High (3)															

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Sem	03
Sub Code	ME3392
Sub Name	ENGINEERING MATERIALS AND METALLURGY
Course Outcome	• Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification. • Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes. • Clarify the effect of alloying elements on ferrous and non-ferrous metals. • Summarize the properties and applications of non-metallic materials. • Explain the testing of mechanical properties.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	1	3	2								2	2	1	2
2	3	1	3	1		2		1				2	2	1	2
3	3	1	3									2	2	1	2
4	3	1	3				2					2	2	1	2
5	3	1	3	2	2							2	2	1	2
Low (1) ; Medium (2) ; High (3)															

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E-Box Colleges

Sem	03
Sub Code	ME3393
Sub Name	MANUFACTURING PROCESSES
Course Outcome	• Explain the principle of different metal casting processes. • Describe the various metal joining processes. • Illustrate the different bulk deformation processes. • Apply the various sheet metal forming process. • Apply suitable molding technique for manufacturing of plastics components.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3		2			2	3	1	1	-	-	1	3	1	2
2	3		2			2	3	1	1	-	-	1	3	1	2
3	3		2			2	2	1	1	-	-	1	3	1	2
4	3		2			2	2	1	1	-	-	1	3	1	2
5	3		2		2	2	2	1	1	-	-	1	3	1	2
Low (1) ; Medium (2) ; High (3)															

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Sem	03
Sub Code	ME3381
Sub Name	COMPUTER AIDED MACHINE DRAWING
Course Outcome	• Prepare standard drawing layout for modelled assemblies with BoM. • Model orthogonal views of machine components. • Prepare standard drawing layout for modelled parts

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	1	2			3				3	2		3	2	2	2
2	1	2			3				3	2		3	2	2	2
3	1	2			3				3	2		3	2	2	2
Low (1) ; Medium (2) ; High (3)															

em	03
Sub Code	ME3382
Sub Name	MANUFACTURING TECHNOLOGY LABORATORY
Course Outcome	• Demonstrate the safety precautions exercised in the mechanical workshop and join two metals using GMAW. • The students able to make the work piece as per given shape and size using machining process such as rolling, drawing, turning, shaping, drilling and milling. • The students become make the gears using gear making machines and analyze the defects in the cast and machined components

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3						1		2			1	1	2	2
2	3						1		2			1	1	2	2
3	3						1		2			1	1	2	2
Low (1) ; Medium (2) ; High (3)															

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Sem	03
Sub Code	GE3361
Sub Name	PROFESSIONAL DEVELOPMENT
Course Outcome	• Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements • Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding • Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects

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E-Box Colleges

Sem	04
Sub Code	ME3491
Sub Name	THEORY OF MACHINES
Course Outcome	• Discuss the basics of mechanism. • Solve problems on gears and gear trains. • Examine friction in machine elements. • Calculate static and dynamic forces of mechanisms. • Calculate the balancing masses and their locations of reciprocating and rotating masses. Computing the frequency of free vibration, forced vibration and damping coefficient.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	2		2			1				1	3		1
2	3	2	2		2			1				1	3		1
3	3	2	2		2			1				1	3		1
4	3	2	2		2			1				1	3		1
5	3	2	2		2			1				1	3		1

Low (1) ; Medium (2) ; High (3)

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E-Box Colleges

Sem	04
Sub Code	ME3451
Sub Name	THERMAL ENGINEERING
Course Outcome	• Apply thermodynamic concepts to different air standard cycles and solve problems. • To solve problems in steam nozzle and calculate critical pressure ratio. • Explain the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems. • Explain the functioning and features of IC engine, components and auxiliaries. • Calculate the various performance parameters of IC engines

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	1	1								1	2	1	
2	3	2	2	1								1	2	1	
3	3	2	2	1								1	2	1	
4	3	2	1	1								1	2	1	
5	3	2	1	1								1	2	1	
Low (1) ; Medium (2) ; High (3)															

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E-Box Colleges

Sem	04
Sub Code	ME3492
Sub Name	HYDRAULICS AND PNEUMATICS
Course Outcome	• Apply the working principles of fluid power systems and hydraulic pumps. • Apply the working principles of hydraulic actuators and control components. • Design and develop hydraulic circuits and systems. • Apply the working principles of pneumatic circuits and power system and its components. • Identify various troubles shooting methods in fluid power systems.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	1	1	1								1	2	1	1
2	2	1	1	1								1	2	1	1
3	2	1	1	1								1	2	1	1
4	2	1	1	1								1	2	1	1
5	2	1	1	1								1	2	1	1
Low (1) ; Medium (2) ; High (3)															

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E-Box Colleges

Sem	04
Sub Code	ME3493
Sub Name	MANUFACTURING TECHNOLOGY
Course Outcome	• Apply the mechanism of metal removal process and to identify the factors involved in improving machinability. • Describe the constructional and operational features of centre lathe and other special purpose lathes. • Describe the constructional and operational features of reciprocating machine tools. • Apply the constructional features and working principles of CNC machine tools. • Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	3	1	1	1	3			3		2	3	3	2
2	3	3	3	1	1	1	3			3		2	3	2	2
3	3	3	3	1	1	1	3			3		2	3	2	2
4	3	3	2	1	1	1	3			3		2	3	2	2
5	3	3	3	1	1	1	3			3		2	3	2	3
Low (1) ; Medium (2) ; High (3)															

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E-Box Colleges

Sem	04
Sub Code	CE3491
Sub Name	STRENGTH OF MATERIALS
Course Outcome	• Understand the concepts of stress and strain in simple and compound bars, the important of principal stresses and principal planes. • Understand the load transferring mechanism in beams and stress distribution due shearing force and bending moment. • Apply basic equation of torsion in designing of shafts and helical springs • Calculate slope and deflection in beams using different methods. • Analyze thin and thick shells for applied pressures.

CO	**PO**												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
2	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
3	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
4	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
5	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
Low (1) ; Medium (2) ; High (3)															

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Sem	04
Sub Code	GE3451
Sub Name	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY
Course Outcome	• To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation. • To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society. • To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations. • To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development. • To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Avg.	**2.8**	**1.8**	**1**	**1**	-	**2.2**	**2.4**	-	-	-	-	**1.8**	-	-	-

Sem	04
Sub Code	CE3481
Sub Name	STRENGTH OF MATERIALS AND FLUID MACHINERY LABORATORY
Course Outcome	• Determine the tensile, torsion and hardness properties of metals bytesting • Determine the stiffness properties of helical and carriage spring • Apply the conservation laws to determine the coefficient of discharge ofa venturimeter and finding the friction factor of given pipe • Apply the fluid static and momentum principles to determine themetacentric height and forces due to impact of jet • Determine the performance characteristics of turbine, rotodynamic pump • and positive displacement pump.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	1	3	3	1	1	1	3	1	1	2	2	2	1
2	3	2	1	3	3	1	1	1	3	1	1	2	3	2	1
3	3	3	2	3	2	1	1	1	3	1	1	2	3	2	1
Low (1) ; Medium (2) ; High (3)															

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Sem	04
Sub Code	ME3461
Sub Name	THERMAL ENGINEERING LABORATORY
Course Outcome	• Conduct tests to evaluate performance characteristics of IC engines • Conduct tests to evaluate the performance of refrigeration cycle • Conduct tests to evaluate Performance and Energy Balance on a Steam Generator

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	2	1	1					1			1	1	1	1
2	2	2	1	1					1			1	1	1	1
3	2	2	1	1					1			1	1	1	1
Low (1) ; Medium (2) ; High (3)															

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Sem	05
Sub Code	ME3591
Sub Name	DESIGN OF MACHINE ELEMENTS
Course Outcome	• Explain the design machine members subjected to static and variable loads. • Apply the concepts design to shafts, key and couplings. • Apply the concepts of design to bolted, Knuckle, Cotter, riveted and welded joints. • Apply the concept of design helical, leaf springs, flywheels, connecting rods and crank shafts. • Apply the concepts of design and select sliding and rolling contact bearings, seals and gaskets

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	3					1	1			2	3	2	2
2	2	2	3					1	1			2	3	2	2
3	2	2	3					1	1			2	3	2	2
4	2	2	3					1	1			2	3	2	2
5	2	2	3					1	1			2	3	2	2
Low (1) ; Medium (2) ; High (3)															

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Sem	05
Sub Code	ME3592
Sub Name	METROLOGY AND MEASUREMENTS
Course Outcome	• Discuss the concepts of measurements to apply in various metrological instruments. • Apply the principle and applications of linear and angular measuring instruments, assembly and transmission elements. • Apply the tolerance symbols and tolerance analysis for industrial applications. • Apply the principles and methods of form and surface metrology. • Apply the advances in measurements for quality control in manufacturing Industries.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	2	2					1			1	3	2	1
2	3	2	2	2					1			1	3	2	1
3	3	2	2	2					1			1	3	2	1
4	3	2	2	2					1			1	3	2	1
5	3	2	2	2					1			1	3	2	1
Low (1) ; Medium (2) ; High (3)															

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E-Box Colleges

Sem	05
Sub Code	CME380
Sub Name	AUTOMOBILE ENGINEERING
Course Outcome	• Recognize the various parts of the automobile and their functions and materials. • Discuss the engine auxiliary systems and engine emission control. • Distinguish the working of different types of transmission systems. • Explain the Steering, Brakes and Suspension Systems. • Predict possible alternate sources of energy for IC Engines.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	1	2	1					1			1	1	2	1
2	2	1	2	1					1			1	1	2	1
3	2	1	2	1					1			1	1	2	1
4	2	1	2	1					1			1	1	2	1
5	2	1	2	1					1			1	1	2	1
Low (1) ; Medium (2) ; High (3)															

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Website: **www.sec.ac.in** Email: principal@sec.ac.in

Sem	05
Sub Code	CME347
Sub Name	LEAN MANUFACTURING
Course Outcome	• Discuss the basics of 6 SIGMA • Elaborate the lean manufacturing tools. • Illustrate about the deeper understanding methodologies of Lean manufacturing. • Discuss lean concepts and its elements. • Describe the implementation and challenges of lean manufacturing.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	1	1	2	1	1				1		3	1	1	2	1
2	1	1	2	1	1				1		3	1	1	2	1
3	1	1	2	1	1				1		3	1	1	2	1
4	1	1	2	1	1				1		3	1	1	2	1
5	1	1	2	1	1				1		3	1	1	2	1
Low (1) ; Medium (2) ; High (3)															

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Sem	05
Sub Code	CME340
Sub Name	CAD/CAM
Course Outcome	• Discuss the basics of the design and concepts. • Develop the two dimensional drafting and projection views. • Discuss the three dimensional modeling, parametric and Non-parametric modeling • Discuss the assembly modeling and top down, bottom up approaches. • Develop the computer aided machining and wirting part programming.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	2	2				1			1	3	3	2
2	3	2	2	2	2				1			1	3	3	2
3	3	2	2	2	2				1			1	3	3	2
4	3	2	2	2	2				1			1	3	3	2
5	3	2	2	2	2				1			1	3	3	2
Low (1) ; Medium (2) ; High (3)															

Sem	05
Sub Code	ME3581
Sub Name	METROLOGY AND DYNAMICS LABORATORY
Course Outcome	• The students able to measure the gear tooth dimensions, angle using sine bar, straightness. • Determine mass moment of inertia of mechanical element, governor effort and range of sensitivity. • Determine the natural frequency and damping coefficient, critical speeds of shafts

CO	**PO**												**PSO**		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		2	2	3		2	2		1	2	2		3	2	2
2		2	2	3		2	2		1	2	2		2	2	2
3		2	2	3		2	2		1	2	2		3	2	2
Avg	-	2	2	3	-	2	2	-	1	2	2	-	2.6	2	2
Low (1) ; Medium (2) ; High (3)															

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Sem	06
Sub Code	ME3691
Sub Name	HEAT AND MASS TRANSFER
Course Outcome	• Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems. • Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems. • Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems. • Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems. • Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	2					1			1	3	2	1
2	3	3	3	3					1			1	3	2	1
3	3	3	3	2					1			1	3	2	1
4	3	3	3	2					1			1	3	2	1
5	3	3	3	2					1			1	3	2	1
Low (1) ; Medium (2) ; High (3)															

Sem	06
Sub Code	CME396
Sub Name	PROCESS PLANNING AND COST ESTIMATION
Course Outcome	• Discuss select the process, equipment and tools for various industrial products. • Explain the prepare process planning activity chart. • Explain the concept of cost estimation. • Compute the job order cost for different type of shop floor. • Calculate the machining time for various machining operations.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	2	2	2					1		1	1	2	1	1
2	3	3	2	1					1		1	1	2	1	1
3	3	3	2	2					1		1	1	2	1	1
4	3	3	2	2					1		1	1	2	1	1
5	3	3	2	2					1		1	1	2	1	1
Low (1) ; Medium (2) ; High (3)															

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Sem	06
Sub Code	CME397
Sub Name	SURFACE ENGINEERING
Course Outcome	• Describe the fundamentals of surface features and different types of friction associated with metals and non-metals • Analyze the different types of wear mechanism and its standard measurement. • Analyze the different types of corrosion and its preventive measures • Analyze the different types of surface properties and surface modification techniques • Analyze the various types of materials used in the friction and wear applications.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	1	2	2	2	2			2	1			2	3	2	1
2	2	2	2	2	2			2	1			2	3	2	1
3	1	2	2	2	2			2	1			2	2	3	1
4	1	2	2	2	3			2	1			2	2	3	1
5	1	1	2	2	1			2	1			3	1	2	1
Low (1) ; Medium (2) ; High (3)															

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Sem	06
Sub Code	CME384
Sub Name	POWER PLANT ENGINEERING
Course Outcome	• Explain the layout, construction and working of the components inside a thermal power plant. • Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants. • Explain the layout, construction and working of the components inside nuclear power plants. • Explain the layout, construction and working of the components inside Renewable energy • power plants • Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	1	1	1		1	3			1		1	2	2	1
2	3	1	1	1		1	3			1		1	2	2	1
3	3	1	1	1		1	3			1		1	2	2	1
4	3	1	1	1		1	3			1		1	2	2	1
5	3	1	1	1		1	3			1		1	2	2	1
Low (1) ; Medium (2) ; High (3)															

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Sem	06
Sub Code	CME359
Sub Name	DESIGN CODES AND STANDARDS
Course Outcome	• Explain the need for codes and Standards in Industry. • Discuss the different codes and standards used in different industry. • Discuss the sources of different codes and standards and the societies that publish them and how these are evolved • Explain need for Government regulations and Certification authorities and familiar with common regulations in India and International • Discuss knowledge of codes and standards used in Process equipment design for Oil and Gas Industry.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	1	3						1			1	1	2	2
2	2	1	3						1			1	1	2	2
3	2	1	3						1			1	1	2	2
4	2	1	3						1			1	1	2	2
5	2	1	3						1			1	1	2	2
Low (1) ; Medium (2) ; High (3)															

Sem	06
Sub Code	ME3681
Sub Name	CAD/CAM LABORATORY
Course Outcome	• Design experience in handling 2D drafting and 3D modelling software systems • Design 3 Dimensional geometric model of parts, sub-assemblies, assemblies and export it to drawing • Demonstrate manual part programming and simulate the CNC program and Generate part programming using G and M code through CAM software.

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	2	2	2	3				2			1	3	3	1
2	2	2	2	2	3				2			1	3	3	1
3	2	2	2	2	3				2			1	3	3	1
Low (1) ; Medium (2) ; High (3)															

Sem	06
Sub Code	ME3682
Sub Name	HEAT TRANSFER LABORATORY
Course Outcome	• Conduct experiment on Predict the thermal conductivity of solids and liquids • Conduct experiment on Estimate the heat transfer coefficient values of various fluids. • Conduct experiment on Test the performance of tubes in tube heat exchangers

CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	1	1	3	2					1			1	2	2	3
2	1	1	3	2					1			1	2	2	3
3	1	1	3	2					1			1	2	2	3
Low (1) ; Medium (2) ; High (3)															