GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (Autonomous)
Approved by AICTE, New Delhi and Affiliated to JNTU-Kakinada
Re-accredited by NAAC with "A" Grade with a CGPA of 3.47/4.00
Madhurawada, Visakhapatnam - 530 048.

DEPARTMENT OF CIVIL ENGINEERING
SCHEME OF COURSE WORK

Course Details:

Course Title:	Design Thinking and Innovation			
Course Code:	20ME11D1	L T P C:	0 0 3 1.5	
Program:	B. Tech.			
Branch:	Civil Engineering			
Semester:	III			

Course Outcomes (COs):

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

1	Outline a problem, apply methods of Empathy on user groups
2	Describe and Define the problem specific to the user group
3	Apply Ideation tools to generate Ideas to solve the problem
4	Develop prototype
5	Test the ideas and demonstrate Storytelling ability to present the Ideas

Program Outcomes (POs):

Graduates will be able to:

1	Apply the knowledge of mathematics, science, engineering fundamentals to solve complex civil engineering problems.
2	Attain the capability to identify, formulate and analyse problems related to civil engineering and substantiate the conclusions.
3	Design solutions for civil engineering problems and design system components and processes that meet the specified needs with appropriate consideration to public health and safety.
4	Perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.
5	Select and apply appropriate techniques from the available resources and modern civil engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.
6	Carry out their professional practice in civil engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
7	Understand the impact of the professional engineering solutions on environmental safety and legal issues.
8	Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.
9	Function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.
10	Communicate fluently on complex engineering activities with the engineering community and society, and will be able to prepare reports and make presentations effectively.
11	To demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
12	Engage them in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of Civil Engineering.

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Program Specific Outcomes (PSOs):

1. Collect, process and analyse the data from topographic surveys, remote sensing, hydrogeological investigations, geotechnical explorations, and integrate the data for planning of civil engineering infrastructure.

2. Analyse and design of substructures and superstructure for buildings, bridges, irrigation structures and pavements.

3. Estimate, cost evaluation, execution and management of civil engineering projects.

Course Outcome versus Program Outcomes:

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

3 - Substantial correlation, 2 - Medium correlation, 1 - Low correlation, - No correlation

Course Outcome versus Program Specific Outcomes:

COs	PSO1	PSO2	PSO3
CO-1	-	3	-
CO-2	-	3	-
CO-3	-	3	-
CO-4	-	3	-
CO-5	-	3	-

3 - Substantial correlation, 2 - Medium correlation, 1 - Low correlation, - No correlation

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Assessment Methods:		Week wise Evaluation / Final presentation along with report

Teaching-Learning and Evaluation

Week No.	TOPIC / CONTENTS	Course Outcomes	Activities	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1-3	**Introduction to Design Thinking**: A primer on design thinking - Traditional approach, The new design thinking approach. Stages in Design Thinking: Empathize, Define, Ideate, Prototype, Test. Mindset for design thinking, Design thinking for product and process innovation, Difference between engineering design and design thinking. **Case Studies**: General, Engineering and Service applications.	CO-1	1. Identify an Opportunity and Scope of the Project. 2. Explore the possibilities and Prepare design brief	• Lecture • Presentation / LCD projector	• Activities • Presentation • Article
4-6	**Methods and Tools for Empathize and Define phases:** **Empathize** - Methods of Empathize Phase: Ask 5 Why / 5W+H questions, Stakeholder map, Empathy Map, Peer observation, Trend analysis **Define** - Methods of Define Phase: Storytelling, Critical items diagram, Define success	CO-1	1. Apply the methods of empathize and Define Phases 2. Finalize the problem statement		
7-8	**Methods and Tools for Ideate phase:** **Ideate** - Brainstorming, 2X2 matrix, 6-3-5 method, NABC method;	CO-3	1. Apply the methods of Ideate Phase: Generate lots of Ideas		
9-11	**Methods and Tools for Prototype Phase:** **Prototype** - Types of prototypes - Methods of prototyping - Focused experiments, Exploration map, Minimum Viable Product;	CO-4	1. Apply the methods of Prototype Phase: Create prototypes for selected ideas		
12-13	**Methods and Tools for Test Phase:** **Test** - Methods of Testing: Feedback capture grid, A/B testing	CO-5	1. Collect feedback; iterate and improve the ideas		
14-15	**Solution Overview** - Create a Pitch -Plan for scaling up - Road map for implementation	CO-5	1. Present your solution using Storytelling method		
16	**Project Submission and Presentation (END EXAM)**				