CO-PO &CO-PSOs Mapping for R16 Regulation

1st Semester

CourseName: English-1 (C111)

C111.1	Develop knowledge in different fields and serve the society and interpret a figure/graph/chart/table with special focus on tenses
C111.2	Stimulate the public to adopt road safety measure and emphases on idioms
C111.3	Give Examples that mass production is ultimately detrimental to biological survival understand the use of cohesive devices
C111.4	Choose a source of energy suitable for rural India and acquire writing skills
C111.5	Explain the usefulness of animals for the human society and develop extensive reading skill and comprehension
C111.6	Identify safety measures against different varieties of accidents at home and in the workplace and writes paragraphs

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C111.1	-	-	1	-	-	-	2	2	2	3	-	1
C111.2	-	-	1	-	-	-	2	2	2	3	-	1
C111.3	-	-	1	-	-	-	2	2	2	3	-	1
C111.4	-	-	1	-	-	-	2	2	2	3	-	1
C111.5	-	-	1	-	-	-	2	2	2	3	-	1
C111.6	-	-	1	-	-	-	2	2	2	3	-	1
C111	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**2**	**2**	**3**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C111.1	-	-
C111.2	-	-
C111.3	-	-
C111.4	-	-
C111.5	-	-
C111.6	-	-
C111	**-**	**-**

Course Name: Mathematics - I (Linear algebra and calculus) (C112)

C112.1	Solve Differential Equations of first order and first degree and apply to Physical and Geometrical problems.
C112.2	Solve Higher order ODE and apply to circuits and SHM
C112.3	Determine Laplace Transform and inverse Laplace Transform of various functions and use Laplace Transforms to determine general solution to linear ODE.
C112.4	Calculate total derivative, Jacobin, maxima and minima of functions of two variables.
C112.5	Form and solve First order PDE.
C112.6	Solving Higher order PDE.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C112.1	3	3	2	2	1	-	-	-	-	-	-	1
C112.2	3	3	2	2	1	-	-	-	-	-	-	1
C112.3	3	3	2	2	1	-	-	-	-	-	-	1
C112.4	3	3	2	2	1	-	-	-	-	-	-	1
C112.5	3	3	2	2	1	-	-	-	-	-	-	1
C112.6	3	3	2	2	1	-	-	-	-	-	-	1
C112	**3**	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C112.1	3	2
C112.2	3	2
C112.3	3	2
C112.4	3	2
C112.5	3	2
C112.6	3	2
C112	**3**	**2**

Course Name: Engineering Chemistry (113)

C113.1	The advantages and limitations of plastic materials and their use in design would be understood.
C113.2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
C113.3	Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like Nano materials and fullerenes and their uses.
C113.4	Liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained.
C113.5	The impurities present in raw water, problems associated with them and how to avoid them are understood.
C113.6	The advantages of engineering materials in various sectors would be understood.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C113.1	2	2	1	1	-	1	3	2	2	1	1	1
C113.2	2	3	-	-	3	3	3	2	1	-	1	1
C113.3	3	2	1	-	1	3	3	3	2	2	2	2
C113.4	2	2	1	1	1	2	2	2	1	1	2	-
C113.5	2	3	1	2	2	3	3	3	2	1	-	2
C113.6	2	3	1	-	-	2	2	2	1	-	1	1
C113	2.16	2.33	0.83	0.66	1.16	2.33	2.66	2.33	1.5	0.83	1.16	1.16

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C113.1	3	1
C113.2	1	-
C113.3	3	-
C113.4	1	1
C113.5	3	-
C113.6	2	-
C113	2.16	1

Course Name: Engineering Mechanics (114)

	Course Outcome Description
C114.1	Simplify the system of forces and moments to equivalent systems and Analyze systems with friction.
C114.2	Construct free body diagrams and develop appropriate equilibrium equations.
C114.3	Determine centroids of simple and composite areas.
C114.4	Determine moment of inertia for simple and composite areas.
C114.5	Apply the fundamental concepts of kinematics and kinetics of particles and rigid bodies along with equilibrium condition in solving engineering problems
C114.6	Solve the problems of simple system with sliding friction and calculate linear and angular acceleration of moving body in general plane motion.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C114.1	2	2	3	2	2	-	2	1	2	1	2	2
C114.2	2	2	3	1	2	-	1	-	1	1	2	2
C114.3	2	2	3	1	1	-	1	1	2	1	2	2
C114.4	2	2	3	1	1	-	1	2	2	1	2	2
C114.5	2	2	3	1	1	-	1	2	2	1	2	1
C114.6	2	3	3	1	1	-	1	2	2	1	2	2
C114	**2**	**2.17**	**3**	**1.17**	**1.34**	**-**	**1.7**	**1.6**	**1.84**	**1**	**2**	**1.84**

MAPPING OF COs WITH PSOs

	PSO 1	**PSO 2**
C114.1	3	2
C114.2	3	2
C114.3	3	2
C114.4	3	2
C114.5	3	2
C114.6	3	2
C114	**3**	**2**

Course Name: Computer Programming (115)

C115.1	Understand the components of computers, evolution of Programming Languages, basics of problem solving.
C115.2	Understand the structure of basic C programs and write simple programs using basic concepts in C.
C115.3	Understand and write simple programs using control structures.
C115.4	Understand the concept of Arrays and Pointers, and use them appropriately
C115.5	Understand and apply modular programming.
C115.6	Understand the concepts of Strings and Structures.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C115.1	3	3	2	-	1	-	-	-	-	-	1	-
C115.2	3	3	2	-	1	-	-	-	-	-	-	-
C115.3	3	3	2		1	-	-	-	-	-	-	-
C115.4	3	3	2	-	1	-	-	-	-	-	-	-
C115.5	3	3	2	-	1	-	-	-	-	1	3	-
C115.6	3	3	1	-	1	-	-	-	-	-	-	-
C115	3	3	1.83	-	1	-	-	-	-	1	2	-

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C115.1	3	-
C115.2	3	-
C115.3	3	-
C115.4	3	-
C115.5	3	-
C115.6	3	-
C115	3	-

Course Name: Environmental Studies (116)

C116.1	The student should have knowledge on the natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
C116.2	The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food
C116.3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
C116.4	Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
C116.5	The environmental legislations of India and the first global initiatives towards sustainable development.
C116.6	About environmental assessment and the stages involved in EIA and the environmental audit.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C116.1	2	1	-	-	2	-	3	2	3	-	2	-
C116.2	2	-	-	-	1	-	3	2	3	-	1	-
C116.3	1	-	1	-	-	-	3	3	3	-	1	-
C116.4	2	2	-	1	1	2	3	3	3	-	3	2
C116.5	1	1	-	-	-	-	3	3	3	-	2	1
C116.6	1	-	2	2	-	-	3	3	3	3	1	3
C116	**1.5**	**1.3**	**1.5**	**1.5**	**1.3**	**2**	**3**	**2.8**	**3**	**3**	**1.66**	**2**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C116.1	-	1
C116.2	-	1
C116.3	-	-
C116.4	1	1
C116.5	-	2
C116.6	1	1
C116	**1**	**1.2**

Course Name: Engineering/Applied Chemistry Laboratory (C117)

C117.1	The students will get the ability to identify any unknown chemical and its nature according to its functionality.
C117.2	Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially.
C117.3	Understand the principles of potentiometric and Conduct metric measurements.
C117.4	Understand the principles involved in Redox titrations.
C117.5	They get the knowledge about pH which influences human health, growth of plants and aquatic bio-components.
C117.6	Understand the practical way of thinking through the prescribed experiments given to them

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C117.1	2	2	-	-	-	-	-	-	2	-	1	-
C117.2	1	2	3	3	-	2	2	2	-	2	1	-
C117.3	-	-	-	-	3	2	-	-	1	3	2	1
C117.4	-	-	-	2	-	-	2	1	2	-	-	-
C117.5	-	-	-	-	-	-	-	-	-	-	-	-
C117.6	-	-	-	-	-	-	-	-	-	-	-	-
C117	1.5	2	3	2.5	3	2	2	1.5	1.67	2.5	1.33	1

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C117.1	2	1
C117.2	3	-
C117.3	3	1
C117.4	2	1
C117.5	2	-
C117.6	1	-
C117	2.16	1

Course Name: English - Communication Skills Lab – I (118)

C118.1	Practice English languages, both written and spoken, competently and correctly
C118.2	Develop accuracy and fluency of speech
C118.3	Employ confidence in using English in verbal situations
C118.4	Understand Letters and Sounds of English
C118.5	Articulate the Sounds of English
C118.6	Focus on Stress and Intonation of native speakers of English

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C118.1	-	-	-	-	-	-	-	3	3	3	-	-
C118.2	-	-	-	-	-	-	-	3	3	3	-	-
C118.3	-	-	-	-	-	-	-	3	3	3	-	-
C118.4	-	-	-	-	-	-	-	3	3	3	-	-
C118.5	-	-	-	-	-	-	-	3	3	3	-	-
C118.6	-	-	-	-	-	-	-	3	3	3	-	-
C118	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	3	3	**-**	**-**

MAPPING OF COs WITH PSOs

	PO1	PO2
C118.1	-	-
C118.2	-	-
C118.3	-	-
C118.4	-	-
C118.5	-	-
C118.6	-	-
C118	-	-

Course Name: Computer Programming Lab (C119)

C119.1	Apply and practice logical ability to solve the problem.
C119.2	Understand C programming development environment, compiling, debugging and linking and executing a program using the development environment.
C119.3	Analyzing the complexity of problems, modularize the problems into small modules and then convert them into programs.
C119.4	Understand and apply the inbuilt functions and customized functions for solving the problems.
C119.5	Understand and apply the pointers, memory allocation techniques.
C119.6	Understands to create/update basic data files.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C119.1	3	-	-	-	-	-	-	-	-	-	3	-
C119.2	-	3	-	3	-	-	-	-	-	3	-	-
C119.3	-	-	3	-	3	-	-	-	-	-	3	-
C119.4	3	-	-	-	-	-	-	-	3	-	3	-
C119.5	-	3	-	-	-	-	-	-	-	-	-	-
C119.6	-	-	-	3	-	-	-	-	-	-	3	-
C119	3	3	3	3	3	-	-	-	3	3	3	-

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C119.1	3	-
C119.2	-	2
C119.3	3	3
C119.4	-	1
C119.5	2	-
C119.6	-	1
C119	2.66	1.75

Course Name: English – II(C121)

C121.1	Discuss the ultimate aim of Education is to enhance wisdom, Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps and acquire official letter writing
C121.2	Stimulate the students to promote peaceful co-existence and universal harmony, highlights the dedicated research work of C V Raman and acquire e-correspondence writing
C121.3	Explain the students to manage different cultural shocks due to globalization, provides an aspiration to the readers from Bhabha to serve the nation and strengthen it and acquire speech writing
C121.4	Analyze insightful commentary on cultural traditions and Bose provide inspiration to the readers and acquire essay writing
C121.5	Distinguish several inputs to protect environment for the sustainability of the future generations, Ray's scientific achievements and acquire writing for the media
C121.6	Focus on the extraordinary achievements of Srinivasa Ramanujan, and acquire report writing

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C121.1	-	-	1	-	-	-	2	2	2	3	-	1
C121.2	-	-	1	-	-	-	2	2	2	3	-	1
C121.3	-	-	1	-	-	-	2	2	2	3	-	1
C121.4	-	-	1	-	-	-	2	2	2	3	-	1
C121.5	-	-	1	-	-	-	2	2	2	3	-	1
C121.6	-	-	1	-	-	-	2	2	2	3	-	1
C121	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**2**	**2**	**3**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C121.1	-	-
C121.2	-	-
C121.3	-	-
C121.4	**-**	**-**
C121.5	**-**	**-**
C121.6	-	-
C121	**-**	**-**

Course Name: Mathematics – II (Mathematical Methods) (C122)

C122.1	Obtain Numerical solution of Transcendental Equations.
C122.2	Estimate value of dependent variable for a given set of observations.
C122.3	Finding Numerical solutions of IVP.
C122.4	Fourier series expansion of periodic functions, Half Range Fourier series.
C122.5	Solution of Higher order PDE by separation of variable and applications.
C122.6	Fourier Sine and Cosine integral and Fourier transforms and finite Fourier transforms.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C122.1	3	3	3	2	1	-	-	-	-	-	-	1
C122.2	3	3	3	2	1	-	-	-	-	-	-	1
C122.3	3	3	3	2	1	-	-	-	-	-	-	1
C122.4	3	3	3	2	1	-	-	-	-	-	-	1
C122.5	3	3	3	2	1	-	-	-	-	-	-	1
C122	**3**	**3**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C122.1	3	2
C122.2	3	2
C122.3	3	2
C122.4	3	2
C122.5	3	2
C122	**3**	**2**

Course Name: Mathematics – III (C123)

C123.1	Determine Rank and solve system of simultaneous linear equations using matrix methods.
C123.2	Determine Eigen vectors of a Matrix and finding nature of a Quadratic form.
C123.3	Determine double integral over a region and triple integral over a volume.
C123.4	Evaluate Improper integrals using Beta, Gamma functions.
C123.5	Calculate gradient of a scalar function, divergence and curl of a vector function
C123.6	Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C123.1	3	3	3	2	1	-	-	-	-	-	-	1
C123.2	3	3	3	2	1	-	-	-	-	-	-	1
C123.3	3	3	3	2	1	-	-	-	-	-	-	1
C123.4	3	3	3	2	1	-	-	-	-	-	-	1
C123.5	3	3	3	2	1	-	-	-	-	-	-	1
C123.6	3	3	3	2	1	-	-	-	-	-	-	1
C123	**3**	**3**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C123.1	-	-
C123.2	-	-
C123.3	-	-
C123.4	-	-
C123.5	-	-
C123.6	-	-
C123	-	-

Course Name: Engineering Physics (C124)

C124.1	The Properties of Light supporting the wave nature and construction working, i.e., principle of Interferometer.
C124.2	The bending nature of light from different slits and resolving powers of diffractometer like Grating, Telescope and Microscopes.
C124.3	The transverse nature of light from methods of production and analysis and learn the working principle of Polari meter and Lasers.
C124.4	The Construction of acoustically good hall based on basic principles and NDT applications.
C124.5	Different types of crystal structures and X-ray diffraction techniques and Nuclear energy source of power.
C124.6	The behavior of materials in external magnetic field and electric field and its applications.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C124.1	3	2	2	2	1	2	1	-	-	-	-	1
C124.2	3	2	1	2	-	1	-	-	-	-	-	2
C124.3	1	3	3	-	3	3	2	2	3	3	1	-
C124.4	2	1	3	-	3	3	3	-	2	2	3	-
C124.5	1	-	3	-	-	2	1	3	1	-	2	2
C124.6	2	1	1	1	2	-	3	-	3	-	-	3
C124	**2**	**1.5**	**2.16**	**1.66**	**1.5**	**1.83**	**1.66**	**0.83**	**1.5**	**0.83**	**1**	**1.33**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C124.1	3	1
C124.2	3	1
C124.3	2	
C124.4	3	1
C124.5	3	1
C124.6	2	1
C124	**2.66**	**1**

Course Name: Basic Electrical and Electronics Engineering (C125)

C125.1	To learn the basic principles of electrical law's and analysis of networks.
C125.2	To understand the principle of operation and construction details of DC machines.
C125.3	To understand the principle of operation and construction details of transformer.
C125.4	To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
C125.5	To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
C125.6	To learn the operation of PNP and NPN transistors and various amplifiers.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C125.1	3	3	2	1	1	-	-	-	-	-	2	2
C125.2	1	2	-	-	1	1	-	-	-	2	-	-
C125.3	1	3	-	-	1	1	-	-	-	2	-	-
C125.4	-	2	-	-	1	1	-	-	-	2	-	-
C125.5	-	1	3	3	1	-	-	-	-	1	2	-
C125.6	-	-	3	3	1	-	-	-	-	1	2	-
C125	1.6	2.2	2.6	2.3	1	1	-	-	-	1.6	2	1

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C125.1	1	1
C125.2	2	2
C125.3	1	1
C125.4	2	2
C125.5	-	-
C125.6	-	-
C125	**1.5**	**1.5**

Course Name: Engineering Drawing (C126)

C126.1	Construct polygons, Engineering Curves.
C126.2	Understand scales and orthographic projections, projections of points & lines.
C126.3	Draw the projections of the lines inclined to both the planes.
C126.4	Draw the projections of the plane inclined to both the planes.
C126.5	Draw the projections of the various types of solids in different positions inclined to one or both the planes.
C126.6	Visualize and convert the isometric view to orthographic view and vice versa.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C126.1	1	1	2	2	1	-	-	1	2	3	2	2
C126.2	1	1	2	2	1	-	-	1	2	3	2	2
C126.3	1	1	2	2	1	-	-	1	2	3	2	2
C126.4	1	1	2	2	1	-	-	1	2	3	2	2
C126.5	1	1	2	2	1	-	-	1	2	3	2	2
C126.6	1	1	3	2	3	-	-	1	2	3	3	2
C126	1	1	2.17	2	1.34	-	-	1.6	2	3	2.17	2

MAPPING OF COs WITH PSOs

	PSO 1	PSO 2
C126.1	3	3
C126.2	3	3
C126.3	3	3
C126.4	3	3
C126.5	3	3
C126.6	3	3
C126	3	3

Course Name: English - Communication Skills Lab - II (C127)

C127.1	Develop fluency of speech by participating in debates
C127.2	Employ communicative language and participate in Group Discussions
C127.3	Give examples to avoid stage fear and make presentations with ease and confidence
C127.4	Employ confidence in attending different types of interviews
C127.5	Understand the importance of e mail writing skills and its techniques
C127.6	Produce right words and phrases in keeping the demands of occasion

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C127.1	-	-	-	-	-	-	-	2	2	3	-	-
C127.2	-	-	-	-	-	-	-	2	2	3	-	-
C127.3	-	-	-	-	-	-	-	2	2	3	-	-
C127.4	-	-	-	-	-	-	-	2	2	3	-	-
C127.5	-	-	-	-	-	-	-	2	2	3	-	-
C127.6	-	-	-	-	-	-	-	2	2	3	-	-
C127	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**-**	**-**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C127.1	-	-
C127.2	-	-
C127.3	-	-
C127.4	**-**	**-**
C127.5	**-**	**-**
C127.6	-	-
C127	**-**	**-**

Course Name: Engineering /Applied Physics Lab (C128)

C128.1	Analyze and apply the concepts of oscillations and of wave(sonometer, meldes experiment)
C128.2	To interpret the intensity variation of light due to Polarization, interference and diffraction
C128.3	Compare the intensity of magnetic field theoretically and experimentally.
C128.4	To study simple harmonic motion and the factors that affect the period of oscillation of pendulums
C128.5	Explain how frequency effects the impedance and to calculate resonant frequency
C128.6	To Calculate the break down voltage using Zener diode.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C128.1	3	3	3	3	3	3	3	-	-	-	-	3
C128.2	3	3	3	3	-	3	-	-	-	-	-	3
C128.3	3	3	3	-	3	3	3	3	3	3	3	-
C128.4	3	3	3	-	3	3	3	-	3	3	3	-
C128.5	3	-	3	-	-	3	3	3	3	-	3	3
C128.6	3	3	3	3	3	-	3	-	3	-	-	3
C128	3	3	3	3	3	3	3	3	3	3	3	3

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C128.1	2	1
C128.2	2	-
C128.3	2	1
C128.4	2	-
C128.5	2	-
C128.6	3	1
C128	**2.16**	**1**

Course Name: Engineering Workshop & IT Workshop (C129)

C129.1	To Acquire the knowledge of safety measures which are followed in workshop while using hand tools and general purpose machine tools.
C129.2	To impart hands-on practice on basic engineering trades (carpentary).
C129.3	To get Knowledge on tolerances and fits and Usage of measuring tools
C129.4	Apply knowledge for computer assembling and software installation.
C129.5	Ability how to solve the trouble shooting problems.
C129.6	Apply the tools for preparation of PPT, Documentation and budget sheet

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C129.1	2	-	1	-	1	1	2	-	-	-	-	-
C129.2	-	1	1	-	2	-	-	-	-	-	-	-
C129.3	2	2	1	-	-	2	-	-	-	-	-	-
C129.4	2	1	-	1	1	-	-	-	-	-	-	2
C129.5	2	2	3	2	2	-	-	-	-	-	-	2
C129.6	3	2	-	-	-	-	-	-	-	2	2	2
C129	2.16	1.4	1.33	1.5	1.5	1.5	2	-	-	2	2	2

MAPPING OF COs WITH PSOs

	PSO1	**PSO2**
C129.1	1	1
C129.2	2	1
C129.3	1	1
C129.4	2	1
C129.5	1	1
C129.6	2	1
C129	1.5	1

Course Name:Metallurgy & Materials Science (C211)

C211.1	Identify the properties of materials with respect to crystal structure, atomic bonding and grain size
C211.2	Understand the construction and identification of phase diagrams and various reactions
C211.3	Classify and distinguish different types of ferrous materials, their properties and applications
C211.4	Understand how to improve the properties of all materials by applying different heat treatment processes
C211.5	Classify and distinguish different types of non-ferrous materials, their properties and applications
C211.6	Understand the properties and applications of advanced materials like nanomaterials, ceramics and composite materials

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
211.1	2	1	-	-	1	-	-	-	1	1	-	-
211.2	2	1	-	-	1	-	-	-	1	1	-	-
211.3	2	1	2	2	-	1	1	-	1	1	-	1
211.4	2	1	1	1	1	1	-	-	1	1	-	-
211.5	2	1	2	2	-	1	1	-	1	1	-	1
211.6	2	1	1	3	1	1	1	-	2	1	-	2
211	2	1	1.5	2	1	1	1	-	1.16	1	-	1.34

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C211.1	2	-
C211.2	2	1
C211.3	2	-
C211.4	2	-
C211.5	2	-
C211.6	2	1
C211	**2**	**1**

Course Name: Mechanics of Solids (C212)

C212.1	Student will know the basic terms like stress, strain, thermal stress, principal stresses, Strain energy, Poisson's ratio,…etc. and how these parameters varying across the uniform and varying sections, composite bars, and relation between elastic constants.
C212.2	Students can draw the SF and BM diagrams for various beams at different loading conditions & determine flexural stresses, shear stresses and section modulus of rectangular, circular, triangular, I, T angle sections.
C212.3	After the completion of this unit students can find the slope and deflection for different support arrangements by Double integration, Macaulay's and Moment area methods.
C212.4	Students will identify when and how a cylinder fails subjected to internal and external pressures.
C212.5	Students are able to calculate shear stress induced in circular shafts and buckling and stability of columns at different support conditions.
C212.6	Students will have the ability to design structural members given the dimensions, material properties such as force-displacement relationships, boundary conditions, loading, allowable stresses, and factor of safety and Perform structural analysis

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C212.1	3	3	2	2	-	1	-	1	-	-	1	2
C212.2	3	3	2	3	-	1	-	1	-	1	1	1
C212.3	3	3	2	3	-	1	-	1	-	1	1	1
C212.4	3	3	2	3	-	1	-	1	-	1	1	1
C212.5	3	3	2	3	-	1	-	1	-	1	1	1
C212.6	3	3	3	3	-	1	-	1	-	-	1	1
C212	**3**	**3**	**2.17**	**2.83**	**-**	**1**	**-**	**1**	**-**	**1**	**1**	**1.33**

MAPPING OF COs WITH PSOs

	PSO1	**PSO2**
C212.1	3	2
C212.2	3	1
C212.3	3	1
C212.4	3	1
C212.5	3	1
C212.6	3	2
C212	3	1.33

Course Name: Thermodynamics (C213)

C213.1	Students are able to understand the basic concepts like thermodynamic system, its boundary, point, path function and related fundamental definitions with respect to energy, work and Heat.
C213.2	Students are able to understand the fundamental of the first, second and third laws of thermodynamics and their application to a wide range of systems.
C213.3	Students are able to analyse the concepts of Carnot cycle, entropy, availability, irreversibility, use of Maxwells relations and thermodynamic functions.
C213.4	Students are able to understand the process of steam formation and its representation on property diagrams with various phase changes and calculate the quality of steam after its expansion in a steam turbine, with the help of standard steam tables and charts.
C213.5	Students are able to use Psychometric charts and calculate various psychometric properties of air.
C213.6	Students are able to understand the concept of air standard,Refrigeration cycles and calculate the efficiency of the systems.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C213.1	2	2	-	-	-	-	-	-	-	-	1	2
C213.2	2	2	-	-	-	-	-	-	-	-	1	2
C213.3	2	2	-	-	-	-	-	-	-	-	-	2
C213.4	2	2	-	-	-	-	-	-	-	-	-	2
C213.5	2	2	-	-	-	-	-	-	-	-	-	2
C213.6	2	2	1	1	-	-	-	-	-	-	1	2
C213	2	2	1	1	-	-	-	-	-	-	1	2

MAPPING OF COs WITH PSOs

	PSO 1	PSO 2
C213.1	2	-
C213.2	2	-
C213.3	2	-
C213.4	3	-
C213.5	3	-
C213.6	3	-
C213	2.5	-

Course Name: Managerial Economics & Financial Analysis (C214)

C214.1	Gain knowledge in basic economic tools in managerial economics and demand analysis.
C214.2	Understand and estimate the demand elasticity and its relationship to pricing and revenue and markets
C214.3	Analyze the production, cost concepts and organization forms and financial status
C214.4	Understand the expenditure and capital budgeting in big industries.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C214.1	2	-	-	3	2	-	-	-	-	-	-	-
C214.2	-	-	3	3	1	-	-	-	-	-	-	-
C214.3	-	3	-	-	2	-	-	-	2	-	-	-
C214.4	-	-	2	-	-	-	-	-	-	-	-	-
C214	2	3	2.5	3	1.67	-	-	-	2	-	-	-

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C214.1	-	2
C214.2	2	-
C214.3	1	1
C214.4	-	-
C214	1.5	1.5

Course Name: Fluid Mechanics & Hydraulic Machines (C215)

C215.1	Learnt the concept of fluid and its properties, manometry, hydrostatic forces acting on different surfaces and also problem solving techniques.
C215.2	Learnt the basic laws of fluids, flow patterns, viscous flow through ducts and their corresponding problems.
C215.3	Learnt the concepts related to boundary layer theory, flow separation, basic concepts of velocity profiles, dimensionless numbers and dimensional analysis.
C215.4	Learnt about concepts of the hydrodynamic forces acting on vanes and their performance evaluation.
C215.5	Understood the importance, function and performance of hydro machinery.
C215.6	Is able to evaluate the performance characteristics of hydraulic turbines and also got idea about the general concept on hydraulic systems and fluidics are imparted to the

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C215.1	3	3	3	1	1	2	1	-	-	1	-	2
C215.2	3	3	3	1	1	2	1	-	-	1	-	2
C215.3	3	3	3	1	1	2	1	-	-	1	-	2
C215.4	3	3	2	1	1	2	-	-	-	1	-	2
C215.5	3	1	2	-	1	-	-	-	-	1	-	2
C215.6	3	2	2	1	1	2	-	-	-	1	-	2
C215	**3**	**2.5**	**2.5**	**1**	**1**	**2**	**1**	**-**	**-**	**1**	**-**	**2**

MAPPING OF COs WITH PSOs

	PSO1	**PSO2**
C215.1	3	3
C215.2	3	3
C215.3	3	3
C215.4	3	3
C215.5	3	3
C215.6	3	3
C215	**3**	**3**

Course Name: Computer Aided Engineering Drawing Practice (C216)

C216.1	Draw projections on auxiliary planes
C216.2	Draw projections for sections of solids and intersections of solids
C216.3	Students will gain the knowledge on surface developments for different solid shapes
C216.4	Introduction to CAD.
C216.5	Creating various 2D and 3D objects using AutoCAD

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C216.1	1	1	2	-	1	-	-	-	-	1	-	1
C216.2	1	1	2	-	1	-	-	-	-	1	-	1
C216.3	1	1	2	-	1	-	-	-	-	1	-	1
C216.4	-	-	2	1	3	-	-	-	-	-	-	1
C216.5	1	2	3	2	3	-	-	-	-	2	-	3
C216	1	1.25	2.2	1.5	1.8	-	-	-	-	1.25	-	1.4

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C216.1	1	1
C216.2	1	1
C216.3	1	1
C216.4	1	2
C216.5	3	3
C216	1.4	1.6

Course Name: Electrical & Electronics Engineering Lab (C217)

C217.1	To learn the application of electrical law's and superposition theorem
C217.2	To understand the tests and speed control methods of a DC machines.
C217.3	To understand the tests of a transformer.
C217.4	To learn the operation and characteristics of PN junction diode, half wave, full wave rectifier
C217.5	To learn the operation and characteristics of a transistor
C217.6	To learn the operation and characteristics of CE amplifier

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C217.1	3	3	3	3	3	-	-	-	-	-	3	3
C217.2	3	3	-	-	3	3	-	-	-	3	-	-
C217.3	3	3	-	-	3	3	-	-	-	3	-	-
C217.4	-	3	-	-	3	3	-	-	-	3	-	-
C217.5	-	3	3	3	3	-	-	-	-	3	3	-
C217.6	3	3	3	3	3	-	-	-	-	3	3	-
C217	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**3**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C217.1	1	1
C217.2	2	2
C217.3	1	1
C217.4	2	2
C217.5	-	-
C217.6	-	-
C217	**1.5**	**1.5**

Course Name: Mechanics of Solids & Metallurgy Lab (C218)

C218.1	By conducting various experiments on materials students will able to understand basic engineering properties of materials like stress, strain, hardness and toughness.
C218.2	Students will able to understand behavior of material under different types of loads like tensile, compressive and shear. And springs under different load conditions.
C218.3	Students will understand will understand behavior of beams and shafts under bending and torsion loads respectively.
C218.4	Students will able to know the procedure of specimen preparation for the purpose of performing micro structure study.
C218.5	Students will able to study and draw the microstructures of various metals.
C218.6	Understanding the influence of heat treatment on micro structure and hardness of various materials.

MAPPING OF COs WITH POs

	PO	PO	PO3	PO4	PO	PO6	PO7	PO8	PO9	PO	PO11	PO12
C218.	3	2	-	-	2	-	-	-	1	-	-	1
C218.	3	2	-	-	2	-	-	-	1	-	-	1
C218.	3	2	-	-	2	-	-	-	1	-	-	1
C218.	2	1	-	3	2	-	-	-	1	-	-	2
C218.	2	1	-	3	2	-	-	-	1	-	-	2
C218.	2	1	-	3	2	-	-	-	1	-	-	2
C218	**2.5**	**1.5**	**-**	**3**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**1.5**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C218.1	2	-
C218.2	2	1
C218.3	2	1
C218.4	2	-
C218.5	2	-
C218.6	2	-
Avg.	**2**	**1**

Course Name: Kinematics of Machinery (C221)

C221.1	Realize the role of kinematics in understanding various mechanisms and their applications in machinery
C221.2	Mathematical understanding of the approximate and exact straight line motion mechanisms and appreciate their applications in engineering.
C221.3	Analyze and compute the velocity and acceleration of kinematic links in various mechanisms by graphical methods and relative velocity methods
C221.4	Study of the relative motion between the various cams and followers and draw the cam profiles.
C221.5	Analysis of power transmission through the design of toothed gearing.
C221.6	Mathematical study of the power transmission drives such as Belt, rope, chain drives and gear trains.

MAPPING OF COs WITH POs

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
C221.1	3	2	3	2	1	1	-	1	1	-	2	2
C221.2	3	3	3	1	2	1	1	-	1	-	2	2
C221.3	3	3	2	2	1	1	-	1	1	-	2	2
C221.4	3	3	2	2	2	2	-	1	2	-	2	2
C221.5	3	3	2	2	1	1	-	1	2	-	2	2
C221.6	3	3	2	2	2	1	1	1	1	-	2	2
C221	**3**	**2.84**	**2.34**	**1.84**	**1.17**	**2**	**2**	**2**	**1.34**	**-**	**2**	**2**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C221.1	3	1
C221.2	3	1
C221.3	3	1
C221.4	3	1
C221.5	3	1
C221.6	3	1
C221	**3**	**1**

Course Name: Thermal Engineering -I (C222)

C222.1	Students are able to differentiate Air standard cycle and Actual cycle, the reasons and effects of various losses that occur in the actual engine operation.
C222.2	They can demonstrate the knowledge in the operation of various engine systems along with their function and necessity.
C222.3	Students will have the knowledge in normal and abnormal combustion phenomenon and knocking in S.I. and C.I. Engines and several engine operating parameters that affect the
C222.4	Students can perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.
C222.5	Students will have the knowledge in various compressors (Reciprocating, rotary, Dynamic and Axial flow compressors) principle of operation, factors and velocity
C222.6	At the end of this course students are able to calculate the work required, power, pressure rise and efficiency of compressors.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C222.1	2	1	2	-	-	2	-	-	-	-	-	2
C222.2	-	-	1	-	-	-	-	-	-	-	2	-
C222.3	1	-	2	-	-	-	-	-	-	-	2	-
C222.4	2	2	2	2	2	2	-	-	-	-	2	-
C222.5	2	1	1	2	-	2	-	-	-	-	2	2
C222.6	2	1	2	2	-	2	-	-	-	-	2	2
C222	1.8	1.25	1.67	2	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**2**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C222.1	1	-
C222.2	-	-
C222.3	-	-
C222.4	2	2
C222.5	2	1
C222.6	2	1
C222	**1.75**	**1.33**

Course Name: Production Technology (C223)

C223.1	Understand about the primary manufacturing processes such as casting, joining and forming processes.
C223.2	Learn the working principles of different types of furnaces.
C223.3	Understand the principles and learn the applications of various advanced welding processes
C223.4	Understand the steps involved in the process of Powder Metallurgy and its applications
C223.5	Learn the various bulk deformation processes and sheet metal forming processes.
C223.6	Learn the properties, processing and applications of various plastics

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C223.1	2	1	1	1	2	1	1	-	1	1	-	1
C223.2	2	1	1	-	2	-	1	-	-	1	-	1
C223.3	2	1	1	1	2	1	1	-	1	1	-	1
C223.4	2	1	1	1	1	-	1	-	1	1	-	1
C223.5	2	1	1	1	2	1	1	-	1	1	-	1
C223.6	2	1	1	1	2	1	1	-	1	1	-	1
C223	**2**	**1**	**1**	**1**	**1.83**	**1**	**1**	**-**	**1**	**1**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C223.1	1	1
C223.2	1	1
C223.3	1	1
C223.4	1	1
C223.5	1	1
C223.6	1	1
C223	**1**	**1**

Course Name: Design of Machine Members -I (C224)

C224.1	Describe the Design Procedure and evaluate the size of simple mechanical components subjected to static loads considering theories of failure
C224.2	Apply knowledge in designing mechanical components subjected to stress concentration and Fatigue loads
C224.3	Design and analyse permanent joints such as riveted and welded joints under loading conditions
C224.4	Design and analyse temporary joints such as bolted and cotter joints under loading conditions
C224.5	Design and analyse couplings under various loading conditions
C224.6	Design and Analyse springs for the given loading condition

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C224.1	1	2	3	1	1	-	-	-	2	1	-	1
C224.2	1	2	3	2	1	-	2	-	2	1	-	1
C224.3	2	2	2	2	2	-	1	-	2	1	-	1
C224.4	2	2	2	2	2	-	1	-	2	1	-	1
C224.5	1	2	3	2	2	-	1	-	2	1	-	1
C224.6	1	2	3	2	2	-	1	-	2	1	-	1
C224	**1.33**	**2**	**2.66**	**1.8**	**1.6**	**-**	**1.2**	**-**	**2**	**1**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C224.1	2	1
C224.2	2	1
C224.3	3	2
C224.4	3	2
C224.5	3	2
C224.6	3	2
C224	**2.66**	**1.66**

Course Name: Machine Drawing (C225)

C225.1	To understand the conventional representation of various machine components and materials
C225.2	To understand and draw the various screw threads, Bolt & nuts and Riveted joints as per standards
C225.3	To understand and draw the various keys, Cotter joints, Shaft Couplings and Bearings as per standards
C225.4	Able to differentiate between Assembly drawings, Part drawings and Production drawings.
C225.5	Understand the representation of sectional and semi-sectional views.
C225.6	Able to draw the assembly drawings for the given components.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO
C225.1	1	-	1	-	-	-	-	-	-	3	-	-
C225.2	1	-	1	-	-	-	-	-	-	3	-	-
C225.3	1	-	1	-	-	-	-	-	-	3	-	-
C225.4	1	-	2	-	-	-	-	-	-	3	-	-
C225.5	1	-	1	-	-	-	-	-	-	3	-	-
C225.6	1	-	2	-	-	-	-	-	-	3	-	-
C225	1	-	1.33	-	-	-	-	-	-	3	-	-

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C225.1	1	-
C225.2	2	-
C225.3	2	-
C225.4	2	-
C225.5	2	-
C225.6	2	-
C225	**1.83**	**-**

Course Name: Industrial Engineering and Management (C226)

C226.1	Contribute to the success of companies through effective problem solving
C226.2	Design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and environments
C226.3	Effectively manage business operations and project management teams
C226.4	To meet the challenges for contemporary professional practice; be able to adapt and solve the increasingly complex problems faced by industry
C226.5	Continue to develop holistically, including the personal and professional skills necessary to adapt to our changing societal, technological, and global environments
C226.6	Graduates are continue to develop holistically as a learner to become leaders of tomorrow

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C226.1	-	2	-	-	3	-	-	-	-	-	-	-
C226.2	-	-	-	-	-	-	2	-	-	-	-	-
C226.3	-	-	2	-	-	-	-	-	-	-	-	-
C226.4	-	-	2	-	-	3	-	-	-	1	-	-
C226.5	3	-	1	-	-	-	-	-	-	-	-	-
C226.6	1	-	-	-	-	1	-	-	-	-	-	-
C226	**2**	**2**	**1. 67**	**-**	**3**	**2**	**2**	**-**	**-**	**1**	**-**	**-**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C226.1	1	2
C226.2	2	1
C226.3	2	-
C226.4	-	1
C226.5	2	-
C226.6	1	2
C226	**1.6**	**1.5**

Course Name: Fluid Mechanics & Hydraulic Machines lab (C227)

C227.1	Students will be able to determine the co-efficient of impact of jet on various vanes
C227.2	Students will be able to understand the performance evaluation of Turbines.
C227.3	Students will be able to understand the performance evaluation of the Centrifugal and Reciprocating pumps.
C227.4	Students will be able to calibrate various flow measuring devices like venturi meter, orifice meter and turbine flow meter.
C227.5	Students will be able to estimate the minor losses for a given pipe lines.
C227.6	Students will be able to determine head loss due to friction in pipes based on Dracy-weisbach equation.

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
227.1	2	1	-	2	-	-	-	-	-	-	-	1
227.2	2	1	-	2	-	-	-	-	-	-	-	1
227.3	2	1	-	2	-	-	-	-	-	-	-	1
227.4	2	1	-	2	-	-	-	-	-	-	-	1
227.5	2	1	-	2	-	-	-	-	-	-	-	1
227.6	2	1	-	2	-	-	-	-	-	-	-	1
Avg.	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
227.1	2	-
227.2	2	-
227.3	2	-
227.4	2	-
227.5	2	-
227.6	2	-
C227	2	-

Course Name: Production Technology Lab (C228)

C228.1	Understand about the primary manufacturing processes such as casting, joining and forming processes.
C228.2	Learn the working principles of different types of furnaces.
C228.3	Understand the principles and learn the applications of various basic and advanced welding processes
C228.4	Understand the steps involved in the process of Powder Metallurgy and its applications
C228.5	Learn the various bulk deformation processes and sheet metal forming processes.
C228.6	Learn the properties, processing and applications of various plastics

MAPPING OF COs WITH POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C228.1	3	3	3	3	3	3	3	3	3	3	3	3
C228.2	3	3	3	3	3	3	3	3	3	3	3	3
C228.3	3	3	3	3	3	3	3	3	3	3	3	3
C228.4	3	3	3	3	3	3	3	3	3	3	3	3
C228.5	3	3	3	3	3	3	3	3	3	3	3	3
C228.6	3	3	3	3	3	3	3	3	3	3	3	3
C228	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

MAPPING OF COs WITH PSOs

	PSO1	PSO2
C228.1	3	2
C228.2	3	1
C228.3	3	2
C228.4	3	2
C228.5	3	2
C228.6	3	2
C228	3	1.9

Course Name: Dynamics of Machinery (C311)

C311.1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles
C311.2	Compute frictional losses, torque transmission of mechanical systems
C311.3	Analyze dynamic force analysis of slider crank mechanism, Turning moment diagrams for different engines and design of flywheel
C311.4	Analyze the different types of governors
C311.5	Understanding of vibrations and its significance on engineering design
C311.6	Understand balancing of reciprocating and rotary masses

Course Name: Dynamics of Machinery (C311)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C311.1	3	3	1	1	-	3	2	-	-	-	-	2
C311.2	3	3	1	-	2	3	2	-	-	-	-	2
C311.3	3	3	2	2	2	2	2	-	-	-	-	2
C311.4	3	3	2	2	-	3	2	-	-	-	-	2
C311.5	3	3	2	3	2	2	2	-	-	-	-	2
C311.6	3	3	3	2	-	2	2	-	-	-	-	2
C311	3	3	1.84	2	2	2.5	2	-	-	-	-	2

	PSO1	PSO2
C311.1	3	-
C311.2	3	-
C311.3	3	
C311.4	3	-
C311.5	3	
C311.6	3	-
C311	3	-

Course Name: Metal Cutting & Machine Tools (C312)

C312.1	Understand the cutting tool geometry, mechanism of chip formation, mechanics of orthogonal cutting, and economics of machining.
C312.2	Identify the basic parts and perform various operations on lathe machine in a machine tool
C312.3	Illustrate with sketches the constructional features and describe the various operations related to the reciprocating machines.
C312.4	Study the working principle s of Milling machine and describe the various indexing mechanism for a milling machine.
C312.5	Discuss the constructional features and the terminologies related to grinding, broaching and honing machines
C312.6	Designing of locating and clamping devices to produce a component and study the applications of CNC over conventional machining process

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C312.1	3	2	-	2	2	-	-	-	-	-	2	-
C312.2	2	2	-	2	3	-	2	-	-	-	-	-
C312.3	2	2	-	2	2	-	2	-	-	-	-	-
C312.4	2	2	-	1	3	-	2	-	-	-	-	-
C312.5	2	1	-	1	2	-	2	-	-	-	-	-
C312.6	2	2	-	3	3	-	3	-	3	-	-	-
C312	**2.17**	**1.84**	**-**	**1.84**	**2.5**	**-**	**2.2**	**-**	**3**	**-**	**2**	**-**

CO	PSO 1	PSO 2
C312.1	2	
C312.2	2	2
C312.3	2	2
C312.4	2	2
C312.5	2	-
C312.6	3	2
C312	**2.16**	**2**

Course Name: Design of Machine Members–II (C313)

C313.1	To select the suitable bearing based on the application of the loads and predict the life of the bearing
C313.2	Design of internal combustion engine parts for safe and continuous operation
C313.3	Apply the basic principles to find position of neutral axis and stress variation across the cross section in curved beams
C313.4	To select and/or design of belt drives, chain drives and power screws based on given conditions
C313.5	Design spur and helical gears based on strength and wear consideration
C313.6	Design of levers, brackets and wire ropes for safe operation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C313.1	3	2	3	3	1	-	-	-	2	-	-	2
C313.2	3	2	3	3	2	2	-	-	2	-	-	2
C313.3	3	2	3	3	2	2	-	-	2	-	-	2
C313.4	3	2	3	3	2	2	-	-	2	-	-	2
C313.5	3	2	3	3	2	-	-	-	2	-	-	2
C313.6	3	2	3	3	1	-	-	-	2	-	-	2
C313	**3**	**2**	**3**	**3**	**1.67**	**2**	**-**	**-**	**2**	**-**	**-**	**2**

	PSO 1	PSO 2
C313.1	3	2
C313.2	3	2
C313.3	3	2
C313.4	3	2
C313.5	3	2
C313.6	3	2
C313	**3**	**2**

Course Name: Operations Research (C314)

C314.1	Identify and formulate LP problems using various methods for maximization and minimization problems.
C314.2	Apply mathematical techniques in different application areas of operations research like transportation, assignment and sequencing models.
C314.3	Students are able to proficient to use mathematical models to solve the Replacement problems.
C314.4	Apply the principles of Game theory and waiting lines to real world Competitive situations.
C314.5	Formulate mathematical models for quantitative analysis of Inventory control practice in industry.
C314.6	Apply mathematical techniques to solve decision models using LP Problems and dynamic programming method.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C314.1	3	3	3	2	2	1	2	1	3	2	2	1
C314.2	3	3	3	2	2	2	-	1	3	2	2	3
C314.3	3	3	3	2	-	-	2	-	-	2	-	-
C314.4	3	3	3	-	-	1	-	1	-	-	2	-
C314.5	3	3	3	2	2	1	-	1	3	2	-	-
C314.6	3	3	3	2	2	1	-	-	3	1	-	1
C314	**3**	**3**	**3**	**2**	**2**	**1.2**	**2**	**1**	**3**	**1.8**	**2**	**1.67**

	PSO1	PSO2
C314.1	3	1
C314.2	3	3
C314.3	2	1
C314.4	2	2
C314.5	2	-
C314.6	3	2
C314	**2.5**	**1.8**

Course Name: Thermal Engineering -II (C315)

C315.1	Student able to understand the concept of Rankine cycle ,Stoichiometry ,flue gas analysis
C315.2	Student able to understand the construction details of various boilers and boiler efficiency calculations
C315.3	Student to acquire the design procedure for the steam nozzles and impulse steam turbine
C315.4	Student able to understand the concept steam condensers and reaction turbine
C315.5	Understand the design and constructional details of gas turbine
C315.6	Student able to understand the concept of jet propulsions and rockets

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C315.1	2	2	1	2	2	-	1	-	-	-	-	1
C315.2	2	1	1	1	-	2	2	-	-	1	-	1
C315.3	2	2	2	2	2	1	-	-	1	1	1	1
C315.4	2	2	2	3	1	2	2	-	1	1	1	1
C315.5	2	2	2	2	2	2	2	-	1	1	1	1
C315.6	2	1	1	1	2	2	2	-	1	1	-	2
C315	**2**	**1.67**	**1.5**	**1.83**	**1.8**	**1.8**	**1.8**	**-**	**1**	**1**	**1**	**1.17**

	PSO1	PSO2
C315.1	2	1
C315.2	2	2
C315.3	2	2
C315.4	2	2
C315.5	2	2
C315.6	2	3
C315	**2**	**2**

Course Name: Theory of Machines Lab (C316)

C316.1	Experimental study of Undamped ,damped free and forced vibrations and determine the whirling speed of the shaft
C316.2	Determine the controlling force of Hartnell Governor
C316.3	Identify the significance of friction in belt &pulley and study the efficiency of simple and compound screw jacks
C316.4	Know the application of Gyroscope and understand the concept of balancing of rotating masses by experiment
C316.5	Study of different types of Gears and Four bar mechanism with the help of functional models
C316.6	Practical determination of moment of inertia of the flywheel and know the relative motion between the cam&follower

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C316.1	3	3	3	-	-	2	-	-	2	2	-	-
C316.2	3	3	3	-	-	2	-	-	2	2	-	-
C316.3	3	3	3	-	-	2	-	-	2	2	-	-
C316.4	3	3	3	-	-	2	-	-	2	2	-	-
C316.5	3	3	3	-	-	2	-	-	2	2	-	-
C316.6	3	3	3	-	-	2	-	-	2	2	-	-
C316	**3**	**3**	**3**	**-**	**-**	**2**	**-**	**-**	**2**	**2**	**-**	**-**

	PSO1	PSO2
C316.1	3	-
C316.2	3	-
C316.3	3	-
C316.4	3	-
C316.5	3	-
C316.6	3	-
C316	**3**	**-**

Course Name: Machine Tools Lab (C317)

C317.1	To impart practical exposure on various machine tools used in industry
C317.2	Able to identify different types of cutting tools and the effect of cutting tool geometry on machining.
C317.3	Able to perform various machining operations on lathe.
C317.4	Capable of manufacturing components according to given drawings using various machine tools.
C317.5	Exhibit the ability in developing sequence of machining operations required for industry.
C317.6	Able to produce work pieces with good surface finish using machine tools

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C317.1	2	-	-	-	2	-	-	-	-	-	-	2
C317.2	2	-	2	-	3	-	-	-	-	-	-	2
C317.3	2	2	-	-	2	-	-	-	2	-	-	2
C317.4	2	-	3	-	-	-	-	-	2	2	-	2
C317.5	2	-	2	-	-	-	-	-	2	2	-	2
C317.6	-	-	3	-	3	-	-	-	-	-	-	2
C317	**2**	**2**	**2.5**	**-**	**2.5**	**-**	**-**	**-**	**2**	**2**	**-**	**2**

	PSO1	PSO2
C317.1	2	-
C317.2	1	2
C317.3	2	-
C317.4	1	-
C317	**1.5**	**2**

Course Name: Thermal Engineering Lab (C318)

C318.1	Student able to understand the IC engine valve, port timing mechanism.
C318.2	To study the performance characteristics of an internal combustion engines and conduct heat balance test on I.C. Engine
C318.3	Understand the method of finding the Indicated power and Evaluate the engine friction by conducting mores test, retardation test and motoring test on IC engine.
C318.4	Able to identify the various fuel characterizations through experimental testing
C318.5	Able To conduct Performance test on reciprocating air compressor and calculations of various efficiencies.
C318.6	To Study the principle of various parameters in different types of boilers and study the different parts by disassembly/ assembly of IC engines.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C318.1	3	3	-	3	-	-	-	-	3	-	3	-
C318.2	3	3	-	3	3	3	3	-	3	3	3	3
C318.3	3	3	-	3	3	3	3	-	3	3	3	3
C318.4	3	3	-	3	3	3	3	-	3	-	3	3
C318.5	3	3	3	3	3	3	3	-	3	3	3	3
C318.6	3	3	3	-	3	3	3	-	3	3	3	3
C318	3	3	3	3	3	3	3	-	3	3	3	3

	PSO1	PSO2
C318.1	1	-
C318.2	2	1
C318.3	2	1
C318.4	1	-
C318.5	2	1
C318.6	1	2
C318	1.5	1.25

Course Name: Metrology (C321)

C321.1	Illustrate the fundamentals of Limits, Fits and Tolerances for gauge design
C321.2	The students are able to measuring the various parameters like length, height, angle, displacement, flatness by using various instruments like Vernier callipers, micrometers,
C321.3	Use linear, angular and optical instruments in various manufacturing techniques
C321.4	Learn the methods of measuring surface roughness and use of comparators
C321.5	Understand the fundamentals of various methods for the measurements of screw threads and gear measurement
C321.6	Analyze the process alignment testing of machine tools for manufacturing field and flatness surface.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C321.1	3	2	3	-	-	2	2	-	-	1	-	2
C321.2	3	3	3	-	-	3	2	-	-	1	-	2
C321.3	3	3	3	-	-	3	3	1	-	1	1	3
C321.4	2	2	3	-	-	2	2	-	-	2	-	2
C321.5	3	2	2	-	-	3	2	-	-	1	1	2
C321.6	2	2	2	2	1	1	1	-	1	1	-	2
C321	**2.67**	**2.34**	**2.67**	**2**	**1**	**2.34**	**2**	**1**	**1**	**1.17**	**1**	**2.17**

	PSO 1	PSO 2
C321.1	3	2
C321.2	3	3
C321.3	2	3
C321.4	2	3
C321.5	2	2
C321.6	1	1
C321	**2.16**	**2.33**

Course Name: Instrumentation & Control Systems (C322)

C322.1	Understand the basic principles of measurement and working mechanism of displacement transducer
C322.2	Select a suitable transducer for temperature and pressure measurements
C322.3	Select appropriate device for the measurement of level, flow, speed and acceleration
C322.4	Understand the concept of strain gauge and strain rosettes for strain measurement
C322.5	Analyze the concept of psychometry for humidity measurement and load cells for the force measurement
C322.6	Significance of control systems in real world applications.

	P	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C322.1	2	1	3	1	-	2	2	-	-	-	-	2
C322.2	2	1	3	1	-	2	2	-	-	-	-	2
C322.3	2	1	3	1	-	2	2	-	-	-	-	2
C322.4	2	2	3	1	-	3	2	-	-	-	-	2
C322.5	2	1	3	1	-	2	2	-	-	-	-	2
C322.6	2	2	3	3	-	-	1	-	-	2	-	2
C322	**2**	**1.34**	**3**	**1.34**	**-**	**2.2**	**1.84**	**-**	**-**	**2**	**-**	**2**

	PSO1	PSO2
C322.1	2	-
C322.2	2	-
C322.3	2	-
C322.4	2	-
C322.5	2	-
C322.6	3	-
C322	**2.17**	**-**

Course Name: Refrigeration & Air-conditioning (C323)

C323.1	Students should have knowledge on refrigeration cycles and various air craft refrigeration systems.
C323.2	Students must know the types of VCR cycles and their practical application.
C323.3	Students must know the components of VCR systems and their types and properties of refrigerants
C323.4	Students should have knowledge of VAR systems their applications
C323.5	Students should be able to perform cooling load calculations, select the appropriate process and equipment for the required comfort and industrial air-conditioning
C323.6	Students have knowledge on types of fans and their performance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C323.1	2	1	-	-	-	2	1	-	-	-	-	1
C323.2	2	2	-	-	-	-	2	-	-	-	-	2
C323.3	2	1	1	-	-	1	2	1	-	-	-	-
C323.4	2	2	1	-	-	2	1	2	-	-	-	-
C323.5	3	2	2	1	-	2	2	1	-	-	-	2
C323.6	2	1	1	-	-	2	2	-	-	-	-	2
C323	**2.17**	**1.5**	**1.25**	**1**	**-**	**1.8**	**1.67**	**1.34**	**-**	**-**	**-**	**1.75**

	PSO1	PSO2
C323.1	-	-
C323.2	2	-
C323.3	-	-
C323.4	-	-
C323.5	**1**	**2**
C323.6	**1**	**1**
C323	**1.33**	**1.5**

Course Name: Heat Transfer (C324)

C324.1	Apply heat conduction equations to different one dimensional surface configurations under steady state heat transfer with and without heat generation
C324.2	Understand and analyze heat transfer through extended surfaces and one dimensional transient conduction heat transfer
C324.3	Prediction of Convective Heat Transfer Coefficients – Dimensional Analysis, standard correlations in natural and forced convection and Understand concepts of continuity, momentum and energy equations
C324.4	Apply forced convective heat transfer empirical correlations to internal and external flows through/over various surface configurations
C324.5	Differentiate film wise & drop wise condensation, boiling regimes and analyze heat exchanger using LMTD and NTU approaches.
C324.6	Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C324.1	3	3	2	1	1	-	-	-	1	1	1	2
C324.2	3	3	2	2	2	-	-	-	1	2	1	2
C324.3	3	3	2	2	1	-	-	-	1	2	1	1
C324.4	3	3	2	2	1	-	-	-	1	2	1	1
C324.5	3	3	2	2	2	-	-	-	1	2	1	2
C324.6	3	3	2	2	1	1	-	-	1	2	1	2
C324	**3**	**3**	**2**	**1.84**	**1.34**	**1**	**-**	**-**	**1**	**1.84**	**1**	**1.67**

	PSO1	PSO2
C324.1	3	2
C324.2	3	3
C324.3	3	-
C324.4	3	-
C324.5	3	3
C324.6	3	1
C324	**3**	**2.25**

Course Name: Green Engineering Systems (C325)

C325.1	Identify various renewable sources of energy, solar radiation on globe and collection
C325.2	Significance of renewable energy in view of their importance in the current scenario and their potential future applications
C325.3	Understand the working principles of solar, wind, biomass, geo thermal, ocean energies and how it provides a clean source of energy.
C325.4	Discuss the working principle and operation of energy efficient system like electrical and mechanical system.
C325.5	Understand Energy efficient processes and green manufacturing systems.
C325.6	Discuss planning ,site selection and operation of Green buildings and their materials

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C325.1	2	1	2	-	1	3	3	1	1	-	-	2
C325.2	2	1	-	-	1	3	3	2	1	-	-	2
C325.3	2	1	-	-	1	3	3	2	1	-	-	2
C325.4	2	1	-	-	1	3	3	3	1	1	-	2
C325.5	2	1	-	-	1	3	3	3	1	1	2	2
C325.6	2	1	-	-	1	3	3	3	1	1	2	2
C325	2	1	2	-	1	3	3	2.34	1	1	2	2

	PSO1	PSO2
C325.1	2	-
C325.2	2	1
C325.3	2	1
C325.4	2	1
C325.5	2	1
C325.6	2	1
C325	2	1

Course Name: Heat Transfer Lab (C326)

C326.1	Perform steady state conduction experiments to estimate thermal conductivity of different materials for plane, cylindrical and spherical geometries.
C326.2	Obtain variation of temperature along the length of the pin-fin under forced and free convection.
C326.3	Estimate the heat transfer coefficients in forced convection, free convection and correlate with the theoretical values.
C326.4	Compare parallel and counter flow heat exchanger performance characteristics.
C326.5	Estimate heat transfer coefficients in condensation, boiling and effectiveness of heat pipe
C326.6	Understand and perform Test Emissivity, Stefan Boltzmann Constant and Critical Heat flux.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C326.1	3	3	2	3	2	2	1	-	3	2	-	2
C326.2	3	3	2	3	2	2	1	-	3	2	-	2
C326.3	3	3	2	3	2	2	1	-	3	2	-	2
C326.4	3	3	2	3	2	2	1	-	3	2	-	2
C326.5	3	3	2	3	2	2	1	-	3	2	-	2
C326.6	3	3	2	3	2	2	1	-	3	2	-	2
C326	**3**	**3**	**2**	**3**	**2**	**2**	**1**	**-**	**3**	**2**	**-**	**2**

	PSO1	PSO2
C326.1	3	2
C326.2	3	2
C326.3	3	2
C326.4	3	2
C326.5	3	2
C326.6	3	2
C326	**3**	**2**

Course Name: Metrology & Instrumentation Lab (C327)

C327.1	Students will be able to apply the procedures to measure the length, height and diameter by using different instruments.
C327.2	Students will be able to measure effective diameter, pitch of thread profile using tool maker's microscope.
C327.3	Students will be able to measure the flatness, surface roughness and perform machine alignments tests.
C327.4	Selection of a proper instrument for measurement of displacement and strain
C327.5	Analyse the requirement of calibration for temperature measuring instrument
C327.6	Identify and use suitable instrument for pressure and flow measurements

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C327.1	3	3	3	1	1	2	2	-	-	1	1	1
C327.2	3	3	3	2	1	2	2	2	-	1	1	2
C327.3	2	2	3	2	1	1	1	-	-	1	-	2
C327.4	2	3	2	2	-	1	3	-	1	1	-	-
C327.5	3	3	2	3	-	1	3	-	1	1	-	-
C327.6	2	3	2	2	-	1	3	-	1	1	-	-
C327	2.5	2.83	2.5	2	1	1.33	2.33	2	1	1	1	1.67

	PSO1	PSO2
C327.1	2	2
C327.2	2	3
C327.3	2	1
C327.4	2	1
C327.5	2	1
C327.6	2	1
C327	2	1.5

Course Name: Computational Fluid Dynamics Lab (C328)

C328.1	Know the basics of C-language and MATLAB to solve the Problems in fluid mechanics and heat transfer
C328.2	Perform the simple differential equations and integration in MATLAB
C328.3	Apply Navier-Stokes equations to solve fluid dynamics problems in MATLAB
C328.4	Perform computational fluid dynamics analysis in ANSYS
C328.5	Apply various numerical tools like finite volume and finite difference for solving the different fluid flow problems.
C328.6	Validate the numerical result by comparison with known analytical results

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C328.1	3	3	3	2	-	1	2	-	-	1	-	-
C328.2	3	3	3	2	-	1	2	-	-	1	-	-
C328.3	3	2	3	2	-	1	2	-	-	1	-	-
C328.4	3	3	2	2	-	1	2	-	-	1	-	-
C328.5	3	3	2	3	-	1	2	-	-	1	-	-
C328.6	3	3	2	2	-	1	2	-	-	1	-	-
C328	3	2.83	2.5	2.16	-	1	2	-	-	1	-	-

CO	PSO1	PSO2
C328.1	2	2
C328.2	2	3
C328.3	2	1
C328.4	2	1
C328.5	2	1
C328.6	2	1
C328	2	1.5

Course Name: Mechatronics (C411)

C411.1	Identify key elements of mechatronics system and its representation in terms of block diagram.
C411.2	Understand working of solid-state electronic devices and apply knowledge of the concept of signal processing and signal conditioning.
C411.3	Analyse the requirements for a given industrial process and select the most appropriate Actuators, sensors, design circuit according to applications.
C411.4	Understand the different logic gates, architecture of microprocessor and microcontroller for industrial applications.
C411.5	Understand the concept of DQA, signal processing and use of interfacing systems such as ADC, DAC, digital I/O.
C411.6	Development of PLC Ladder programming for given applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C411.1	3	3	1	1	2	1	-	-	-	-	-	2
C411.2	2	2	1	1	3	1	-	-	-	-	-	1
C411.3	3	3	2	2	3	1	-	-	1	-	-	1
C411.4	2	2	2	2	3	2	-	-	-	-	-	2
C411.5	2	2	1	1	2	2	-	-	-	-	-	2
C411.6	3	3	3	3	3	2	-	-	1	-	1	3
C411	**2.5**	**2.5**	**1.67**	**1.67**	**2.67**	**1.5**	**-**	**-**	**1**	**-**	**1**	**1.83**

	PSO1	PSO2
C411.1	3	1
C411.2	-	-
C411.3	3	3
C411.4	2	-
C411.5	-	-
C411.6	**2**	1
C411	**2.5**	**1.67**

Course Name: CAD/CAM (C412)

C412.1	Ability to describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid
C412.2	Ability to describe Memory types, input/output devices, display devices and computer graphics
C412.3	Acquire the knowledge of geometric modeling and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations
C412.4	Explain fundamental and advanced features of NC and CNC machines
C412.5	Ability to describe the use of GT and CAPP for the product development.
C412.6	Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C412.1	3	2	2	-	-	1	-	-	-	1	-	-
C412.2	2	2	2	-	2	1	1	-	-	2	-	3
C412.3	2	2	2	-	-		-	-	-	2	-	2
C412.4	2	2	2	1	3	2	-	-	-	1	-	2
C412.5	2	2	2	1	-	1	2	-	2	1	-	-
C412.6	1	2	3	-	2	2	-	1	1	1	2	-
C412	**2**	**2**	**2.16**	**1**	**2.33**	**1.4**	**1.5**	**1**	**1.5**	**1.33**	**2**	**2.33**

	PSO 1	PSO 2
C412.1	3	3
C412.2	3	3
C412.3	3	3
C412.4	3	3
C412.5	3	3
C412.6	3	3
C412	**3**	**3**

Course Name: Finite Element Methods (C413)

C413.1	Understand the numerical methods involved in Finite Element Methods.
C413.2	Demonstrate the procedure to generate a finite element model and understand the role and significance of shape functions in finite element formulations.
C413.3	Formulate and solve one dimensional structural problem involving bar, beam, and trusses.
C413.4	Understand the formulation of two-dimensional elements. (CST and LST elements)
C413.5	Apply the numerical integration technique to solve the quadrilateral and higher order elements in FEM.
C413.6	Illustrate an ability to identify, formulate, and apply FEA software to solve steady heat transfer and dynamic analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C413.1	2	2	2	-	-	-	-	-	-	-	-	-
C413.2	-	3	2	2	-	-	-	-	-	-	-	-
C413.3	-	2	2	2	-	-	-	-	-	-	-	-
C413.4	-	3	2	3	-	-	-	-	-	-	-	-
C413.5	2	2	2	-	3	-	-	-	-	-	-	2
C413.6	-	-	2	2	3	-	-	-	-	-	-	2
C413	**2**	**2.4**	**2**	**2.25**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

	PSO1	PSO2
C413.1	2	-
C413.2	2	1
C413.3	2	1
C413.4	2	-
C413.5	2	1
C413.6	2	1
C413	**2**	**1**

Course Name: Power Plant Engineering (C414)

C414.1	Understand various conventional methods of power generation and its principle of operation.
C414.2	Identify elements in a layout and their functions of steam, diesel, gas, hydro, nuclear and power plants.
C414.3	Discuss the working principle, measure, classify the different layouts of the hydro electric power plants along with their auxiliaries.
C414.4	Describe the working principle and reactor operations of the nuclear power plant and their impact on environment.
C414.5	Understanding the Co-ordination of Combined operations of different power plants
C414.6	Determine performance of power plants based on load variations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C414.1	2	2	2	-	1	3	3	2	2	-	2	1
C414.2	2	2	2	-	-	2	3	2	2	-	-	1
C414.3	2	2	2	-	1	2	3	2	2	-	-	1
C414.4	2	2	2	-	-	2	3	2	2	-	-	1
C414.5	2	2	2	-	-	2	2	2	1	-	-	1
C414.6	3	3	2	-	1	-	-	2	-	1	-	1
C414	**2.177**	**2.177**	**2**	**-**	**1**	**2.2**	**2.8**	**2**	**1.8**	**1**	**2**	**1**

	PSO1	PSO2
C414.1	2	2
C414.2	2	2
C414.3	2	2
C414.4	2	2
C414.5	2	2
C414.6	2	2
C414	**2**	**2**

Course Name: Additive Manufacturing (C415)

C415.1	To understand the process chain of additive manufacturing to produce complex components
C415.2	To impart the basic knowledge about different liquid rapid prototyping methods
C415.3	Explain solid and powder based rapid prototyping methods with case studies
C415.4	Describe the various rapid tooling methods and their importance in manufacturing industry
C415.5	Importance of different softwares and data formats used in additive manufacturing
C415.6	Apply the concept of additive manufacturing in various sectors like medical, automobile and jewellery etc.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C415.1	2	-	2	1	-	2	-	-	-	-	-	-
C415.2	2	2	2	2	-	2	-	-	2	1	2	2
C415.3	2	2	2	2	-	2	-	-	2	1	2	2
C415.4	2	2	2	1	-	2	-	-	2	1	2	2
C415.5	2	2	1	1	3	2	-	-	2	1	2	2
C415.6	2	-	3	2	-	2	2	3	2	1	2	2
C415	**2**	**2**	**2**	**1.5**	**3**	**2**	**2**	**3**	**2**	**1**	**2**	**2**

	PSO 1	PSO 2
C415.1	2	2
C415.2	3	1
C415.3	3	1
C415.4	2	1
C415.5	2	3
C415.6	2	2
C415	**2.33**	**1.67**

Course Name: Advanced Materials (C416)

C416.1	Classify composites, Properties of constituents and their suitability for the structural applications.
C416.2	Acquire knowledge on polymer composites and manufacturing of PMC,MMC& CCC
C416.3	Select the appropriate technique for manufacture of fiber-reinforced composite products.
C416.4	Relate the compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina.
C416.5	Get insight into Functionally graded materials and Shape memory alloys
C416.6	Describe and evaluate the properties of the Nano materials and their applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C416.1	3	-	1	-	-	2	2	-	1	1	-	2
C416.2	3	-	1	-	-	2	2	-	1	1	-	2
C416.3	3	-	1	-	-	2	2	1	1	1	-	2
C416.4	3	1	1	-	-	2	2	1	1	1	-	2
C416.5	3	-	1	-	-	2	2	-	1	1	-	2
C416.6	3	-	1	-	-	2	2	-	1	1	-	2
C416	**3**	**1**	**1**	**-**	**-**	**2**	**2**	**1**	**1**	**1**	**-**	**2**

	PSO1	PSO2
C416.1	3	-
C416.2	3	2
C416.3	3	2
C416.4	3	2
C416.5	3	-
C416.6	3	-
C416	**3**	**2**

Course Name: CAD/CAM Lab (C417)

C417.1	Execute steps required for modeling 3D objects by using protrusion, cut, sweep, extrude commands
C417.2	Convert 3D solid models into 2D drawing-different views, sections
C417.3	Use isometric views and dimensioning of part models
C417.4	Understand and analyze the problem with the help of ANSYS software
C417.5	Able to Machine simple components on CNC machines
C417.6	Able to use CAM software to generate NC code

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1
C417.1	2	2	2	1	2	-	-	-	-	2	-	2
C417.2	-	2	3	1	2	-	-	-	-	3	-	2
C417.3	2	2	2	1	2	-	-	-	-	2	-	2
C417.4	3	3	2	3	2	2	-	-	-	3	2	3
C417.5	3	2	3	2	3	-	-	-	-	2	2	3
C417.6	2	2	2	3	2	-	-	-	-	2	-	2
C417	**2.4**	**2.16**	**2.34**	**1.84**	**2.16**	**2**	**-**	**-**	**-**	**2.34**	**2**	**2.34**

	PSO 1	PSO 2
C417.1	3	3
C417.2	3	3
C417.3	3	3
C417.4	3	3
C417.5	3	3
C417.6	3	3
C417	**3**	**3**

Course Name: Mechatronics Lab (C418)

C418.1	Understand the basic principles of measurement and working mechanism of different transducers.
C418.2	Understand the concept of strain gauge and strain rosettes for strain measurement.
C418.3	Understand the construction and working of a LVDT and its application in measurement of displacement.
C418.4	Able to work with PLC & Ladder Programming systems and its integration to mechanical systems for real time applications.
C418.5	Selection of appropriate sensors and transducers depending on application.
C418.6	Development of hydraulic and Pneumatic systems and implementation for real life system.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO1
C418.1	2	1	1	-	2	-	-	-	-	-	3	1
C418.2	2	1	2	1	2	-	-	-	-	-	3	3
C418.3	2	2	2	1	1	-	-	-	-	-	1	2
C418.4	1	2	2	1	1	-	-	-	-	-	1	2
C418.5	1	2	2	2	2	1	-	-	-	-	1	3
C418.6	1	2	2	2	2	1	-	-	-	-	3	3
C418	1.5	1.67	1.84	1.4	1.67	1	-	-	-	-	2	2.34

	PSO 1	PSO 2
C418.1	3	1
C418.2	3	1
C418.3	2	1
C418.4	1	1
C418.5	1	1
C418.6	3	2
C418	2.16	1.16

Course Name: Production Planning and Control (C421)

C421.1	Understand the core features of the production planning and control at the operational and strategic levels, specifically the relationships between people, process, technology, productivity and quality and how it contributes to the competitiveness of firms.
C421.2	Present and illustrate qualitative and quantitative forecasting techniques and their influence on production planning and control.
C421.3	Demonstrate and explain the use of Manufacturing Requirements Planning (MRP2), Just - In - Time (JIT) techniques in terms of operation and their importance in Lean World Class Manufacturing
C421.4	Solve routing and scheduling problems
C421.5	Summarize various aggregate production planning techniques.
C421.6	Identify the dispatching activities and various types of follow-ups

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C421.1	3	3	3	-	-	-	2	-	2	-	-	-
C421.2	3	2	2	3	-	-	-	-	-	-	-	-
C421.3	3	2	2	2	-	-	-	-	-	-	2	2
C421.4	3	3	3	3	3	2	-	-	-	-	1	2
C421.5	3	-	-	2	-	-	-	-	-	-	2	-
C421.6	3	3	3	3	3	-	-	-	-	-	-	-
C421	**3**	**2.6**	**2.6**	**2.6**	**3**	**2**	**2**	**-**	**2**	**-**	**1.67**	**2**

	PSO1	PSO2
C421.1	2	-
C421.2	2	-
C421.3	2	-
C421.4	2	-
C421.5	2	-
C421.6	2	-
C421	**2**	**-**

Course Name: Unconventional Machining Processes (C422)

C422.1	Understand the significance of various nontraditional machining processes and the details of Ultrasonic machining in modern manufacturing.
C422.2	Able to explain Working principle, advantages, disadvantages and applications of Electrochemical Machining Process
C422.3	Able to explain the Process, equipment of Electric Discharge Machining (EDM) and wire EDM
C422.4	Understand the Electron beam Machining and Laser Beam Machining processes
C422.5	Demonstrate the Plasma Machining Processes and its applications
C422.6	Explain the Abrasive and water jet machining processes and its applications

	PO1	PO	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C422.1	2	2	1	1	1	1	1	1	1	1	1	1
C422.2	3	1	1	1	1	1	1	1	1	1	1	1
C422.3	3	1	-	-	-	-	-	-	-	-	1	1
C422.4	3	1	1	-	-	-	-	-	-	-	-	-
C422.5	3	1	1	-	-	-	-	-	-	-	-	-
C422.6	3	1	1	-	-	-	-	-	-	-	-	-
C422	**2.8**	**1.1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

	PSO 1	PSO 2
C422.1	2	2
C422.2	2	2
C422.3	2	2
C422.4	2	2
C422.5	2	2
C422.6	2	2
C422	**2**	**2**

Course Name: Automobile Engineering (C423)

C423.1	Demonstrate the vehicle construction, types of automobile engines, chassis and lubrication system in automobile.
C423.2	Draw and explain the working of different types of transmission systems in automobile.
C423.3	Sketch and explain steering system and its geometry.
C423.4	Understand the working of different types of suspension, breaking and electrical systems.
C423.5	Explain engine specifications and discuss various safety systems in automobile.
C423.6	Understand engine emission control systems, pollution standards and demonstrate engine service

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C423.1	2	1	-	-	3	-	-	2	3	2	2	2
C423.2	2	2	-	-	3	-	-	3	3	2	3	2
C423.3	2	1	1	-	3	-	-	2	3	2	2	2
C423.4	2	1	-	-	3	-	-	3	3	2	2	2
C423.5	2	3	3	-	3	3	3	2	3	2	3	2
C423.6	2	2	3	-	3	2	3	2	3	2	3	2
C423	**2**	**1.67**	**2.34**	**-**	**3**	**2.5**	**3**	**2.34**	**3**	**2**	**2.5**	**2**

	PSO 1	PSO 2
C423.1	2	2
C423.2	2	1
C423.3	2	1
C423.4	2	2
C423.5	2	2
C423.6	2	2
C423	**2**	**1.66**

Course Name: Non Destructive Evaluation (C424)

C424.1	Identify different nondestructive testing methods and understand the Radiographic tests
C424.2	Examine and evaluate the various Ultrasonic testing procedures
C424.3	Study in detail about the nondestructive evaluation using Liquid Penetrate and Eddy currents
C424.4	Know and study about the standardization and calibration of magnetic particle testing
C424.5	To evaluate the different infrared and thermal testing procedures
C424.6	Apply the Non Destructive Testing methods in various industrial applications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C424.1	3	3	3	3	2	2	2	3	-	2	1	2
C424.2	3	2	2	3	1	2	2	2	-	2	1	1
C424.3	3	1	2	3	1	2	1	2	-	2	1	-
C424.4	3	1	2	3	1	2	1	2	-	1	1	-
C424.5	3	2	3	3	1	2	2	2	-	1	1	1
C424.6	3	3	3	3	2	3	2	3	-	2	1	-
C424	3	2	2.5	3	1.33	2.16	1.67	2.33	-	1.67	1	1.33

	PSO1	PSO2
C424.1	3	1
C424.2	2	1
C424.3	2	-
C424.4	2	-
C424.5	2	1
C424.6	3	-
C424	2.33	1

Course Name: Seminar (C425)

C425.1	Identify a topic in advanced areas of Mechanical Engineering.
C425.2	Identify and compare technical and practical issues related to the area of interest
C425.3	Analyses the references/bibliography related to topic
C425.4	Prepare a well-organized report including elements of technical writing and critical thinking
C425.5	Interpret and Communicate technical issues and recent developments through presentation
C425.6	Write technical documents for scientific communication and Promote and develop presentation skills

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C425.1	3	3	3	3	3	3	3	3	3	3	3	3
C425.2	3	3	3	3	3	3	3	3	3	3	3	3
C425.3	3	3	3	3	3	3	3	3	3	3	3	3
C425.4	3	3	3	3	3	3	3	3	3	3	3	3
C425.5	3	3	3	3	3	-	-	-	-	-	3	-
C425.6	3	3	3	3	3	-	-	-	-	-	-	-
C425	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

	PSO1	PSO2
C425.1	3	3
C425.2	3	3
C425.3	3	3
C425.4	3	3
C425.5	3	3
C425.6	3	3
C425	**3**	**3**

Course Name: Project (C426)

C426.1	Identify a topic in advanced areas of Mechanical Engineering
C426.2	Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
C426.3	Identify methods and materials to carry out experiments/simulations/development
C426.4	Reorganize the procedures of design, development & manufacturing with a concern for society, environment and ethics
C426.5	Analyze and discuss the results to draw valid conclusions
C426.6	Prepare a report as per recommended format and defend the work

	PO	PO	PO3	PO	PO5	PO6	PO	PO8	PO9	PO10	PO11	PO12
C426.1	3	3	3	3	3	3	3	3	3	3	3	3
C426.2	3	3	3	3	3	3	3	3	3	3	3	3
C426.3	3	3	3	3	3	3	3	3	3	3	3	3
C426.4	3	3	3	3	3	3	3	3	3	3	3	3
C426.5	3	3	-	3	-	-	-	-	-	-	3	-
C426.6	3	-	3		3	-	-	-	3	-	-	-
C426	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

	PSO1	PSO2
C426.1	3	3
C426.2	3	3
C426.3	3	3
C426.4	3	3
C426.5	3	3
C426.6	3	3
C426	**3**	**3**