SCHEME OF COURSE WORK

Course Details:

Course Title	**:ADVANCED MECHANICAL COMPONENT DESIGN**		
Course Code	**:13ME2210**	**L P C**	**: 4 0 3**
Program:	**: M.Tech.**		
Specialization:	**: CAAD**		
Semester	**:II**		
Prerequisites	**:Material science and Mechanics of solids**		
Courses to which it is a prerequisite	**:Fracture Mechanics,Design of Machine Elements.**		

Course Outcomes (COs):

At the end of the course, the student will be able to

1	explain the mechanical behaviour under creep
2	assess the fracture, crack modes stress intensity factor
3	design and analysis of components of pressure vessels
4	design of thick walled high pressure vessels
5	prescribe the design of gear box; explain the kinematic arrangement

Program Outcomes (POs):

At the end of the program, the students in CAAD will be able to

PO 1	acquire knowledge in latest computer-aided design and analysis tools
PO 2	create 3D models of real-time components using latest CAD software
PO 3	acquire technical skills to formulate and solve engineering and industrial problems
PO 4	carry out analysis for the design of new products
PO 5	have proficiency to solve problems using modern engineering design tools
PO 6	have capability to work in multidisciplinary streams
PO 7	apply project and finance management skills to organise engineering projects
PO 8	prepare technical reports and present them effectively
PO 9	engage in lifelong learning
PO 10	realize professional and ethical responsibilities
PO 11	conduct surveys, analyse data, plan, design and implement new ideas into action

Course Outcomeversus**Program Outcomes:**

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO-1	S	M										
CO-2		S	M	M								
CO-3			S		M							
CO-4		S			M							
CO-5		M			S							

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

AssessmentMethods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Creep:Material behavior**,** stages of creep, creep strength, relaxation,	CO-1,CO -2	1. What are the different stages of Creep? 2. Define creep strength and relaxation.	Lecture	
2	Mathematical modeling of creep behavior	CO-1,CO -2	1. Explain the mathematical modeling of creep	Lecture	Seminar
3	Maxwell model, Voigt-Kelvin Model	CO-1,CO -2	1.Explain Maxwell model 2. Explain Voigt-Kelvin model	Lecture	
4	Fracture: Introduction, **c**rack modes**, s**tress intensity factor	CO-1,CO -2	1.Write short note on different crack modes 2. What is stress intensity factor?	Lecture	
5	Fracture toughness, plastic zone correction, *J*-Integral**.**	CO-1,CO -2	1.Write brief note on Fracture toughness 2. What is plastic zone correction? Explain.	Lecture	Assignment
6	Design of cylindrical and spherical vessels	CO-3	1. What are the factors to be considered for designing of Cylindrical Vessels? 2. Explain the major differences in designing of cylindrical and spherical vessels.	Lecture	
7	Thin and thick walled cylinder analysis, design of end closers,	CO-3	1. How the thin walled cylinders are analysed? 2. What is the importance of end closers?	Lecture	
8	Design of standard and non-standard flanges, design of vessels.	CO-3	1. What is the difference between standard and non standard flanges? 2. Explain the steps involved in Design of flanges.	Lecture	
9	**Mid-Test 1**Design of supports for process vessels.	CO-3	1. What is the role of supports in process vessels? 2. Explain the factors to be considered for design of process vessels.	Lecture	Seminar
10	Design of thick walled high pressure vessels.	CO-3	1. Describe the design considerations for high pressure vessels?		
11	Design by various theories of failure	CO-5	1. Explain the various theories of failure.	Lecture	
12	Construction of these vessels with high strength steel and other special methods.	CO-5	1. What are the methods for the construction of high pressure vessels?	Lecture	
13	Design of gearbox: Component of speed reducers	CO-4	1. What are the components of speed reducer?	Lecture	
14	Multi speed gear box, speed changing	CO-4	1. Draw the diagram of multi speed gear box. 2. Write on speed changing mechanisms in gear box.	Lecture	

15	Speed diagrams, kinematic arrangement	CO-4	1. Draw the speed diagrams and kinematic arrangements.	Lecture	
16	**Mid-Test 2**Design of gear box	CO-4	1. What are the considerations to be given in design of a gear box?		Seminar
	END EXAM				