Government College of Engineering, Salem - 11

Department of Civil Engineering

M.E. - Computer Aided Design

COs - POs and PSO Mapping

Course Articulation Matrix – 18 Regulation

Semester – I															
18CDC11 - Concepts of Engineering Design															
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Apply design principles for Quality Products to create economically viable products.	2	2	1	3	1	-	-	-	2	-	1	-	3	3	1
CO2	Identify the materials and integrate the manufacturing processes with Engineering Design	2	3	2	2	3	-	-	-	-	-	1	-	3	2	3
CO3	Synthesize the principles of design for machinability, accessibility and assembly with greater concern towards environmental issues.	2	1	1	2	2	1	-	-	-	-	1	-	-	1	-
CO4	To compute reliability engineering parameters and estimates for applications in mechanical devices and manufacturing environments.	1	1	1	1	2	-	-	-	1	-	1	-	-	-	1
Average		1.8	1.8	1.3	2	2	1	-	-	1.5	-	1	-	3	2	1.2

Semester – I																
18CDC12 - Computer Aided Modelling and Design																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Apply mathematical skills in the design and generation of modelling in software.	2	2	2	1	3	-	-	-	2	-	1	-	1	1	2
CO2	Apply basic concepts to develop construction techniques and solid modelling concepts	2	2	2	2	3	-	-	-	-	-	1	-	1	1	3
CO3	Apply the modeling concept, to design the product in manufacturing	2	1	1	2	3	-	-	-	-	-	1	-	2	2	1
CO4	Use computer and CAD software for design and modelling.	1	1	1	-	3	-	-	-	1	-	1	-	3	2	1
Average		1.8	1.5	1.5	1.7	3	-	-	-	1.5	-	1	-	1.8	1.5	1.8

Semester – I																
18CDC13 - CAD Modelling and Drafting Lab																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Use SOLID EDGE and CATIA software toolbars and menus, draw and modify tools	-	1	2	3	-	1	3	-	1	1	-	-	1	2	3
CO2	Model the 3D mechanical components with dimensioning	-	2	3	3	-	2	3	-	2	1	-	-	2	1	3
CO3	Model the automobile parts	-	2	3	3	-	2	3	-	2	2	-	-	3	2	-
CO4	Assembling and detailing of a given mechanical component using software assistance.	-	2	3	3	-	2	3	-	3	2	-	-	1	3	-
Average		-	1.8	2.8	3	-	1.8	3	-	2	1.5	-	-	1.8	2	3

Semester – I																
18CDC14 - Finite Element Analysis Lab- I																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Derive equations in finite element methods for 1D, 2D and 3D problems	1	2	1	3	-	1	1	-	1	-	-	-	1	2	3
CO2	Formulate and solve basic problems in heat transfer, solid mechanics and fluid mechanics	3	1	2	1	-	1	1	-	2	1	-	-	3	-	-
CO3	Demonstrate a knowledge and understanding of the fundamentals of the finite element method as an approximation method for analysis of a variety of engineering problems.	3	2	1	2	3	1	1	-	2	1	-	-	2	2	2
CO4	Analyse a real component using a finite element package.	3	1	1	1	3	-	-	-	2	2	-	-	1	-	3
Average		2.5	1.5	1.3	1.8	3	1	1	-	1.7	1.3	-	-	1.8	2	2.7

Semester – I																
18MLC01 - Research Methodology and IPR																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand research problem formulation.	1	-	-	-	-	-	-	-	-	-	1	-	1	2	-
CO2	Analyse research-related information	-	3	-	-	-	1	-	-	-	-	1	-	2	1	-
CO3	Follow research ethics	-	-	2	-	1	1	-	-	-	-	1	-	-	-	-
CO4	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.	-	-	-	2	1	-	-	-	-	2	1	-	-	-	2
CO5	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to the creation of new and better products, and in turn brings about, economic growth and social benefits.	-	-	-	-	-	-	-	-	-	-	1	-	2	-	3
Average		1	3	2	2	1	1	-	-	-	2	1	-	1.7	1.5	2.5

Semester – II															
18CDC21 - Finite Element Methods in Design															
		Program Outcomes												**Program Specific Outcomes**	
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand the concept of finite element method for soling design problems.	3	1	3	1	-	-	-	1	1	-	-	-	1	2	-
CO2	Formulate and solve manually problems in 10D structural systems involving bars, trusses, beams and frames.	3	1	3	3	3	-	-	1	1	-	-	-	-	-	3
CO3	Develop 2-D FE formulations involving triangular, quadrilateral elements and higher order elements	3	1	3	3	2	-	-	1	1	-	-	-	-	-	-
CO4	Apply the knowledge of FEM for stress analysis, model analysis, heat transfer analysis and flowanalysis	3	2	3	3	2	-	2	2	1	-	-	-	1	2	-
Average		3	1.3	3	2.5	2.3	-	2	1.3	1	-	-	-	1	2	3

Semester – II																
18CDC22 - Mechanical Vibrations and Acoustics																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Define the basic terms of vibrating system	3	1	1	1	1	-	-	-	-	-	1	-	-	-	1
CO2	Illustrate and identify the basic components of vibrating system	1	3	1	1	2	2	-	-	-	-	1	-	-	-	-
CO3	Formulate mathematical models of problems in vibrations using Newton's second law or energy principles	2	1	2	1	-	1	1	-	-	-	1	-	1	2	-
CO4	Determine a complete solution to mechanical vibration problems using Mathematical or numerical techniques	1	3	2	1	1	-	-	-	-	-	1	-	-	-	-
Average		1.8	2	1.5	1	1.3	1.5	1	-	-	-	1	-	1	2	1

Semester – II															
18CDC23 - Finite Element Analysis Lab –II															
		Program Outcomes												**Program Specific Outcomes**	
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand the concept of FEM.	1	2	1	3	-	1	1	-	1	-	-	-	2	1	-
CO2	Apply the FEM technology for Thermal & Fluid Flow Analysis	3	1	2	1	-	1	1	-	2	1	-	-	2	2	3
CO3	Make familiar with the use of CAE Software.	3	2	1	2	3	1	1	-	2	1	-	-	1	-	2
CO4	Make familiar of the use of Mass, moment, energy conservation of fluid flow.	3	1	1	1	3	-	-	-	2	2	-	-	3	1	1
Average		**2.5**	**1.5**	**1.3**	**1.8**	**3**	**1**	**1**	**-**	**1.8**	**1.3**	**-**	**-**	**2**	**1.3**	**2**

Semester – II															
18CDC24 - CAM and Robotics Lab															
		Program Outcomes												**Program Specific Outcomes**	
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Apply the basic concepts in NC technology for turning and milling applications.	-	1	2	3	-	1	3	-	1	1	-	-	3	1	1
CO2	Make familiar with the use of CAE and CAM Software.	-	2	3	3	-	2	3	-	2	1	-	-	2	2	1
CO3	Practice in part programming and operating a machining center.	-	2	3	3	-	2	3	-	2	2	-	-	3	1	-
CO4	Program and control robot path for industrial applications	-	2	3	3	-	2	3	-	3	2	-	-	3	1	2
Average		-	1.8	2.8	3	-	1.8	3	-	2	1.5	-	-	2.8	1.3	1

Semester – II																
18CDC25 - Mini Project																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Students will get an opportunity to work in the actual industrial environment if they opt for an internship	-	1	2	3	-	1	3	-	1	1	-	-	1	1	1
CO2	In the case of a mini project, they will solve a live problem using Software/analytical/computational tools.	-	2	3	3	-	2	3	-	2	1	-	-	1	1	2
CO3	Students will learn to write technical reports	-	2	3	3	-	2	3	-	2	2	-	-	1	-	-
CO4	Students will develop skills to present and defend their work in front of a technically qualified audience	-	2	3	3	-	2	3	-	3	2	-	-	1	-	-
Average		-	1.8	2.8	3	-	1.8	3	-	2	1.5	-	-	1	1	1.5

Semester – III																
18CDC31 - Dissertation Phase – I																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Students will be able to use different experimental techniques.	1	3	3	1	1	1	1	1	2	1	1	-	1	-	-
CO2	Students will be able to use different software/ computational/analytical tools	-	1	1	-	-	-	3	1	-	1	-	-	1	-	-
CO3	Students will be able to design and develop an experimental set up/ equipment/test rig.	2	-	1	2	-	1	-	1	2	1	1	-	1	2	1
CO4	Students will be able to conduct tests on existing set ups/equipment's and draw logical conclusions from the results after analyzing them.	-	-	-	-	-	2	-	1	-	1	-	-	-	-	1
CO5	Students will be able to either work in a research environment or in an industrial environment.	-	-	-	-	-	2	2	-	1	-	1	-	-	-	1
CO6	Students will be conversant with technical report writing.	1	1	1	-	-	1	3	1	1	-	1	-	2	1	-
CO7	Students will be able to present and convince their topic of study to the engineering community	1	1	1	-	-	-	1	1	-	-	-	-	-	1	-
Average		1.2	1.5	1.7	1.5	1	1.4	2	1	1.5	1	1	-	1.6	1.3	1

Semester – IV																
18CDC41 - Dissertation Phase – II																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Students will learn to survey the relevant literature such as books, national/international refereed journals and contact resource persons for the selected topic of research.	1	3	3	1	1	1	1	1	2	1	1	-	1	1	1
CO2	Students will be able to use different experimental techniques.	-	1	1	-	-	-	3	1	-	1	1	-	1	-	2
CO3	Students will be able to use different software/ computational/analytical tools.	2	-	1	2	-	1	-	1	2	1	-	-	1	-	-
CO4	Students will be able to design and develop an experimental set up/ equipment/test rig.	-	-	-	-	-	2	-	1	-	1	-	-	1	-	-
CO5	Students will be able to conduct tests on existing set ups/equipment and draw logical conclusions from the results after analyzing them.	-	-	-	-	-	2	2	-	1	-	1		-	1	-
CO6	Students will be able to either work in a research environment or in an industrial Environment	1	1	1	-	3	-	1	1	-	-	-	-	3	1	1
Average		1.3	1.7	1.5	1.5	2	1.5	1.7	1	1.7	1	1	-	1.4	1	1.3

Elective															
18CDE11 - Advanced Mathematical Methods in Engineering															
		Program Outcomes											**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Obtain the solutions of homogeneous and non-homogeneous differential equations.	2	2	2	1	3	-	-	-	2	-	1	-	-	1	-
CO2	Obtain the solution of wave equation by method of Eigen function	2	2	2	2	3	-	-	-	-	-	1	-	-	-	-
CO3	Obtain the solutions of diffusion and wave equation involved in engineering problems by using Laplace and Fourier transform techniques	2	1	1	2	3	-	-	-	-	-	1	-	1	-	-
CO4	Gain the knowledge on statistical sampling and its applications, analysis of variance as one and two way classification	1	1	1	-	3	-	-	-	1	-	1	-	-	-	1
Average		1.8	1.5	1.5	1.3	3	-	-	-	1.5	-	1	-	1	1	1

Elective																
18CDE12 - Advanced Composite Materials																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Choose and select the suitable composite material and their reinforcements	1	2	1	3	1	-	-	-	2	-	1	-	-	-	-
CO2	Select constituent materials glass, carbon, aramid, ceramic fibers and resins	1	1	1	2	2	1	-	-	-	-	1	-	-	-	1
CO3	Understand & Apply engineering mechanics, analysis and design, macro and micro mechanics of composites	2	2	1	1	2	2	3	-	-	2	1	-	1	-	-
CO4	Highlight the appropriate use of composite structures in the industry.	1	1	1	1	2	-	-	-	1	-	1	-	-	1	-
Average		1.3	1.5	1	1.8	1.8	1.5	1.5	-	1.5	2	1	-	1	1	1

Elective																
18CDE13 - Product Lifecycle Management																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand history, concepts and terminology of PLM.	1	2	1	3	1	-	-	-	2	-	1	-	-	-	-
CO2	Understand and analyse the product life cycle environment.	1	1	1	2	2	1	-	-	-	-	1	-	-	-	1
CO3	Understand PLM/PDM implementation approaches	2	2	1	1	2	2	3	-	-	2	1	-	1	-	-
CO4	Integrate PLM/PDM with other applications	1	1	1	1	2	-	-	-	1	-	1	-	-	1	-
Average		1.3	1.5	1	1.8	1.8	1.5	3	-	1.5	5	1	-	1	1	1

Elective																
18CDE14 - Design for Manufacturing, Assembly																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Select various machining and metal joining processes for economical production and select the materials	3	1	1	1	1	-	1	1	-	-	1	-	-	-	-
CO2	Understand constraints of manufacturing processes that limit design possibilities with respect to cycle time	1	2	1	1	1	3	1	1	-	-	1	-	1	1	3
CO3	Integrate the knowledge of compliance analysis and interference analysis for assembly	2	2	-	3	-	-	1	1	-	-	2	-	3	2	1
CO4	Prepare project or report to illustrate applied DFM principles in manufacturing and service industries	1	1	1	2	-	1	-	1	-	-	2	-	2	-	2
Average		1.8	1.5	1	1.8	1	2	1	1	-	-	2	-	2	1.5	2

Elective																
18CDE15 - Advanced Engineering Materials																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Identify fundamental issues and establish directions for selection of materials	3	1	1	1	1	1	-	-	-	-	1		-	-	-
CO2	Prepare high strength materials.	1	2	-	1	1	1	-	-	-	-	1	-	-	-	-
CO3	Suggest materials for low and high temperature applications.	1	2	3	1	1	-	-	-	-	-	1	-	-	-	1
CO4	Integrate knowledge of different types of advanced engineering materials	1	1	2	1	1	1	-	-	2	-	1	-	-	-	-
CO5	Analyse problem and find appropriate solution for use of materials.	1	-	1	1	-	-	-	-	-	1	1	-	1	2	-
Average		1.4	1.5	1.7	1	1	1	-	-	2	1	1	-	1	2	1

Elective																
18CDE16 - Experimental Stress Analysis																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	To explain the concept of elasticity and the difference between stress and strain	2	3	2	2	1	2	2	1	2	1	1	-	-	-	-
CO2	Explain the term as plane stress and plane strain	2	2	2	2	1	2	2	1	3	1	1	-	1	-	1
CO3	Conduct the transformation of plane stress or plane strain components using Mohr's circle, the method of Eigen values and eigenvectors, the method of quadratic form of ellipsoids, and the method of stress or strain trajectories	1	2	3	1	2	2	2	-	1	1	1	-	-	2	-
CO4	Apply basic concepts of elastic stability and buckling of elastic	1	1	1	2	1	3	1	-	1	1	1	-	1	-	-
Average		1.5	2	2	1.8	1.3	2.3	1.8	1	1.8	1	1	-	1	2	1

Elective																
18CDE21-Advanced Kinematics of Mechanisms																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Develop an analytical equation describing the relative velocity and acceleration of links.	2	2	1	3	1	-	-	-	2	-	1	-	2	2	3
CO2	Solve constrained equation to design the linkages for a specified application.	2	3	2	2	3	-	1	-	-	-	1	-	3	1	2
CO3	Select configure and synthesize mechanical components into complete systems.	2	1	1	2	2	1	-	-	-	-	1	-	-	-	-
CO4	Select the topological arrangements of a robotic arm for specific applications.	1	1	1	1	2	-	-	-	1	-	1	-	1	-	-
Average		1.8	1.8	1.3	2	2	1	1	-	1.5	-	1	-	2	1.5	1.5

Elective																
18CDE22 - Advanced Tool Design																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Identify the properties of tool material, tool nomenclature and to classify the cutting tools.	1	2	1	2	-	-	-	-	-	-	1	-	-	-	3
CO2	Apply design principles for tool design and to create economically viable products	-	1	3	1	-	-	-	-	-	-	1	-	3	1	2
CO3	Can find the applications of all the areas in the day to day life.	1	1	1	3	-	-	-	1	-	-	1	-	-	-	-
CO4	Synthesize the principles of Tool design and Design of Jigs and Fixtures as per modern industrial requirement	1	1	1	1	1	-	-	-	-	-	1	-	1	2	-
Average		1	1.3	1.5	1.8	1	-	-	1	-	-	1	-	2	1.5	2.5

Elective																
18CDE23 - Advanced Strength of Materials																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Relate the mechanical properties of materials to their structure.	1	1	1	2	-	-	-	-	-	-	1	-	-	-	-
CO2	Select materials for structural applications which can withstand the bending.	1	1	1	1	-	-	-	-	-	-	1	-	-	-	1
CO3	Solve realistic and/or fundamental problems relating to the mechanical behavior of materials for individual solutions and tests.	1	1	3	1	-	-	-	1	-	-	1		-	-	-
CO4	Design the problems related to designing the pressure vessels and piping systems.	1	1	1	1	1	-	-	-	-	-	1	-	1	2	-
Average		1	1	1.5	1.3	1	-	-	1	-	-	1	-	1	2	1

Elective																
18CDE24 - Mechanics of Fracture																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Use any one of the four parameters for finding out damage tolerance: stress intensity factor, energy release rate, J integral, Crack tip opening displacement.	2	2	2	2	2	1	-	-	-	-	-	-	-	-	-
CO2	Manage singularity at crack tip using complex variable.	2	2	2	2	2	1	-	-	-	-	-	-	-	1	-
CO3	Learn modern fatigue and to calculate the fatigue life of a component with or without crack in it.	2	2	2	3	3	1	-	-	-	-	-	-	1	-	-
CO4	Learn modern sophisticated experimental techniques to determine fracture toughness and stress intensity factor.	2	2	2	3	3	1	-	-	-	-	-	-	-	-	1
Average		2	2	2	2.5	2.5	1	-	-	-	-	-	-	1	1	1

Elective																
18CDE25 - Rapid Prototyping and Tooling																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Identify the intended modelling process for a particular product.	1	1	1	-	1	-	-	-	-	-	1	-	1	2	3
CO2	Improves the scope of application in the field of manufacturing products	1	1	1	-	-	-	-	-	-	-	1	-	3	-	2
CO3	Familiar on iterative prototyping techniques for working out the details of the online interaction, Including software development tools and software environments.	1	1	3	1	-	-	-	1	-	-	1	-	-	1	-
CO4	Designing of existing product into variety of attractive designed product and new interactive devices with low cost and ever more challenging	1	1	1	1	1	-	-	-	-	-	1	-	3	-	-
Average		1	1	1.5	1	1	-	-	1	-	-	1	-	2.3	1.5	1.5

Elective																
18CDE26 - Nanomaterials Technology																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand processing techniques for nanomaterials.	2	2	1	3	3	1	1	-	1	-	-	-	-	-	-
CO2	Knowledge about various properties of nano-materials and to optimize the methods for specific material application	1	1	2	1	-	1	1	-	2	1	1	-	1	2	-
CO3	Use various nano-fluids in the fields of engineering	2	2	1	2	3	1	1		2	1	1	-	-	-	-
CO4	Use of Nano particles for the health, ecological and environmental hazards	1	1	1	1	-	-	-	2	2	2	2	-	-	-	1
Average		1.5	1.5	1.3	1.8	3	1	1	2	1.7	1.3	1.3	-	1	2	1

Elective																
18CDE31 - Productivity Management and Re-Engineering																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	understand the need for change in organizations and be able to apply appropriate strategies to affect change in an appropriate manner	2	1	1	1	1	1	1	-	1	-	1	-	-	-	-
CO2	Creating a layout of a manufacturing department that integrates both production equipment and office accommodation	1	-	1	-	3	2	-	2	1	-	1	-	-	1	-
CO3	Use the techniques, skills, and modern engineering tools necessary for engineering practice	1	1	1	1	1	1	-	-	-	-	3	-	-	-	1
Average		1.3	1.0	1	1.0	1.7	1.3	1.0	7	1.0	-	1.7	-	-	1.0	1.0

Elective																
18CDE32 - Theory of Plates and Shells																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Apply design principles and to create economically viable products.	2	1	3	3	3	1	1	-	1	-	1	-	-	-	-
CO2	Develop the ability to obtain the various deflections in plates and shells.	1	3	1	2	1	2	-	-	-	-	1	-	-	-	2
CO3	Synthesize the principles of analysis of finite difference and finite element methods	1	3	1	2	1	2	-	-	-	-	1	-	1	1	-
Average		1.3	2.3	1.7	2.3	1.7	1.7	1	-	1	-	1	-	1	1	2

Elective																
18CDE33 - Optimization Techniques in Design																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Know the different optimization techniques.	1	1	1	1	1	-	-	1	1	-	1	-	-	-	-
CO2	Apply these techniques to solve static and dynamic problems of day to day applications	1	3	1	1	2	2	-	2	2	-	1	-	1	3	-
CO3	Develop the ability to obtain the optimal solution for engineering problems.	1	3	1	1	2	2	-	2	2	-	1	-	-	-	1
Average		1	2.3	1	1	1.7	2	-	1.7	1.7	-	1	-	1	1	1

Elective																
18CDE34 - Computational Fluid Dynamics																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Ability to Write the mathematical representation of governing equation for fluid flow and heat transfer scenarios	3	1	1	2	1	-	-	-	-	-	1	-	-	-	3
CO2	Solve one dimensional and two-dimensional heat transfer problems	1	2	2	2	1	-	-	-	1	-	1	-	1	-	-
CO3	Ability to identify, formulate, and solve conduction type problems using appropriate CFD technique	1	3	1	3	1	-	-	1	2	-	1	-	3	2	-
CO4	Ability to understand different turbulence model and able to apply appropriate models to various practical applications.	1	1	1	1	1	-	-	-	-	-	1	-	-	1	1
Average		1.5	1.8	1.3	2	1	-	-	1	1.5	-	1	-	2	1.5	2

Elective															
18CDE35 - Computer Integrated Manufacturing Systems															
		Program Outcomes											**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	It helps the students to get familiarized with the computer aided process planning, group technology, process planning and control and computer integrated manufacturing systems	1	1	-	2	1	2	1	-	1	-	1	-	3	2	3
CO2	The student shall be comfortable with using CAD/CAM systems with programming and operating of CNC machine tools	1	2	1	2	1	2	1	-	2	-	1	-	3	3	-
CO3	To apply the concept of computer aided planning and control	2	2	1	1	1	3	1	1	1	-	1	-	2	2	1
Average		1.3	1.7	1	1.7	1	2.3	1	1	1.3	-	1	-	2.7	2.3	2

Elective																
18CDE36 - Industrial Robotics and Expert Systems																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Identify a Robot for a specific application	3	1	1	-	1	1	1	-	-	-	1	-	-	-	-
CO2	Interface various Servo and hardware components with Controller based projects	1	2	2	-	1	3	1	-	2	-	1	-	-	-	2
CO3	Access the machine vision capabilities of the robot to select objects based upon shape, orientation and colour	1	1	-	3	-	-	1	-	2	-	1	-	-	2	-
CO4	Design and critically evaluate: a safe system in a robot cell	-	-	1	-	-	1	-	-	-	-	1	-	1	3	3
CO5	Implement and present a basic automation task with an industrial robot, including online and offline programming and evaluation of the results, based on a given specification	1	2	1	-	3	-	-	-	1	-	-	-	3	-	-
Average		1.5	1.2	1.2	3	1.6	2	1	-	2.5	-	1	-	2.0	2.5	2.5

Elective																
18CDE41 - Experimental Techniques and Data Analysis																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Develop an appropriate experimental research design for an engineering case study taking into account practical limitations.	2	2	2	3	3	1	-	-	1	-	1	-	1	2	1
CO2	Apply knowledge of statistical analysis to assess a hypothesis by selecting appropriate statistical tests and by correctly interpreting the results of these tests	2	2	1	2	1	-	-	-	-	-	1	-	3	1	-
CO3	Propose an appropriate statistical model for a given dataset and interpret the goodness of fit.	2	2	1	2	1	-	-	-	-	-	1	-	3	-	-
CO4	Optimize the experimental result and correlated with analytical data by using taughi method.	2	2	1	2	1	-	-	-	-	-	1	-	2	3	3
Average		2	2	1.3	2.3	1.5	1	-	-	1	-	1	-	2.3	2.5	2

Elective																
18CDE42 - CAD/CAM Tools																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	To get familiarized with computer aided tools for various industrial applications which includes manufacturing, process planning, inspection, data management and reverse engineering.	2	3	2	2	1	2	2	1	2	-	1	-	3	2	2
CO2	To apply the concept of geometric modelling and create new objects.	2	2	2	2	-	2	2	1	3	1	1	-	3	3	2
CO3	To evaluate the principle of synthesis of curves and create new 3D Objects.	1	3	3	1	2	2	2	2	1	-	1	-	3	3	3
Average		1.7	2.7	2.3	1.7	1.5	2	2	1.3	2	1	1	-	3	2.7	2.3

Elective																
18CDE43 - Contact Mechanics																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Gain knowledge about the couplings between normal- and tangential loads and deformations.	3	2	1	1	-	-	-	-	-	1	1	-	-	-	-
CO2	Understand the mechanism of elastic fracture and brittle fracture.	1	1	1	1	-	-	1	-	-	1	1	-	-	-	1
CO3	Understand the elastic problems with tangential, sliding or rolling contacts and plastic contact problem.	1	1	1	1	-	-	-	-	-	-	1	-	1	2	-
CO4	Applying the relations for thermo-elastic contact, contact of rough surfaces, adhesion.	1	2	1	1	-	-	-	-	-	-	1	-	1	-	1
Average		1.5	1.5	1	1	-	-	1	-	-	1	1	-	1	2	1

Elective																
18CDE44 - Advanced Automotive Systems																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Apply design principles for manufacturing to create eco-friendly automobiles	2	1	3	3	2	1	-	-	1	1	-	-	-	3	-
CO2	Enhanced knowledge on automobile design and its innovation with greater concern towards environmental issues.	2	1	2	-	1	-	-	-	1	1	1	-	3	1	-
CO3	Apply the electronic technology in automotive, for improving performance or reduce cost	2	1	2	-	2	-	-	-	-	-	1	-	-	-	-
CO4	Apply the automotive electronics to control the engine in order to reduce the emission level	2	1	1	-	2	1	1	-	1	1	-	-	-	-	1
Average		2	1	2	3	1.8	1	1	-	1	1	1	-	1	1	1

Elective																
18CDE45 - Design of Material Handling Equipment																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Describe the importance of proper material handling techniques and regarding hoisting and conveying equipment	2	1	2	2	1	1	1	-	-	1	1	-	1	-	-
CO2	List hazards associated with hoisting and conveying	1	1	3	2	1	1	2	1	1	3	1	-	-	1	-
CO3	Learn about various hoisting gear drives used in various applications.	1	2	1	1	3	3	1	-	-	1	1	-	-	-	2
Average		1.3	1.3	2	1.7	1.7	1.7	1.3	1	1	1.7	1	-	1	1	2

Elective																
18CDE46 - Plasticity and Metal Forming																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand the stress and strain tensor field	2	1	2	2	1	1	1	-	-	1	1	-	-	-	-
CO2	Apply the concepts to evaluate the theory of plasticity	1	1	3	2	1	1	2	1	1	3	1	-	-	1	2
CO3	Formulate the concepts for plasticity and plastic deformation analysis	1	2	1	1	3	3	1	-	-	1	1	-	-	-	-
CO4	Recognize the various metal forming techniques	1	1	2	1	2	1	1	-	-	2	1	-	1	1	1
Average		1.3	1.3	2	1.5	1.8	1.5	1.3	1	1	1.8	1	-	1	1	1.5

Elective																
18CDE51 - Tribology in Design																
		Program Outcomes												**Program Specific Outcomes**		
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand friction, wear and lubrication	2	2	2	3	-	-	-	-	1	1	1	-	1	1	1
CO2	Analyze properties of lubrication on hydrodynamic, hydrostatic, Elasto hydrodynamic condition	2	1	1	1	1	-	1	-	-	1	1	-	3	2	2
CO3	Develop processes of lubrication in all regimes, Suggest an explanation to the cause of a tribological failure	2	1	1	1	1	1	1	-	1	1	1	-	1	1	-
CO4	Understand the friction phenomena and select a suitable lubricant for a specific application	1	1	1	1	1	1	1	-	-	1	1	-	1	-	-
CO5	Understand and determine wear processes in contacts between metallic and non-metallic surfaces	1	1	3	1	1	-	1	-	-	1	1	-	1	-	-
Average		1.6	1.2	1.6	1.4	1	1	1	-	1	1	1	-	1.4	1.3	1.5

Elective															
18CDE52 - Enterprise Resource Planning															
		Program Outcomes												**Program Specific Outcomes**	
Course Outcomes		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	Understand the risks and benefits of ERP	1	3	1	-	1	1	2	1	1	1	1	-	1	1	2
CO2	Understand the technologies needed for ERP implementation.	1	2	1	-	1	2	1	-	1	-	1	-	1	1	2
CO3	Understand the implementation process	1	2	2	1	1	2	2	1	2	1	1	-	1	1	-
CO4	Analyze the role of Consultants, Vendors and Employees.	-	1	2	-	2	2	1	2	1	-	1	-	3	2	-
CO5	Analyze the role of PLM, SCM and CRM in ERP.	1	1	1	1	1	1	1	1	1	-	1	-	3	2	-
Average		1	1.8	1.4	1	1.2	1.6	1.4	1	1.2	1	1	-	1.8	1.4	2