VISION & MISSION

Vision

To become a pioneering centre in Civil Engineering and technology with attitudes skills and knowledge.

Mission of the Department

The Department of Civil Engineering is committed

- To produce well qualified and talented engineers by imparting quality education.
- To enhance the skills of entrepreneurship, innovativeness, management and lifelong learning in young engineers
- To inculcate professional ethics and make socially responsible engineers.

Program Educational Objectives of CE

This education is meant to prepare our students to thrive and lead. During their progression, our graduates will

PEO 1: Graduates of the program will be successful in technical and professional career.
PEO 2: Graduates of the program will have proficiency in solving real time Civil Engineering projects.
PEO 3: Graduates of the program will continue to engage in life-long learning with ethical and social responsibility.

Program Outcomes of Civil

Graduates of the Civil Engineering program will be able to

a. Apply knowledge of mathematics, science and fundamentals of Civil Engineering.

b. Analyse problem and interpret the data.

c. Design a system component, or process to meet desired needs in Civil Engineering within realistic constraints.

d. Identify, formulate, analyse and interpret data to solve Civil Engineering problems.

e. Use modern engineering tools such as CAD and GIS for the Civil Engineering practice.

f. Understand the impact of engineering solutions in a global, economic and societal context.

g. Understand the effect of Civil Engineering solutions on environment and to demonstrate the need for sustainable development.

h. Understanding of professional and ethical responsibility.

i. Work effectively as an individual or in a team and to function on multi-disciplinary context.

j. Communicate effectively with engineering community and society.

k. Demonstrate the management principles in Civil Engineering projects.

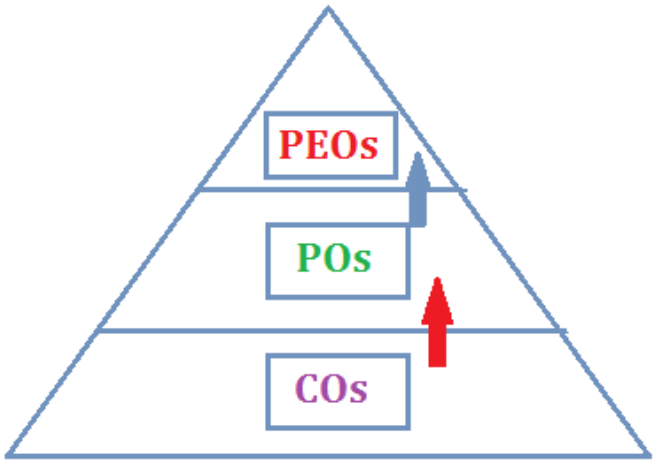
l. Recognize the need for and an ability to engage in life-long learning.

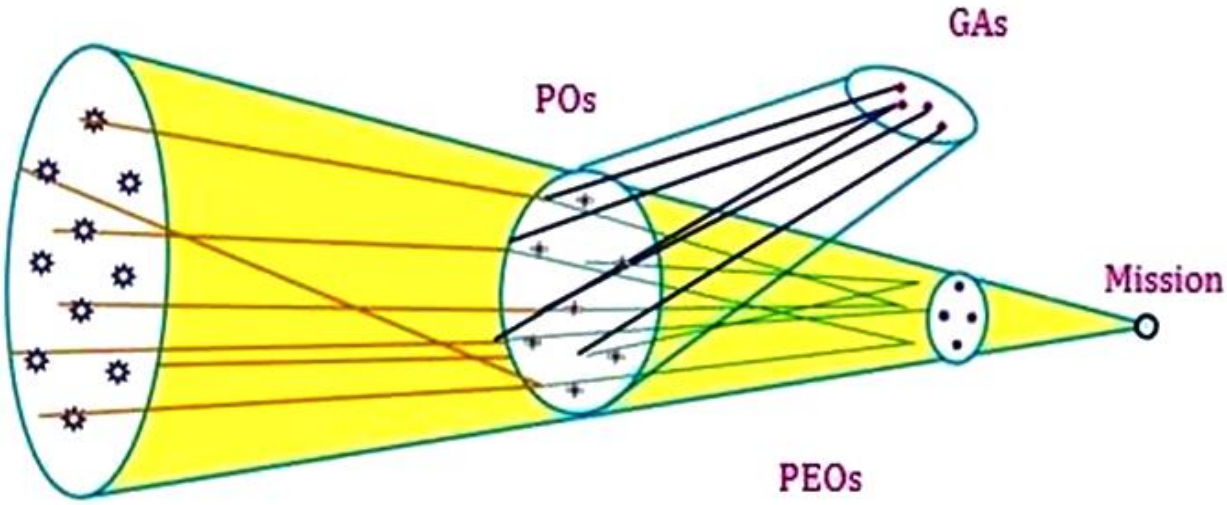
Course Outcomes

The following table summarizes the difference between course objectives and course outcomes.

Course Objectives	Course Outcomes
Describe what a faculty needs to teach and a plan for delivery.	Describe what students should demonstrate and show upon the completion of a course.
At the end of the course student will understand and know the concepts of the topics covered.	At the end of the course students will be able to do, demonstrate, choose, design,……..the topics covered.

Relationship between PEOs, POs and Cos





Program Educational Objectives (PEOs)are assessed a few years (3 to 5years) after Graduation.

Program Outcomes (POs) are assessed during and upon Graduation Course Outcomes (COs) are assessed upon Course Completion.

Mapping

Mapping is the process of representing preferably in matrix form, the correlation among the parameters such as PEOs, POs, COs, etc.. It may be done for one to many, many to one, and many to many parameters.

Course Outcomes (COs)-Program Outcomes (POs) Relationship Matrix (Indicate the relationships by mark "X")

P- Outcomes / C-Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
1												
2												
3												
4												
5												
6												
7												

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.TECH(CE) PROGRAM STRUCTURE

I B.TECH I SEMESTER

Group	Subject code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR17A1001	Linear Algebra and Single Variable Calculus	2	1	-	3	4	100
BS	GR17A1002	Advanced Calculus	2	1	-	3	4	100
BS	GR17A1008	Engineering Chemistry	2	1	-	3	4	100
ES	GR17A1012	Engineering Mechanics- STATICS	2	1	-	3	4	100
ES	GR17A1018	Basic Electrical Engineering	3	1	-	3	4	100
ES	GR17A1023	Engineering Graphics	1	-	2	3	5	100
HS	GR17A1024	Business Communication And soft skills	-	-	2	2	4	75
ES	GR17A1026	IT Workshop	-	-	2	2	4	75
BS	GR17A1030	Engineering Chemistry lab	-	-	2	2	4	75
		TOTAL	**12**	**5**	**8**	**25**	**37**	**825**

I B.TECH II SEMESTER

Group	Subject code	Name of subject	Credits			Total Credits	Total Hours	Total Marks
			L	T	P			
BS	GR17A1003	Transform Calculus and Fourier Series	2	1	-	3	4	100
BS	GR17A1004	Numerical Methods	2	1	-	3	4	100
HS	GR17A1005	English	2	1	-	3	4	100
BS	GR17A1006	Physics for Engineers	2	1	-	3	4	100
ES	GR17A1011	Computer Programming and data structures	2	1	-	3	4	100
ES	GR17A1020	Engineering Mechanics -DYNAMICS	2	1	-	3	4	100
ES	GR17A1025	Engineering Workshop	-	-	2	2	4	75
ES	GR17A1028	Computer Programming and Data structures Lab	-	-	2	2	4	75
BS	GR17A1029	Engineering Physics Lab	-	-	2	2	4	75
		TOTAL	**12**	**6**	**6**	**24**	**36**	**825**

II B.TECH I SEMESTER

Group	Subject Code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR17A2003	Building Materials and Construction Planning	2	1	-	3	5	100
PC	GR17A2004	Electrical Technology	2	1	-	3	4	100
PC	GR17A2005	Strength of Materials-I	3	1	-	4	5	100
PC	GR17A2006	Surveying	3	1	-	4	5	100
PC	GR17A2007	Fluid Mechanics	3	1	-	4	5	100
PC	GR17A2008	Fluid Mechanics Lab	-	-	2	2	4	75
PC	GR17A2009	Surveying Lab – I	-	-	2	2	4	75
PC	GR17A2010	Computer Aided Drafting of Building Lab	-	-	2	2	4	75
Total credits/Hours/Marks			**13**	**5**	**6**	**24**	**36**	**725**
MC	GR17A2002	Value Education and Ethics	-	-	2	0	2	100
MC	GR17A2106	Gender Sensitization Lab	-	-	2	0	2	75

II BTECH II SEMESTER

Group	Subject code	Name of subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
BS	GR17A2011	Probability and Statistics	2	1	-	3	4	100
PC	GR17A2012	Strength of Materials-II	3	1	-	4	5	100
PC	GR17A2013	Hydraulics and Hydraulic Machinery	2	1	-	3	5	100
PC	GR17A2014	Engineering Geology	3	1	-	4	5	100
PC	GR17A2015	Structural Analysis	3	1	-	4	5	100
PC	GR17A2016	Strength of Materials Lab	-	-	2	2	4	75
PC	GR17A2017	Hydraulics and Hydraulic Machinery Lab	-	-	2	2	4	75
PC	GR17A2018	Surveying Lab – II	-	-	2	2	4	75
Total credits/Hours/Marks						**25**	**36**	**725**
MC	GR17A2001	Environmental Science	-	-	2	0	2	100

III B.TECH I SEMESTER

Group	Sub-Code	Name of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR17A3001	Concrete technology	3	1		4	5	100
PC	GR17A3002	Design of Reinforced Concrete Structures	3	1		4	5	100
HS	GR17A2104	Managerial Economics and Financial Analysis	3	1		4	5	100
Open Elective 1			**3**	**1**		**4**	**4**	**100**
Professional Elective 1			**3**	**1**		**4**	**5**	**100**
PE	GR17A3004	Advanced Structural Analysis						
PE	GR17A3105	Environmental Impact assessment						
PC	GR17A3005	Concrete Technology Lab			2	2	4	75
PC	GR17A3006	Engineering Geology Lab			2	2	4	75
BS	GR17A3100	Advanced English Communication Skill Lab			2	2	4	75
PE	GR17A3004	Advanced Structural Analysis						
		TOTAL	**14**	**5**	**6**	**25**	**36**	**725**

III B.TECH II SEMESTER

Group	Sub-Code	Name of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR17A3007	Design of Steel Structures	3	1		4	5	100
PC	GR17A3102	Management Science	3	1		4	5	100
PC	GR17A3010	Geotechnical Engineering-I	3	1		4	5	100
Open Elective 2			**3**	**1**		**4**	**4**	**100**
Professional Elective 2			**3**	**1**		**4**	**5**	**100**
PE	GR17A3108	Advanced Water Resource Engineering						
PE	GR17A3011	Disaster Management and Mitigation						
PE	GR17A3012	Bridge Engineering						
PC	GR17A3013	Geotechnical Engineering Lab			2	2	4	75
PC	GR17A3014	Highway Materials Lab			2	2	4	75
PC	GR17A3101	Industry Oriented Mini Project			2	2	4	75
		Total	**14**	**5**	**6**	**25**	**36**	**725**

IV B.TECH I SEMESTER

Group	Sub-Code	Name of Subject	Credits			Total Credits	Total Hours	Total Marks
			L	T	P			
PC	GR17A4001	Geotechnical Engineering-II	3	1		4	5	100
PC	GR17A4002	Estimating & Costing	3	1		4	5	100
PC	GR17A4003	Environmental Engineering	3	1		4	5	100
Professional Elective 3			**3**	**1**		**4**	**4**	**100**
PE	GR17A4007	Finite Element Methods						
PE	GR17A4004	Ground Water Development & Management						
PE	GR17A4009	Ground Improvement Techniques						
Open Elective 3			**3**	**1**		**4**	**5**	**100**
OE	GR17A4161	Green Building Technology						
PC	GR17A4010	Irrigation Design & Drawing			2	2	4	75
PC	GR17A4011	Environmental Engineering Lab			2	2	4	75
PC	GR17A4012	Computer Applications in Structural Engineering (CASE) Lab			2	2	4	75
TOTAL			**14**	**5**	**6**	**25**	**36**	**725**

IV B.TECH II SEMESTER

Group	Sub-Code	Name of Subject	Credits			Total credits	Total Hours	Total Marks
			L	T	P			
PC	GR17A4013	Construction Technology & Project Management	2	1		3	4	100
Professional Elective 4			**3**	**1**		**4**	**5**	**100**
PE	GR17A4005	Prestressed Concrete						
PE	GR17A4015	Pavement Analysis & Design						
PE	GR17A4016	Water Shed Management						
Professional Elective 5			**3**	**1**		**4**	**5**	**100**
PE	GR17A4017	Remote Sensing & GIS						
PE	GR17A4018	Airport, Docs & Harbour Engineering						
PE	GR17A4145	Advanced Steel Structural Design						
PC	GR17A4020	GIS Lab			2	2	4	75
PC	GR17A4142	Comprehensive Viva			1	1	4	100
PC	GR17A4143	Seminar			1	1	4	100
PC	GR17A4144	Major Project			10	10	10	200
Total			8	3	**14**	**25**	**36**	**775**

Open Elective 1		Course Title	Department Offering
OE-I	GR17A3151	Water Resources Engineering	CE
	GR17A3152	Solar & Wind Energy Systems	EEE
	GR17A3153	Applied Thermodynamics	ME
	GR17A3154	Principles of E- Commerce	CSE
	GR17A3155	Data mining and Applications	IT
	GR17A3156	Computer Architecture and Organization	ECE
Open Elective 2		**Course Title**	**Department Offering**
OE-II	GR17A3161	Transportation Engineering	CE
	GR17A3162	Sensors & Transducers	EEE
	GR17A3163	Automobile Engineering	ME
	GR17A3164	Human Computer Interaction	CSE
	GR17A3165	Essentials of Big Data Analytics	IT
	GR17A3166	Principles of Operating Systems	ECE
Open Elective 3		**Course Title**	**Department Offering**
OE-III	GR17A4161	Green Building Technology	CE
	GR17A4162	Soft Computing Techniques	EEE
	GR17A4163	Operations Research	ME
	GR17A4164	Mobile Computing and Applications	CSE
	GR17A4165	Business Intelligence	IT
	GR17A4166	Principles of Satellite Communications	ECE

CO-PO MAPPINGS

GR17A2003- BUILDING MATERIALS AND CONSTRUCTION PLANNING														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Apply knowledge of science and engineering for eco-friendly construction.	H					M	H	M				M	M	
2. Recognize the methods to control cost of construction.	M					M	M	M				M		H
3. Create awareness about green building practice.	H					H	H	H				H	M	
4. Develop a team environment to analyse existing building types, develop a list of programmatic requirements, sketch a schematic design, and use this information to develop drawings and models sufficient to present a competent architectural design solution.	M					M	M	M				M	H	
5. Express the fundamental knowledge of the systems and processes used to construct the built environment, including an understanding of industry terminology.	H					H	M	M				H		H
6. Generalize the various quality control aspects of civil engineering materials.	H					H	M	H				H		H
7. Describe the properties, uses and variety of materials important in construction.	H					H	H	M				H	M	

GR17A2004- ELECTRICAL TECHNOLOGY														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Analyse circuit models for elementary electronic components.	H	M		M										M
2. Identify the application of Ohms law & Kirchhoff's laws.	H	M		M									M	
3. Familiar with ac and dc circuits solving.	H		M			M								H
4. Identify the electrical machinery in simple & complex applications.	M	H	M	M									M	
5. Demonstrate the designing and conducting experiments, to analyse and interpret data, and also provides the ability to visualize and work on laboratory and multidisciplinary tasks.	H	M		M								M	H	M
6. Measure the fundamental electrical quantities using oscilloscope.	M			M								M	M	
7. Analyse the fundamental principles of electrical machines.		M		M		M							M	M

GR17A2005 - STRENGTH OF MATERIALS-I													PSO	
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	1	2
1. Determine the stresses, strains, elastic constants such as modulus of elasticity, modulus of rigidity, Poisson's ratio and bulk density. And also to determine the strain energy for various types of loading.	H	M	M	M			M						M	M
2. Determine the shear force, bending moment diagrams and identify the point of contra flexure for different types of beams such as cantilever, simple supports and fixed beams etc. with different loading.	H		M	M			M						M	H
3. Formulate the bending equation and shear equation to calculate the bending stresses and shear stresses for the different sections of the structural members.	H		M	M			M					M		M
4. Evaluate the slope and deflection of different beams for the different end conditions and loading by using different methods such as double integration and moment area method etc.	H		M	M			M					M		M
5. Analyse the principal and tangential stresses in the different planes by using analytical and graphical methods.	H	M	M	M			M					M		
6. Utilize appropriate materials in design considering engineering properties, sustainability.	M		M	M			H					M	H	M
7. Perform engineering work in accordance with ethical and economic constraints related to the design of structures.	H		M	M			M	M		M	M		M	M

GR17A2006- SURVEYING													PSO	
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	1	2
1. Interpret a plan and setting out the frame work in the field		M			H			H	M		H	H		H
2. Function as a member of a survey party in completing the assigned field work	M	H				M	M							
3. Illustrate the need for licensed surveyors to establish positioning information for property and structures			M	H				M	H	M				
4. Illustrate the need for accurate and thorough note taking in field work to serve as a legal record	M		H	M		M				M	M	H	M	M
5. Classify the difference between plane surveying and geodetic surveying			M	M		M				M				
6. Utilize vertical angle measurement devices to solve complex distance measurements.	M	H		M				M		M		M		

7. Apply advanced survey software tools like G.P.S Q-GIS and arch-GIS	M			M		M				M		M	H	H

GR17A2007- FLUID MECHANICS														
COs/POs	**a**	**B**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Comprehend the various fluid properties and fluid path lines.	M	H	M	M					M		M		M	
2. Analyse the concept of hydrostatic forces on Inclined, Horizontal and curved planes	M	M	H	H					M		H			M
3. Identify the path line, stream line and streak line, uniform and various types of flows.	M	H	M	M					M		H		M	
4. Compute Boundary Layer thickness and Drag and lift forces.	M	H	M	M					M		H			
5. Distinguish Laminar and Turbulent flows in pipes and calculate the shear and velocity values.	M	H	M	M					M		H		M	
6. Estimate the major and minor head losses in pipe flows	M	H	M	M					M		H		M	M
7. Predict the different discharge measurement using irrigation and water resources fields.	H	M	M	M					M		H		M	M

GR17A2008- FLUID MECHANICS LAB														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Estimate the coefficient of discharge through venturimeter, orifice meter.	M	H		M					M		H		M	
2. Distinguish between losses of head due to contraction and enlargement.	H		M				M				M			M
3. Predict the major losses in pipes.	H		M				M				M		M	
4. Differentiate the laminar, turbulent and transitional flows.	H	M	M				M				M			
5. Calculate the discharge through orifice, mouthpiece and weirs.	H		M				M				M		M	
6. Estimate the energy heads.	H	M	M				M				M		M	M

7. Apply knowledge in Irrigation and water distribution systems.	H	M	M				M		M		M		M	M

GR17A2009- SURVEYING LAB-I														
COs/POs	**a**	**B**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Define the characteristics and applications of basic survey instruments.	M	H		H			H	M	H		H	M		
2. Generalise the methods of obtaining geographical information.	H	H		H	M			M	M			H		M
3. Apply knowledge of mathematics, science and engineering in land measurement techniques.	H	H			M		M	H	M			H	M	
4. Calculate distances, inclinations, elevations, areas and volumes.	H	M					M					H		
5. Generate maps of earth surfaces		M				H			H			H	M	M
6. Analyse data from existing maps and transfer relevant points onto ground.	M	H				M	H	M		M		M	H	H
7. Evaluate the compatibility of instruments.	M	M	H					M	H	H	M	M		

GR17A2010- CAD LAB														
COs/POs	**a**	**B**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Comprehend the fundamentals of Building Drawings.	M	H			H		M	H		M	H	H	H	M
2. Analyse the Concept of Design Problems with Field Orientation.	M	H	M		H					H		M	H	M
3. Demonstrate common drafting techniques and shortcuts used by professionals.	M	H			H		H			M	M	H		
4. Demonstrates a readiness to take action to perform the task or objective in field.	M		H		H			M	H		M	H		
5. Compare different values, and resolve conflicts between them to form an internally consistent system of values in Drawings.	M		H		H		H		M	H	H	H		
6. Adopts a long-term value system that is "pervasive, consistent, and predictable" throughout the Draftsman's Career.	M	H			H		M	H		M	H	H	H	M

7. Apply full-scale CAD software system for geometric modelling.	M	H	M		H					H		M	H	M

GR17A2002- VALUE EDUCATION AND ETHICS

COs/POs	a	B	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 1
1. Choose the right value system by self-analysis and right understanding								H	H			H		
2. Make use of positive thinking, dignity of labour for building harmony and peace in self, family and society								H	H			H		
3. Analysing the importance of personality on effective behaviour								H	H			H		M
4. Identify and solve ethical dilemmas by finding value based and sustainable solutions in professional life.								H	H			H	H	M
5. Find sustainable technological solutions for saving environment								H	H			H	H	M
6. Compile value and ethical systems for continuous happiness and prosperity								H	H			H		
7. Take part in effective team work bringing out win-win solutions for complex problems								H	H			H	M	M

GR17A2106- GENDER SENSITIZATION

COs/POs	a	B	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 1
1. Students will have developed a better understanding of important issues related to gender in contemporary India.								H	M			H		
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.								H	M			H	M	
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.								H	M			H		M
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.								H	M			H		
5. Men and women students and professionals will be better equipped to work and live together as equals.								H	M			H	M	

6. Students will develop a sense of appreciation of women in all walks of life.								H	M			H		
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.								H	M			H	M	

GR17A2011- PROBABILITY AND STATISTICS

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1. Estimate the chance of occurrence of various uncertain events in different random experiments with strong basics of probability.	H	H		M								M		
2. Evaluate random processes which occur in engineering applications governed by the Binomial, Poisson, Exponential, Normal and Uniform distributions.	H	H		M		M				M		M	M	
3. Apply various sampling techniques.	H	M	M	M		M				M		M		M
4. Forecast the models using Regression Analysis.	H	M		M		M						M		
5. Estimate the system performance measures in different queuing processes.	H	M		H					M			M	M	M
6. Apply Inferential Statistics to make predictions or judgments about the population from which the sample data is drawn.	H	H		M								M	M	
7. Develop models for Stochastic Processes.	H	H		H								M		M

GR17A2012- STRENGTH OF MATERIALS-II

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1. Define stresses in thin and thick cylinders under pressure, show stress distribution diagrams.	H	M		H										M
2. List the various stresses in cylinders and define Lame's theorems	H	M	H											M
3. Differentiate between closed and open coiled helical springs			H						H				M	
4. Evaluate the buckling/failure load for axially loaded and eccentrically loaded columns.				H									M	

5. Identify function of slenderness ratio in axially loaded columns.		H	H										M	
6. Explain the effect of equivalent length in long columns for various end conditions.		H											M	
7. Analyse the torsional strength of structural members.		H										H	M	

GR17A2013- HYDRAULICS AND HYRAULIC MACHINERY														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Express the properties of different types of channel flows and types of channel sections.	M	H					H	H	M	M	M	M	M	
2. Identify the efficient channel geometrical section	M	H					H	H	M	M	M	M	M	
3. Compute the specific energy and hydraulic jump energy losses in open channel flow.	M	H					H	H	M	M	M	M		M
4. Analyse the dimensions of models and prototypes of irrigation structure and force of Jet.	M	H	M	H			H	H	M	M	M			M
5. Estimate the efficiency, heads and design of Pelton wheel, Francis and Kaplan turbine.	H	M	H	H			M	M	M	M			M	
6. Compute the efficiency, heads and design of centrifugal pumps.	M	H	M	H				M	H	M	M			M
7. Calculate the capacity of pumps connecting in parallel and series and types of hydropower plants.	M	M	H	H			H	H	M	M				

GR17A2014- ENGINEERING GEOLOGY														
COs/POs	**a**	**B**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Recognize the importance of geology from civil Engineering point of view.	H	M	M			M	H	M	H		M	M	M	
2. Identify the physical properties of minerals and their role in common rock forming minerals.	H	M	M	M		M			M	M		M		H
3. Distinguish the features of igneous, sedimentary and metamorphic rocks.	H	M	M	M		M				M		M	M	
4. Distinguish various geological structures.		M		M		M	H	M	H		M		M	

5. Analyse the failures of dams, reservoirs and tunnels due to geological reasons.	H			M		M			H	M	H	M		M
6. Indicate importance of ground water, earthquakes and landslides.	H		M		M	M		H				M		
7. Discuss about the rocks, minerals and geological structures from Civil Engineering point of view.	H	M	M	M		M			H	M		M		

GR17A2015- STRUCTURAL ANALYSIS

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1. Determine deflections of beams and trusses using energy methods.	H	M	M	H			M		M	M	M	M		
2. Analyse three and two hinged, circular and parabolic arches.	H	H	H	H			M	M	M	H	M	M	M	H
3. Analyse indeterminate beams of 1st degree statical indeterminacy using force method for Propped cantilever beams.	H	H	H	M		M	M	M	M	H	M	M		M
4. Analyse 2nd and 3rd degree statically indeterminate beams using Clappeyorn's three moment theorem.	H	H	H	M		M	M	M	M	H	M	M		M
5. Apply Slope deflection, Moment distribution and Kani's methods to analyse statically indeterminate structures.	H	H	H	H		M	H	H	H	M	M	M		M
6. Analyse statically determinate and indeterminate structures using rolling load method.	H	H	H	H		M	H	H	H	M	M	M	M	M
7. Analyse statically determinate and indeterminate structures using influence line method.	H	H	H	H		M	M	M	M	H	M	H	M	M

GR17A2016- STRENGTH OF MATERIALS LAB

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1. Determine the important mechanical properties of materials	H	M	H	M						M	M	M	M	M
2. Identify the stiffness of an elastic isotropic material	H			M					M					
3. Evaluate the Reciprocal theorem	H			M										
4. Measure any substance's resistance to uniform compression.	M		M	M			M							

5. Determine the resistance of various materials against abrasion.	M			M									M	
6. Assess the quality of materials	H												M	H
7. Identify the resistance of materials against impact loads	M			M										

GR17A2017- HYDRAULICS AND HYDRAULIC MACHINERY LAB														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Calculate the impact factor and force exerted on flat and curved vanes	H	M	M	H			M		M	M	M	M	M	
2. Determine the efficiency of Pelton wheel turbine	H	H	H	H			M	M	M	H	M	M		M
3. Predict the efficiency of Francis turbine	H	H	H	M		M				H	M	M		M
4. Compute the efficiency of centrifugal pumps	H	H	H	M		M	M	M	M	H	M	M		
5. Compute the efficiency of reciprocating pumps	H	H	H	H		M	H	H				M		M
6. Estimate the input and output efficiency of hydraulic turbine	H	H	H	H		M	H	H	H	M	M	M	M	
7. Compute the energy dissipation in open channel flows	H	H	H	H					M	H	M	H	M	

GR17A2018- SURVEYING LAB-II														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Define the characteristics and applications of modern survey equipment.		H		H								M		
2. Generalise the advanced methods of obtaining geographical information.	H	M		H	M							H		M
3. Apply knowledge of mathematics, science and engineering in land measurement techniques.	H	H			M				M			H	M	
4. Calculate distances, inclinations, elevations, areas and volumes using Theodolite & Total station.	H	M					M					H		
5. Generate maps of earth surfaces.		M				M			H			H	M	M
6. Analyse data from existing maps and transfer relevant points onto ground.	M	H								M			H	H

7. Evaluate the compatibility of instrument.					H									

GR17A2001- ENVIRONMENTAL SCIENCE														
COs/POs	**a**	**B**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**1**
1. Assess an importance of environment, its purpose, design and perspectives.	H	M	H	M						M	M	M		
2. Environmental issues related to the exploitation of natural resources and development of the mankind.	H			M					M				M	
3. Role of professionals in protecting the environment from degradation.	H			M					H			H		
4. The solutions for environmental problems created by local, national and global developmental activities.	M		M	M			M		M				M	
5. Critically evaluate literature on environmental problems.	M			M					H					
6. Develop relevant research questions for environmental investigation.	H											M		

GR17A3001- CONCRETE TECHNOLOGY														
COs/POs	**a**	**B**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**PSO**	
													1	**2**
1. Classification of grades of cement, the types of cement and the types of different admixtures.	H	M			M	M		M					M	H
2. Classification and the physical properties of aggregates.		H			M	M		M						
3. Differentiate the physical properties of fresh and hardened concrete and also about the manufacturing of concrete.		H	M			M		M					M	
4. Estimate the creep and shrinkage of concrete and how to conduct the different tests such as compression and tension etc. on hardened concrete.	H	M			M	M								
5. Design the mix proportions for the specific work for required strength and workability with available materials at work place.	M	M	H									M		M

6. Distinguish the special concretes like Self compacting concrete, Fibre reinforced concrete, Polymer concrete and light weight concrete etc.			H	M		M			M			M	M	H
7. Research on how to develop high strength and high-performance concrete.	M	H	M		M	M						M	M	H

GR17A3002- DESIGN OF REINFORCED CONCRETE STRUCTURES

COs/POs	a	B	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1. Create awareness in Limit state design in Design of Reinforced Concrete Structures.	H		M	M				M				M		M
2. Analyse and design beams.	M	H	M									M	M	M
3. Design one way and two way slabs.	H	M	M	M								M	M	M
4. Design stairs and canopy.	M	M	H				M	M				M	M	M
5. Design short and long columns.	M	M	H				M	M				M	M	M
6. Design different types of footings.		M	H				M	M				M	M	M
7. Design beams and slabs for Limit state of serviceability.		M	H				M	M				M	M	M

GR17A2104- MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1. Scan the economic environment.	M	M		M		H	M		H	M	H	M	M	
2. Examine markets and competition.	M					M	M		M	M	M		M	
3. Forecast the demand.	H						M		M					
4. Plan the operations and the production.	M		M					M	M					

5. Select the appropriate form of organization.			M						M		M		M	
6. Prediction of the cost and decide the price of the products and/or services produced.		M		M				M	H	M	M			
7. Create awareness in the financial statements and make financial analysis.				M		M				M				

GR17A3151- WATER RESOURCES ENGINEERING

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1. Estimate and process rainfall data, runoff data, evaporation data, evapotranspiration data and infiltration data.	H	M									M			
2. Design a model in a region, direct runoff hydrograph, unit hydrograph, S-Curve hydrograph and synthetic unit hydrograph.	H	M				M		H			M		M	
3. Calculate the discharge of radial flow to wells in a region of confined and unconfined aquifers by determining the aquifer parameters by field tests and pumping tests.	H	M	M			M		M		M			M	
4. Design a suitable irrigation method depending on soil, water and plant conditions on the field.	H	M		M				M		M				M
5. Present irrigation schedules and irrigation efficiencies for farmers on the field.	M	M	M							M				
6. Design irrigation canals by Kennedy's theory, Lacey's theory and IS standards.	H	H	H	H		H	M	M			M	M	M	
7. Estimate design discharge by SCS Curve Number Method and analyse the regional flood frequency, Measure and estimate stream flow by methods of stream gauging in a watershed.	H	H	H				M	M	M	M		H		M

GR17A3004- ADVANCED STRUCTURAL ANALYSIS

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Evaluate the degree of static and kinematic indeterminacies of structures such as beams, truss and frames and	H		M	M				M				M		

apply Castigliano's theorems for the analysis.														
2. Analyse indeterminate continuous beams and simple frames using Slope deflection, Moment distribution and Kani's methods of analysis.	M	H	M									M		
3. Apply Slope deflection, Moment distribution and Kani's methods of analysis to Gable frames and to Portal frames with sway.	H	M	M	M								M		
4. Analyse the beams, trusses and frames using stiffness matrix method.	M	M	H				M	M				M	M	
5. Analyse the beams, trusses and frames using flexibility matrix method.	M	M	H				M	M				M	M	
6. Estimate the collapse load and plastic moment capacity of beams, trusses and frames.		M	H				M	M				M	M	
7. Apply approximate methods of analysis to various frames subjected to vertical and horizontal loads.		M	H				M	M				M		

GR17A3105- ENVORONMENTAL IMPACT ASSESSMENT

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Identify elements of community and environment likely to be affected by the proposed developments.	M	H	M	M	M	M	M	M	H	H	H	M	M	
2. Identify the negative impacts and propose the provision of infrastructure or mitigation measures.	H	M	M	M	H	H	M	M	H	H	M	M		M
3. Develop current EIA methods and the techniques.	H	M	M	M	M	M	H	M	H	M	H	M	M	
4. Develop current assessment methods, environmental monitoring systems and legislation.	H	M	H	M	H	M	M	H	H	M	M	M		H
5. Assess process of environmental impact modelling and prediction as a design tool.	H	M	H	M	M	H	M	H	M	H	M	M	M	
6. Interact with experts of other fields to assess the impact.	H	M	H	M	H	M	M	H	H	M	M	M		H
7. Present EIA report in a way understandable by everyone.	H	H	H	M	M	H	M	H	M	H	M	M		M

GR17A3005- CONCRETE TECHNOLOGY LAB

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS

													1	2
1. Identify the suitable materials used for concrete for particular purpose.	H		M	H							M	H	M	H
2. Gauge the quality control of concrete.	H		M	H							M	H	M	
3. Identify the main laboratory tests relevant to the use of concrete on site.	H	H	H	H							M	H		
4. Recognise the theoretical concepts learned in the courses concrete technology and building materials and construction planning.	H	H		H		H					M	H		
5. Design normal concrete mixes.	H	H	H	H							M	H		M
6. Analyse properties of different materials used for the construction.	H	H	H	H		H					M	H	M	M
7. Interpret the properties in tern to design or invent the new materials.	H	H	H	H							M	H	H	H

GR17A3006- ENGINEERING GEOLOGY LAB

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Identify various minerals and their properties.		M	M	H			M			M		M		H
2. Identify various rocks and their properties.		H	M				M			M				H
3. Assess various rocks and minerals used in the industries.		M	H			M			H		M			H
4. Identify and interpret various maps of geological structures like faults, folds, beds and unconformities.		M	H			M	H				H		M	
5. Resolve simple structural geological problems.		H	M		M	M							M	
6. Analyse the importance of geological structure for any constructions.		H	M		M			M		M				
7. Demonstrate the effect of water tables under any civil engineering structures.		H		M	M				M	M				

GR17A3007- DESIGN OF STEEL STRUCTURES

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2

1. Identify various types of structural steel and its properties. Also, able to define concepts of LSD.	H	M	M							M			M	M
2. Classify and design various types of connections.	M	H					M					M	M	M
3. Design tension members for the given loads.	M	H		H									M	M
4. Design compression members for the given loads and moments.		H	M		`		M					M	M	M
5. Design the steel beams and eccentric connections for the given loads and moments.		M	H				M					M	M	M
6. Design the eccentric connections for the given loads and moments.	M			M	M						M	H	M	M
7. Analyse structures using plastic method of analysis and evaluate collapse load and plastic moment capacity.			H	M		M	M			M			M	M

GR17A3102- MANAGEMENT SCIENCE

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Apply the basic concepts, theories and approaches relating to management, organization, and leadership.	M	M	M							M				
2. Apply principles of operations, statistical quality control and inventory control necessary for better managing production.	M	M					M					M		
3. Assess the fundamentals necessary for understanding marketing management.	M	M		M										
4. Identify certain concepts and important functions of personnel management and industrial relations.		M	M				M					M		M
5. Anticipate tools and techniques of Project Management.		M	M				M					M		
6. Apply Strategic Management and Contemporary Strategic Issues.	M			M		M					M	M		
7. Analyse certain latest concepts like MIS, End User Computing, MRP, JIT, TQM, Six Sigma and CMM, SCM, ERP, PM, BPO, Business Process Re-engineering and Bench Marking, Balanced Score Card.			M	M		M	M			M				

GR17A3010- GEOTECHNICAL ENGINEERING-1														
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Identify basic Engineering properties of soil and relate them with Civil Engineering practices.	H	M	M							M				M
2. Evaluate various experiments to determine the geotechnical properties of soil.	M	H					M					M		
3. Identify, formulate and solve various problems in geotechnical engineering.	M	H		H										
4. Analyse the mechanism and behaviour of soil under various field situations		H	M				M					M		M
5. Identify field equipment used in improving soil properties.		M	H				M					M		
6. Assess importance of extensive research in geotechnical engineering.	M			M		M					M	H		M
7. Analyse soil mechanics for development of construction sites both technically and economically.			H	M		M	M			M				

GR17A3161- TRANSPORTATION ENGINEERING														
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Apply basic principles of physics in estimating stopping and overtaking sight distance requirements		M			H			H	M		H	H		
2. Analyse the factors influencing road vehicle performance, characteristics and design.	M	H				M	M						M	
3. Review the level of service for selected road segments.			M	H				M	H	M				
4. Organize the basic traffic signal phasing and timing plan.	M		H	M		M				M	M	H		M
5. Compute the geometric features of road like horizontal and vertical alignment.			M	M		M				M				
6. Illustrate the basic traffic stream parameters and models, traffic flow models, and queuing theory.	M	H		M				M		M		M	M	
7. Demonstrate the systematic approach where the interaction of humans and the vehicles and their impact on the society and transportation.	M			M		M				M		M	M	

GR17A3108- ADVANCED WATER RESOURCES ENGINEERING														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Estimate and calculate the inflow, outflows from the reservoir as well its capacity by using mass curve techniques.	M	M	H						H					
2. Design and analyse the different types and components of various dams pertaining to corresponding boundary conditions.	M	H	M		M									H
3. Interpret performance, safety and stability of the gravity dam.	M	M	H		M								H	
4. Calculate flow through the earthen dams and also corresponding remedial measures to prevent more seepage through dams, various irrigation structures.		M	H					H	H	M				
5. Design various diversion head works by using Bligh's and Khosla's theory.		M	H	M	M					M	M			H
6. Assess the efficiency of performance of any component of hydraulic structure like a weir, barrage, CD work, etc.	H											H		
7. Indicate different types of irrigation structures along with their designs and analysis by using different evaluation methods.			M	M				M						H

GR17A3011- DISASTER MANAGEMENT AND MITIGATION														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Acquire knowledge of types of disaster, and their impacts on environment and on human development.	M	H	H	M	H	M		M	H	H		M	H	
2. Recognize difference between endogenous and exogenous hazards and causes and their impacts.	H	M	H	M	H	M		M	H	H		M		H
3. Interpret the causes for floods and droughts, their impacts.	H		H	M	H	M		M	H	H		M	M	
4. Awareness on emerging approaches in disaster management in preparedness, emergency stage and post disaster stage.	H	M	H	M	H	M		M	H	H		M	M	
5. Apply approach for disaster preparedness mitigation & awareness and council available nationally and internationally.	H	M	H	M	H	M		M	H	H		M	M	
6. Analyse the use of latest technologies used in disaster management & mitigation and awareness.	H	M	H	M	H	M		M	H	H		M		M

7. Analysis on various research programs done.	H	M	H	M		M		M	H	H	H	M	M	

GR17A3012- ADVANCED REINFORCED CONCRETE STRUCTURAL DESIGN														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Design the cantilever type and counter fort retaining wall.	H	H	H	M		M		M				M	M	M
2. Design ground level water tanks.	H	M	H	M		M		M				M	M	M
3. Design overhead water tanks.	H	M	H	M		M		M				M	M	M
4. Design bridges.	H	M	H	M		M		M				M	M	M
5. Design flat slabs.	H	M	H	M		M		M				M	M	M
6. Design Bunkers.	H	M	H	M		M		M				M	M	M
7. Design Silos.	H	M	H	M		M		M				M	M	M

GR17A3013- GEOTECHNICAL ENGINEERING LAB														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Classify the soils and its basic properties.	H	H		M						M		H		
2. Analyse soil behaviour and its mechanism.	M	H		H								M		
3. Determine basic properties of soil in simple and complex applications.	M			M				M				H		H
4. Develop a proficiency in handling experimental data.	H	M						H	M	M				M
5. Report the results of a laboratory experiment at a professional standard.	H	M						H	M	M		M		H
6. Analyse data for real time applications.	M	H		M								M	M	M
7. Recommend extensive research in geotechnical properties.	H	H		H				M	M	M		M	M	H

GR17A3014- HIGHWAY MATERIALS LAB														
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Estimate desired characteristics of aggregates.	M	M		M		M		H						M
2. Distinguish suitable materials for road construction.		M	M	H										M
3. Categorize pavement materials by their physical and mechanical properties.				H					M					
4. Demonstrate various experiments on bitumen to measure its properties.	M	H	M										M	
5. Design bituminous mixes as per pavement requirements.	M	H		M					M					M
6. Evaluate mixes for their strength and deformation characteristics.	H			M		M					M			
7. Calibrate the optimum binder content for the construction of pavement surfaces in flexible pavements.	H	M		M										M

GR17A3101-Industry Oriented Mini Project														
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Work in a team.	H	H			M						M			
2. Analyze, design and implement a real time problem.		H	M		M					H	M	H	M	
3. Understand the various phases involved in developing a product.	H				M						M	H		M
4. Express/ interpret their views with out hesitation	H	H	M		M				M			M		
5. Produce the project in product based form.	H	M	M		M	M						M		H
6. Lose their stage fear and develop self - confidence	H		M	M		M	M	H			H			M
7. Present the project orally and in written report.	H	M			M							H		M

GR17A4001- GEOTECHNICAL ENGINEERING-II														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Identify the various soil exploration techniques and interpret the resulting soil profiles.	M	H		M					M					
2. Assess the slope stability and design of earth retaining walls.	M	H		M		M								M
3. Compute earth pressures and stability of retaining walls.	M	H		M		M				M				
4. Apply bearing capacity equations for shallow and deep foundations and to evaluate rate of settlement	H	M		M			M							M
5. Identify and solve foundation related engineering problems.	M	H		M		M								
6. Estimate pile and pile group capacity for soils.	H	M		M								M		
7. Recognize the shapes and components of well foundations.	M						M					M		

GR17A4002- ESTIMATING & COSTING														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Calculate the quantities of different items in a building.	H	M	H	H	H	M	M	H	H	H	H	M		
2. Estimate the quantities of materials required for different types of roads and structures.	H	M	H	H	H	M	M	H	H	H	H	M		M
3. Handle the tendering process for executing any civil engineering work.	M	M	M	M	M	M	M	M	M	M	M	M	M	
4. Assess the value of any property.	M	M	M	M	M	M	M	M	M	M	M	M	M	M
5. Recognize the process and importance of cost estimation, cost budgeting and cost control.	H	M	H	H	M	M	H	H	H	H	H	M	M	M
6. Estimate the rate per unit of any item of work.	H	M	H	H	H	M	M	H	H	H	H	M		
7. Interpret the process and importance of valuation of buildings and other structures.	M	M	M	M	M	M	M	M	M	M	M	M	M	

GR17A4003- ENVIRONMENTAL ENGINEERING														
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Design and implement a drinking water supply system for a residential community.	M			M					M				H	M
2. Identify the cause of outbreak of epidemics and eradicate.	M	H		M		M							H	M
3. Establish drinking water supply and waste water collection system for a town.	M	H				M				M		M	H	M
4. Identify safe disposal methods for wastewater.	H	M		M			M					M	M	
5. Design suitable treatment for wastewater.	M	H		M		M							H	M
6. Identify suitable sources of water for a public water supply system.	H	M		M								M	M	M
7. Design of biological treatment of tickling filters.	M						M					M	M	M

GR17A4007- FINITE ELEMENT METHODS														
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS	
													1	2
1. Identify mathematical model for solution of common engineering problems.	H	H			H		M			H		M	M	
2. Formulate shape functions and stiffness matrix for 1D element.	H	H			H	H	H	M	M	H				
3. Formulate shape function and stiffness matrix for 2D CST elements	M	M			H	H	M	M			H			
4. Evaluate shape functions for 4 noded, 8 noded iso-parametric elements also with help of Lagrangian and Serendipity concept.	M		M	M	H	H		H	H	H	H	M		

5. Evaluate shape functions for 4 noded, 8 noded with help of Lagrangian and Serendipity concept.	H	M	H	H	H		H	H	M	M		H		
6. Evaluate stress and strain for axi-symmetric elements.	H	M	H	H	H	M		H	M			H		
7. Formulate the methodology for the numerical integration with different solutions technique.	H	M	H	H	H		H	H					M	M

GR17A4004- GROUND WATER DEVELOPMENT & MANAGEMENT

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Enumerate the porosity, specific yield and specific retention of aquifer.	H		M					M				M	M	
2. Calculate the storage coefficient and transmissivity of aquifers and to derive differential equation governing groundwater flow in three dimensions in Cartesian and Polar coordinates.	H	M	M									M	M	M
3. Analyse the pumping test data in steady and unsteady groundwater flow towards a well in confined and unconfined aquifers using Dupuit's and Theim's equations.	H	M	M				M	M			M	M	M	M
4. Appraise surface and subsurface methods of exploration of investigation of groundwater.	H	M	M									M		H
5. Assess the methods of recharge of groundwater using GIS and remote sensing.	H	M	M									M	H	H
6. Compile dynamics of saline water intrusion and to manage the groundwater basin.	H	M	M	M								M		M
7. Synthesize the overall concepts and procedures necessary for the development and management of ground water resources.	H	M	M	M			M		M				M	

GR17A4009- GROUND IMPROVEMENT TECHNIQUES

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Identify dewatering technique for the field related problems.	H		M									M	H	H
2. Discuss grouting methods in civil engineering applications.	M	H		M								M	M	
3. Assess the field problems related to problematic soils by adopting various ground improvement techniques.	M	H		M								M	H	H

4. Differentiate reinforced earth retaining structures.	M	H		M								M	M	M
5. Classify various techniques for stabilization more technically and economically by using geotextiles.	M	H		M									M	
6. Recognize the suitability and practicability required for various ground improvement methods.	M	H		M								M	H	
7. Analyse the importance of extensive research in various ground improvement techniques.	M			M		M	M			M		M	H	H

GR17A4161- GREEN BUILDING TECHNOLOGY

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Apply principles, history, environmental and economic impacts of green building technology and to identify the criteria for rating systems along with the established Indian codes and guidelines.	M		M	M		H	H	H		H		H	H	
2. Identify various Renewable and Non-renewable sources of energy along with their carbon foot prints and also comprehend the techniques and benefits of building performance testing such as building modelling and energy analysis, monitoring and metering.	M				H	H	H	H		M		M	M	M
3. Recognize the energy efficient green building materials and explain the cost effective Building Technologies, Strategies for Green Building Systems and Energy Conservation Measures.	H	H		M		H	H		M	M		M	H	H
4. Identify and compare cost and performance of building materials with recycled components, non-petroleum based materials, materials with low volatile organic compounds, materials with low embodied energy and salvaged materials and incorporate them into design.	M		H	M		H	H	M	H			H		H
5. Explain the application of design guidelines of Green Building considering the Energy Conservation Measures.			M	M		H	H		M	H		H		H

6. Perform cost/benefit analysis and life-cycle analysis of green buildings.	H	M		M					M	M	H	H		M
7. Summarize on the building codes, relevant legislation governing the consumption of resources and emission of environmental pollutants by buildings and be familiar with IGBC green building certification procedure.				H		H	H	M	H	H	H	H	M	

GR17A4010- IRRIGATION DESIGN & DRAWING LAB														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Identify the importance of various irrigation & Hydraulic structures.	H	H			H		M			H		M	M	
2. Determine the applicability of various structures to be proposed at the site.	H	H			H	H	H	M	M	H				M
3. Calculate the various components of hydraulic structures for the given data.	M	M			H	H	M	M			H		M	
4. Design hydraulic structures at any scale.	M		M	M	H	H		H	H	H	H	M	M	M
5. Analyse the various hydraulic structures like Canal regulator, under tunnel etc.	H	M	H	H	H		H	H	M	M		H	M	
6. Design and draw the hydraulic structures using Q-CAD tool.	H	M	H	H	H	M		H	M			H		M
7. Evaluate different types of hydraulic structures, their design and drawings using various drafting tools.	H	M	H	H	H		H	H					M	

GR17A4011- ENVIRONMENTAL ENGINEERING LAB														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Identify various skills in low cost water treatment methods.	H	H		M						M		H		
2. Describe the physical, chemical and biological parameters of water and their importance.	M	H		H								M		

3. Anticipate the social responsibility to eradicate water borne diseases.	M			M				M				H	M	H
4. Recognize the methods to control environmental pollution.	H	M						H	M	M			M	
5. Recognize the effect of the pollutants on the environment: atmosphere, water and soil.	H	M						H	M	M		M	M	H
6. Create a plan strategies to control, reduce and monitor pollution.	M	H		M			M						M	
7. Generalize the various quality control aspects of industrial effluents by performing the different lab tests.	H	H		H			M	M	M					M

GR17A4012- COMPUTER APPLICATIONS IN STRUCTURAL ENGINEERING (CASE) LAB

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Analyse and Design the various types of Beams for the different loads.	M	H	H		M						H	H		
2. Analyse and Design a 2D frame of Multi-Storied Building.	M	H	H		M						H	H		
3. Analyse and Design a 3D frame of Multi-Storied Building.	M	H	H		M						H	H	H	M
4. Analyse and Design a RCC Over Head tank.	M	H	H		M						H	H	H	M
5. Analyse and Design the different types of Steel Trusses.	M	H	H		M						H	H	H	M
6. Analyse and Design a Steel Tower with arms on both sides.	M	H	H		M						H	H		
7. Analyse and Design a Steel Deck Bridge.	M	H	H		M						H	H	H	M

GR17A4013- CONSTRUCTION TECHNOLOGY & PROECT MANAGEMENT

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Discuss various construction schedules to manage a construction project.						M	M	M			M			
2. Summarize different construction methods and its application based on the field requirements.						M	M	M				M		H

3. Identify various construction equipment used in the construction site.						M	M	M			M		M	
4. Apply probability, statistics, and decision analysis in project planning, quality systems and safety management of construction activity.						M	M	M		M			M	M
5. Prepare Cost Estimates and documentation for various types of constructions.						M	M	M			M			
6. Associate in Contracting, tendering and Bidding in constructions.	M	M		M	M				M			M		
7. Practice Construction Law and Arbitration.						M	M	M	M				M	

GR17A4005- PRESTRESSED CONCRETE

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Examine the transfer and development length as well as pre-stress losses.	M	H		H			M					M		
2. Demonstrate the design calculations to predict service behaviour of pre-stressed concrete structures, accounting for the time-dependent effects of concrete creep and shrinkage.	H	H	H	H		M					M	H	M	M
3. Design for ultimate strength of pre-stressed concrete structures.	H		H	H								H	M	M
4. Illustrate the pre-stressed concrete structures to satisfy relevant Design Standards.	H	H		H		M	M					H		
5. Evaluate the pre-stressed concrete fabrication and construction process.	H	H	H	H		M	H					H	M	M
6. Demonstrate the pre-stressed concrete models and sections in complex applications that can handle social and global needs.	H	H		H		H					M	H	H	M
7. Attain the overall knowledge of pre-stressed concrete structures.	M			M		H	M				M	H	M	M

GR17A4015- PAVEMENT ANALYSIS & DESIGN

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2

1. Illustrate highway design methods, constraints and controlling factors.		M	H			H							M	
2. Design pavements using road software tools.			H	M				M			M			H
3. Apply the design standards in designing principal elements of the highway.			H		H				M					
4. Acquire necessary information like volume and axle load data to design flexible and rigid pavements.		M		H							M			
5. Predict the resource constraints and utilize the available materials in a sustainable way.			H			M			M	M			H	
6. Examine the basic parameter of traffic engineering and the methods which help to estimate those parameters.	M	M		H										M
7. Recognize the major failure modes of flexible and rigid pavement and helps in maintaining them properly.				H			M				M			M

GR17A4016- WATER SHED MANAGEMENT

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Examine and recommend principles for protection, management, and monitoring watersheds.	H	H		M								H	H	
2. Measure, monitor, and assess watershed health in other regional streams.	H											H	M	M
3. Demonstrate and develop suitable restoration work plans.	H	H	M	H					M			H		
4. Illustrate broad-based theories and applications in the watershed management field to solve problems and address issues in the profession.	H	H	M	M					M			H		
5. Evaluate the sediment delivery risk level for erosion problem areas.	H		H	M		M			H			H		
6. Explain the physical and biological processes of watersheds.	H			H		H		H		H		H	M	H
7. Compare different types of the management systems.	H	H	M	H		H			H			H	H	M

GR17A4017- REMOTE SENSING & GIS

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2

1. Describe the fundamental concepts of Geographic Information Science and Technology.	H			H		H		H		H		H		
2. Demonstrate proficiency in the basic functions of geospatial software.		H			M			M						M
3. Apply fundamentals of remote sensing and spatial analysis techniques.	H		H		M		H			M				
4. Map creation and design principles, including thematic map display, employment of map projections, and cartographic design.		H			M				M					M
5. Create and acquisition of spatial data.			H			M			M					
6. Recognize the topo maps prepared by survey of India.	H			H			M			M				
7. Overlay different maps in GIS.	H			H		H		H		H		H		

GR17A4018- AIRPORTS, DOCKS & HARBOUR ENGINEERING														
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**	
													1	**2**
1. Identify the components of aircraft.	H			H		H		H		H		H		
2. Compare various alternative structures of docks and airports.		H						M					M	M
3. Interpret planning and design principles of some of the components of waterway and airway transportation.	H		H				H			M			M	
4. Describe different imaginary surfaces in airport.		H							M					
5. Analyse the characteristics of Aircraft.			H			M			M					
6. Record and reproduce of data to draw wind rose diagrams.	H			H			M			M				
7. Evaluate the length of runway based on different design parameters.	H			H		H		H		H		H		M

GR17A4145- ADVANCED STEEL STRUCTURAL DESIGN													
COs/POs	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**POS**

													1	2
1. Design the purlins.	M	H		H			M					M	M	M
2. Design roof trusses.	H	H	H	H		M					M	H	M	M
3. Design Plate Girder.	H		H	H								H	M	M
4. Design Steel bridges.	H	H		H		M	M					H	M	M
5. Design Steel Rectangular Water tanks.	H	H	H	H		M	H					H	M	M
6. Design Steel Cylindrical Water tanks.	H	H		H		H					M	H	M	M
7. Design Gantry Girder.	M			M		H	M				M	H	M	M

GR17A4020- GIS LAB

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Demonstration in geo-referencing and digitization with toposheets.	M	H			M			M						
2. Demonstrate proficiency in the basic functions of geospatial software.	H		H		M		H			M				M
3. Create awareness fundamental remote sensing and spatial analysis techniques.		H			M				M					
4. Evaluate basic proficiency in map creation and design principles, including thematic map display, employment of map projections, and cartographic design.			H			M			M					H
5. Analyse proficiency in the creation and acquisition of spatial data.	H			H			M			M			M	
6. Recognize the topo maps prepared by survey of India.	H			H		H		H		H		H		
7. Determine the overlaying of different maps in GIS.	H	H	M		M			M			H	M		

GR17A4143- Seminar

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Ability to prepare a technical report.		M		M					M	H				M
2. Ability to demonstrate the fundamentals.	H	M	M	M										
3. Ability to develop technical skills.	H		M	M										M
4. Ability to prepare for technical presentation in the conferences.				M	M					H				H
5. Ability to develop presentation skills including preparation of audio visual aids.					M			M		H				
6. Ability to find public speaking skills and listening comprehension.		M						M		H				M
7. Ability to prepare a technical report.		M		M					M	H				H

GR17A4142- Comprehensive Viva

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2
1. Ability to assess knowledge in the subject and the project.	H	M	M	M										M
2. Ability to practice technically.		H	M	M										
3. Ability to integrate technical question through all the years of study.		H	M	M										
4. Ability to express and communicate.					M			M		H				
5. Ability to evaluate technical confidence.		H	M	M										
6. Ability to improve communication.					M					H				
7. Ability to validate the knowledge gained through years of study.		M	H	M									M	H

GR17A4144- Project Work

COs/POs	a	b	c	d	e	f	g	h	i	j	k	l	POS 1	POS 2

1. Ability to interpret ideas and thoughts into practice in a project.	M	H	H	M									M	H
2. Ability to analyze the gap between theoretical and practical knowledge.	M	H	M			M								H
3. Ability to compose technical presentation in the conference.							M	M	M	H			M	
4. Ability to develop organizational skills and team work.						M		M	H	M			M	
5. Ability to debate for technical discussions.					M			M	H	H				
6. Ability to prepare for publishing papers in journals.		H	H	H	M			M	M	H				M
7. Ability to propose for the patent rights for the projects.		M	M			M								H