BOARD OF STUDIES MEETING – 2022-23

K.S.R.M COLLEGE OF ENGINEERING

AUTONOMOUS

Minutes of the Meeting

Date	**04.08.2022**	**Day**	**Thursday**
Time	**11:30 AM**	**Venue**	**Virtual meeting: https://meet.google.com/wji-ywny-quh**
Dept./SS	**CE**	**Convener**	**Dr. N. Amaranatha Reddy**

Members Present:13 **Members Absent: 00**

S.No	Name	Designation	Signature	S.No	Name	Designation
1.	Prof. M. Amaranath Reddy	Prof., IIT Kharagpur				
2.	Prof. Santhosh G. Thampi	Prof., NIT Calicut				
3.	Dr. R. Bhavani	Prof., JNTU Ananthapur				
4.	Dr. N. Amaranatha Reddy	Associate Prof., KSRMCE				
5.	Dr. K. Sunil Kumar Reddy	Associate Director Transit & Metro				
6.	Dr. M. Srinivasula Reddy	Associate Professor, GPREC, Kurnool				
7.	Prof. G. Sreenivasa Reddy	Prof., KSRMCE				
8.	Prof. T. Kiran Kumar	Prof., KSRMCE				
9.	Prof. V. Giridhar	Prof., KSRMCE				
10.	Dr. V. Ramesh Babu	Associate Prof., KSRMCE				
11.	Dr. P. Kishore Kumar Reddy	Associate Prof., KSRMCE				

12.	Sri. P. Suresh Praveen Kumar	Assistant Prof., KSRMCE				
13.	Sri. P. Rajendra Kumar	Assistant Prof., KSRMCE				

Dr. N. Amaranatha Reddy, welcomed all the members to the meeting and presented the agenda of the meeting.

The resolutions are:

	To do item	**Discussion**	**Resolution**	**Coordinator/in-charge**
1	Approval of Curriculum and syllabus of R22PG Regulation	The Head of the Department has presented the curriculum and syllabus designed by the faculty of CE by considering the stakeholders feedback & action taken report, suggestions of Department Review Committee and by comparing with premier institute syllabus	The committee has approved the curriculum and syllabus of R22PG Regulations.	Dr. N. Amaranatha Reddy
2	Discussion and approval of course structure and syllabus for R20 (V and VI sem) Regulations.	The Head of the Department has presented the Course Structure and Syllabus of (R20 V and VI semesters) designed by the faculty of CE by considering the stakeholders feedback & action taken report, suggestions of Department Review Committee and by comparing with premier institute syllabus	The committee Suggested to replace the Urban Transportation Planning with Traffic Engineering subject.	Prof. G. Sreenivasa Reddy

3.	Approval of Honors and Minors degree courses under R20 regulations.	The Head of the Department has presented the syllabus designed by the faculty of CE by considering the stakeholders feedback & action taken report, suggestions of Department Review Committee and by comparing with premier institute syllabus.	The committee approved the syllabus of Minor and Honor Degree courses with no corrections	Prof. T. Kiran Kumar
4.	To finalize and approve the syllabus for New Courses, Value Added Courses, Certificate Courses, Skill Courses, Employability Courses and Entrepreneurship Courses.	The Head of the Department has presented the syllabus designed by the faculty of CE by considering the stakeholders feedback & action taken report, suggestions of Department Review Committee and by comparing with premier institute syllabus	The committee approved the content for offering New Courses, Value Added Courses, Certificate Courses, Skill Courses, Employability Courses and Entrepreneurship Courses to implement in 2022-23.	Prof. V. Giridhar

The Head of the Department have proposed the Vote of thanks and Concluded the meeting.

Convenor

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Regulations for

UG Programs in Engineering (R20UG)

(Effective from 2020-21 for Regular students and from 2021-22 for Lateral Entry students)

Kandula Srinivasa Reddy Memorial College of Engineering

(Autonomous)

Kadapa – 516005, A.P.

(Approved by AICTE, Affiliated to JNTUA, Ananthapuramu, Accredited by NAAC)
(An ISO 9001-2008 Certified Institution)

Department of Civil Engineering
R20UG - Curriculum

B. Tech. - I Semester

Course code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2021101	BSC	Linear Algebra and Calculus	3	0	0	40	60	3
20EP102	BSC	Engineering Physics	3	0	0	40	60	3
2024103	HSMC	Communicative English	3	0	0	40	60	3
2014104	ESC	Basic Electrical & Electronics Engineering	3	0	0	40	60	3
2003105	ESC	Engineering Drawing	1	0	2	40	60	2
2003106	ESC	Engineering Drawing Lab	0	0	2	40	60	1
20EP107	BSC	Engineering Physics Lab	0	0	3	40	60	1.5
2024108	HSMC	Communicative English Lab	0	0	3	40	60	1.5
2014109	ESC	Basic Electrical & Electronics Engineering Lab	0	0	3	40	60	1.5
Total			**13**	**0**	**13**	**360**	**540**	**19.5**

L - Lecture, T - Tutorial, P – Practical

B. Tech. - II Semester

Course code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2021201	BSC	Differential Equations and Vector Calculus	3	0	0	40	60	3
20EC202	BSC	Engineering Chemistry	3	0	0	40	60	3
2005203	ESC	C-Programming & Data Structures	3	0	0	40	60	3
2001204	ESC	Strength of Materials	3	0	0	40	60	3
20EW205	LC	Engineering Workshop	0	0	3	40	60	1.5
2005206	LC	IT Workshop	0	0	3	40	60	1.5
20EC207	BSC	Engineering Chemistry Lab	0	0	3	40	60	1.5
2005208	ESC	C-Programming & Data Structures Lab	0	0	3	40	60	1.5
2001209	ESC	Strength of Materials Lab	0	0	3	40	60	1.5
20MC210	MC	Environmental Science	3	0	0	40	0	0.0
Total			**15**	**0**	**15**	**400**	**540**	**19.5**

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech. - III Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2021302	BSC	Probability, Statistics & Numerical Methods	3	0	0	40	60	3
2001302	ESC	Geology and Building materials	3	0	1	40	60	3.5
2001303	PCC	Advanced Strength of materials	3	1	0	40	60	4
2001304	PCC	Fluid Mechanics	3	0	0	40	60	3
2001305	PCC	Geomatics	3	0	0	40	60	3
2001306	PCC (LAB)	Fluid Mechanics Laboratory	0	0	3	40	60	1.5
2001307	PCC (LAB)	Geomatics Lab	0	0	3	40	60	1.5
20013S1	SOC	Civil Engineering Workshop (Skill oriented)	1	0	2	40	60	2
Total Credits			**16**	**1**	**9**	**320**	**480**	**21.5**

B. Tech. - IV Semester

Course Code	Category	Course Title	Hours/Week			IM	EM	CR
			L	T	P			
2025401	HSS	Business Economics and Accounting for Engineers	3	0	0	40	60	3
2001402	PCC	Hydraulics & Hydraulic Machinery	3	0	0	40	60	3
2001403	PCC	Soil Mechanics	3	0	0	40	60	3
2001404	PCC	Structural Analysis	3	0	0	40	60	3
2001405	PCC	Transportation Engineering	3	0	0	40	60	3
2001406	BSC (LAB)	Building Planning and Drawing (AutoCAD)	0	0	3	40	60	1.5
2001407	PCC (LAB)	Soil Mechanics Laboratory	0	0	3	40	60	1.5
2001408	PCC (LAB)	Transportation Engineering Laboratory	0	0	3	40	60	1.5
20014S2	SOC	Advanced Civil Engineering Workshop (Skilloriented-2)	1	0	2	40	60	2
2024410	HSMC	Universal Human Values	3	0	0	40	60	3
Total			**19**	**0**	**11**	**400**	**600**	**24.5**

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech. - V Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001501	PCC	Hydrology & Irrigation	3	0	0	40	60	3
2001502	PCC	Foundation Engineering	3	0	0	40	60	3
2001503	PCC	Concrete Technology	3	0	0	40	60	3
2001504	PEC-I	Optimization Techniques in Civil Engineering	3	0	0	40	60	3
2001505		Advanced Structural Analysis						
2001506		Remote Sensing & GIS						
	OEC-I		3	0	0	40	60	3
2099510	MC	Management Organizational behaviour	2	0	0	40	00	0
2001507	PCC	Concrete Technology Lab	0	0	3	40	60	1.5
2001508	PCC	Structural Analysis and Design Lab (Staad Pro)	0	0	3	40	60	1.5
20015S3	SC	SketchUp-3D modelling	1	0	2	40	60	2
2001509	PROJ	Community Service Project	0	0	3	100	-	1.5
Total			**18**	**00**	**11**	**460**	**480**	**21.5**

B. Tech. - VI Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001601	PCC	Environmental Engineering	3	0	0	40	60	3
2001602	PCC	Water Resources Engineering	3	0	0	40	60	3
2001603	PCC	Design of Reinforced Concrete Structures	3	0	0	40	60	3
2001604	PEC-II	Pre-stressed Concrete	3	0	0	40	60	3
2001605		Bridge Engineering						
2001606		Traffic Engineering						
2006601	HSSE	Human Resource Development	3	0	0	40	60	3
2006602		Digital Marketing						
2006603		Project Management						
20993M3	MC	Constitution of India	2	0	0	40	00	0
2001607	PCC	Environmental Engineering Lab	0	0	3	40	60	1.5
2001608	PCC	Computer Aided Design and Drafting Lab	0	0	3	40	60	1.5
2001609	PCC	Advanced Concrete Technology Lab	0	0	3	40	60	1.5
20016S4	SC	Advanced English Communication skills lab	1	0	2	40	60	2
Total			**18**	**00**	**11**	**400**	**540**	**21.5**

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech. - VII Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001701	PEC-III	Ground Improvement Techniques	3	0	0	40	60	3
2001702		Quantity Estimation of structures						
2001703		Finite Element Methods						
2001704	PEC-IV	Design of Steel Structures	3	0	0	40	60	3
2001705		Water Supply Engineering						
2001706		Advanced Concrete Structures						
2001707	PEC-V	Design and Drawing of Irrigation Structures	3	0	0	40	60	3
2001708		Construction Practice and Management						
2001709		Urban Transportation Planning						
	OEC-II		3	0	0	40	60	3
	OEC-III		3	0	0	40	60	3
	OEC-IV		3	0	0	40	60	3
20015S5	SOC-V	Practices in Geo-Technical Engineering	1	0	2	40	60	2
2001710	PR	Industrial/Research Internship	0	0	6	100	-	3
Total			**19**	**00**	**08**	**380**	**420**	**23**

B. Tech. - VIII Semester

Course Code	Category	Course Title	Hours / Week			IM	EM	CR
			L	T	P			
2001801	PROJ	Project Work/Internship	-	-	30	50	50	12
Total			**-**	**-**	**30**	**50**	**50**	**12**

Open Electives Courses Offered by Department of Civil Engineering:

20OE101	Disaster Management
20OE102	Basics of Civil Engineering
20OE103	Building Materials
20OE104	Solid Waste Management
20OE105	Estimation and Costing
20OE106	Water Management
20OE107	Repair & Rehabilitation of Structures
20OE108	Geo-Environmental Engineering
20OE109	Environmental Impact Assessment
20OE110	Industrial Safety Engineering
20OE111	Surveying
20OE112	Traffic Engineering

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

V Semester
Syllabus

B. Tech., V Semester

Course Title	Hydrology & Irrigation				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001501	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- The students acquire knowledge about hydrologic cycle, precipitation its measurement. To understand the precipitation forms, evaporation. types measurements.
- To study the Infiltration, surface runoff, floods and its importance and effects.
- Introduce the types of irrigation systems, Introduce the concept of planning and design of irrigation systems.
- Learn design principles of Diversion Head works.
- To Study the classification of dam their importance, applications.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Have a thorough understanding of the theories and principles governing the hydrologic processes, To evaluate the average precipitation, evaporation and its importance
CO 2	To know the losses and its estimation impacts. Importance of infiltration, runoff and floods
CO 3	Estimate irrigation water requirements, Design irrigation canals and canal network.
CO 4	Plan and design diversion head work, Dams
CO 5	Analyze stability of gravity dam and earth dam

UNIT-I

Introduction

Definition of hydrology – Hydrologic cycle; Precipitation: Types and forms of precipitation, Measurement – Recording and non-recording type of rain gauges– Average depth of precipitation – Double mass curve; Mean Precipitation: Arithmetic Mean, Thiessen Polygon and Isohyet Methods; Evaporation, Transpiration, Evapotranspiration – Factors affecting – Estimation and Measurement – Methods to Reduce evaporation.

UNIT – II

Infiltration

Factors affecting Infiltration, Measurement of Infiltration, Infiltration Curve and Infiltration Indices; Runoff: Components – Factors affecting – Features of hydrograph – Separation of base flow –Direct runoff hydrograph, Unit hydrograph; Flood Estimation: Introduction– Methods– Rational Method & Empirical formulae.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – III

Irrigation

Necessity and importance, principal crops and crop seasons – Types - Methods of application - Consumptive use - Estimation of consumptives use - Crop water requirement - Duty and delta - Factor affecting duty - Irrigation efficiencies - Water logging - Standard of quality for irrigation - Crop rotation.

Flow irrigation

Classification of canals - Design of Irrigation canals by Kennedy's and Lacey's theories.

UNIT – IV

Diversion head works - Weirs and barrages - Layout of diversion head works – Components - Causes and failure of hydraulic structures. Types of dams - Merits and demerits - Factors affecting selection of type of dam - Factors governing selecting site for dam - Types of reservoirs.

UNIT – V

Storage head works

Gravity dams: Forces acting on gravity dam - Causes of failure of a gravity dam - Elementary profile and practical profile of a gravity dam - Limiting height of a low gravity dam - Drainage galleries.

Types of Earth dams: Causes of failure of earth dam - Criteria for safe design of earth dam.

Text Books:

1. Mays, L.W. and K. Tung, "Hydro systems Engineering and Management", McGraw-Hill Inc., New York, 1992.
2. P. Jayarami Reddy, "A Text Book of Hydrology", Laxmi Publications, Third edition, 2016.
3. H.M. Raghunath, "Hydrology: Principles, Analysis, Design: Principles, Analysis and Design", New Age International Pvt Ltd, Third edition, 2015.
4. S.R. Sahasrabudhe, "A Textbook of Irrigation Engineering", S.K. Kataria & Sons, 2013

Reference Books:

1. Aswathanarayana U., "Water Resources Management and the Environment", A.A. Balkema Publishers, 2001
2. K.C.Parti, "Hydrology and Water Resources Engg", Narosa Publishers, 2001.
3. A.K.Biswas, "Water Resources-Environment Planning & development", Tata McGraw Hill, 1997.
4. G.L. Asawa, "Irrigation And Water Resources Engineering", newagepublishers, 2005.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Foundation Engineering				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001502	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To emphasize the importance of soil investigations including destructive and non-destructive methods
- To explain how earth pressure theory is important in retaining structure design
- To explain the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation systems including settlement consideration
- To explain in what circumstances pile is needed and how do analysis the pile and pile group under various soil conditions
- To study the types of slopes for different conditions

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Carry out soil investigation for any civil engineering construction
CO 2	Analyze earth retaining structures for any kind of soil medium
CO 3	Perceive knowledge to design shallow and deep foundations
CO 4	Analyze to calculate bearing capacity and foundation settlement
CO 5	Understand various methods for computation of factor of safety for any type of slope condition

UNIT-I

Site Investigation & Sub-Soil Exploration

Site reconnaissance – Depth of exploration – Lateral extent of exploration – Test pits – Auger borings – Wash borings – Soil samplers – Penetration test – Standard penetration test (SPT) – Geophysical methods – Seismic refraction and electrical resistivity methods – Sub soil investigation reports - Plate load test – Pressure meter.

UNIT – II

Earth Pressure Theories and Retaining Walls

Active and passive earth pressures in cohesion less and cohesive soils (with and without surcharge, horizontal and inclined surfaces) - Rankine's theory of earth pressure – Earth pressures in layered soils – Coulomb's earth pressure theory – Culmann's and Rebhann's graphical method. Types of retaining walls – Stability of gravity and cantilever retaining walls – Drainage in retaining walls.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – III

Bearing capacity of shallow foundations

Types of foundations – Depth of foundation – Terzaghi's bearing capacity equation – Bearing capacity of strip, square, circular, rectangular footings – Meyerhof's theory – Skempton's method – Brinch Hansen's method – Effect of ground water table on bearing capacity – Bearing capacity from building codes – Tolerable settlements – Settlement analysis.

UNIT – IV

Pile Foundations

Types of piles – Load carrying capacity of piles based on Static pile formulae – Dynamic pile formulae – Pile Load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups - Negative skin friction.

UNIT – V

Earth Slope Stability

Infinite and finite earth slopes – Types and causes of failures – Factor of safety of infinite slopes – Stability analysis by Swedish arc method, Standard method of slices, Bishop's simplified method – Taylor's stability number- Stability of slopes of earth dams under different conditions.

Text Books:

1. Professor John N. Cernica, P.E., Ph.D., "Geotechnical Engineering: Soil Mechanics", by John Wiley & Sons, Inc., New York.
2. B C Punmia, Ashok Kumar Jain & Arun Kumar Jain "Soil Mechanics & Foundation Engineering", Laxmi Publications, New Delhi.
3. Dr. K R Arora "Soil Mechanics & Foundation Engineering", Standard Publishers Distributers, New Delhi.
4. Braja M. Das, "Fundamentals of Geotechnical Engineering", Cengage Learning, USA.

Reference Books:

1. Joseph E. Bowles "Foundation analysis & Design", Tata McGraw-Hill Companies, Inc. New York.
2. R. Whitlow, "Basic Soil Mechanics", Addison Wesley Longman Limited, Edinburgh Gate, England.
3. C. Venkatramaiah "Geotechnical Engineering", New Age International (P) Limited, Publishers, New Delhi.
4. Michael Tomlinson and John Woodward, "Pile Design and Construction Practice", Taylor & Francis, London.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Concrete Technology				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001503	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To understand the different types of cements & admixtures available in construction industry and their properties.
- To understand the basic requirement so of aggregate used for concrete and properties of fresh concrete.
- To understand the durability properties of concrete.
- To understand the mechanical properties of concrete.
- To design a concrete mix for various grades of concrete

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Know the basics of cement, its composition, different properties.
CO 2	Get familiarize with aggregates used in concrete and the properties of fresh concrete.
CO 3	Know about elasticity, shrinkage creep and durability of concrete.
CO 4	Carry out the testing on hardened concrete.
CO 5	Design the mix of concrete proportions by ACI and IS methods

UNIT-I

Cements and Admixtures

Portland cement – Chemical composition – Hydration, Setting of cement – Types of cements - Tests on physical properties – Different grades of cement – Introduction to Mineral and chemical admixtures, their functions, uses and dosages.

UNIT – II

Aggregates & Fresh Concrete

Concrete aggregates: Classifications – Strength and other mechanical properties – Moisture content and its effects – Deleterious substances – Alkali-Aggregate reaction – Grading curves and grading requirements – Gap-graded aggregate.

Fresh concrete: Workability – Factors affecting workability – Measurements of workability – Effect of time and temperature – Segregation – Bleeding – Mixing of concrete – vibration of concrete – Pumped concrete, underwater concrete, pre-placed concrete, Ready mixed concrete– Pumped concrete.

UNIT – III

Properties of Concrete

Elasticity, Shrinkage and Creep: Modulus of elasticity – Dynamic modulus – Poisson's ratio– Shrinkage and its effects – Creep of concrete – Factors affecting creep

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Durability: Introduction, types of durability tests – Chemical attack of Concrete – Efflorescence – Air entrained concrete – Thermal properties – Resistance of concrete to fire.

UNIT – IV

Hardened Concrete

Curing of concrete: Methods of curing – Maturity - Influence of temperature – Steam curing at atmospheric pressure – High pressure steam curing

Hardened concrete: Compression tests – Flexure test –Splitting test – Rebound Hammer test– Ultrasonic pulse velocity test, Digital Image Processing.

UNIT – V

Mix Design of Concrete

Concrete Mix Design and Quality Control: Basic consideration – Objectives - Principles of Mix Proportioning-Factors in the choice of properties– Procedure for ACI & IS methods of mix design - Simple example of mix design.

Text Books:

1. A M Neville, "Properties of Concrete", Pearson Education India, 5th edition, 2012.
2. P.K.Mehta and J.M.Monteiro, "Concrete: Micro Structure, Properties and Materials", McGraw Hill Publishers, 4th edition, 2013.
3. M S Shetty "Concrete Technology", S. Chand Publishers, New Delhi.
4. A R Santha Kumar "Concrete Technology", Oxford University Press, New Delhi.

Reference Books:

1. M L Gambhir "Concrete Technology", Tata McGraw-Hill Companies, Inc. New York.
2. P K Mehta and J M Monteiro "Concrete: Micro structure, Properties and Materials", Tata McGraw-Hill Companies, Inc. New York.
3. Krishna Raju "Design of Concrete Mix", CBS Publishers, New Delhi.
4. J Prasad and C G K Nair "Non-Destructive Test and Evaluation of Materials", Tata McGraw-Hill Companies, Inc. New York.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Optimization Techniques in Civil Engineering				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001504	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- Understand the importance optimization to various practice problems and solve them simple mathematical techniques.
- The various optimization techniques for single variable optimization problem
- Direct search methods and Gradient methods for multi variable un constraint Optimization problems

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Applying the concept of simple mathematic for practice problem for optimization.
CO 2	Analyse the one-Dimensional problem and application to civil engineering procedure.
CO 3	Understand constrained and unconstrained optimization.
CO 4	Apply the dynamic programming techniques to solve problem in civil engineering problems.
CO 5	Appraise the Integer programming techniques.

UNIT-I

Introduction to Optimization

Engineering applications, Statement of optimization, classification of optimization, Classical optimization: Single variable, multi variable with and without optimization. Mutli variable with inequality constraints Khun -Tucker conditions.

UNIT – II

One Dimensional Minimization

Uni-modal Function, Unrestricted search, Exhaustive search, Dichtomous search, Interval Halving method, Fibonici and golden bisection Method, Newton and Quasi Newton method.

UNIT – III

Non-Linear –Unconstrained optimization-I

Classification, scaling of design variables, Random search methods, Univeriate search, pattern Directions, Hook Jeeves, Powel method, Rosenbrock method.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – IV

Non-Linear –Unconstrained optimization-II

Characteristics, Random search methods, complex method, sequential linear programming, Zoutendijk's method, Penality method

UNIT – V

Dynamic programming

Multi stage decision processes, concept of sub optimization, few examples problems

Integer programming: Gomory's cutting plane method, Branch and bound method.

Text Books:

1. David G. Luerbeggan, "Introduction to Linear and Non Linear Programming", Addison Wesley Publishing Co. 1973.
2. Hadley G. "Nonlinear and – dynamic programming" Addison Wesley Publishing Co. 1964.
3. HarndyA.Tahh. "operations Research, An Introduction", Macmillan Publishers Co. NewYork,1982.
4. J.K Sharma: Operations Research, S Chand ,9th edition, New Delhi

Reference Books:

1. Cordan C.C. Beveridge and Robert S. Schedther, "Optimization, Theory and Practice" McGraw Hill Co.1970.
2. SS. Rao, "Engineering Optimization theory and practice", New age international 3rd edition 2013.
3. Jasbir .S. Arora, "Introduction to Optimum Design" Mc Graw hill International edition, 4th edition Singapore.
4. M. C. Joshi, K. M. Moudgalya, "Optimization Techniques theory and practice", Narosa Publications

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Advanced Structural Analysis				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001505	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To introduce stiffness method and flexibility method for analysis of statically indeterminate structures.
- To understand the basics of finite element method and application to structural analysis.
- Use and/or develop structural analysis software to analyze complicated structural systems.
- Interpret the output from computer-based analyses for the purpose of structural design

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Identify static and dynamic indeterminacy of structure and can apply matrix methods to analyse the structures.
CO 2	Analyse the continuous beams using stiffness and flexibility methods.
CO 3	Analyse two dimensional portable frames using stiffness and flexibility methods.
CO 4	Analyse two-dimensional pin-jointed trusses using stiffness and flexibility methods.
CO 5	Transform local coordinate system to global coordinate system in matrix methods.

UNIT-I

Introduction to Matrix methods

Introduction, coordinate systems, displacement and force transformation matrices, element and structure stiffness matrices, Element and structure flexibility matrices, equivalent joint loads, stiffness, and flexibility approaches.

UNIT – II

Matrix methods for beams

Analysis of continuous beams by flexibility method and stiffness method with and without settlement of supports.

UNIT – III

Matrix methods for Plane Frames

Analysis of 2-D frames by Flexibility matrix methods.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – IV

Matrix methods for Plane Frames

Analysis of 2-D frames by Stiffness matrix methods.

UNIT – V

Matrix methods for Plane truss problems

Analysis of 2-D trusses by flexibility method and stiffness method.

Text Books:

1. G. S. Pandit and S. P. Gupta, "Structural Analysis - A Matrix Approach", McGraw Hill Education; 2nd edition,2008.
2. M W Weaver and Gere, "Matrix Analysis of framed Structures", Springer, 1990.
3. S.S. Bhavikatti, "Matrix Methods of Structural Analysis", Dreamtech Press, 2019
4. S. Ramamrutham, R. Narayan, "Theory of Structures", 9th Edition, 2014.

Reference Books:

1. Devdas Menon, "Advanced Structural Analysis", Narosa Publishing House, 2015.
2. Asslam Kassimali, "Matrix Analysis of Structures", Cengage Learning, USA. 2012.
3. C.K Wang, "Analysis of Indeterminate Structures", Tata McGraw-Hill Companies, Inc. New York, 1992.
4. T.N.Gayl, "Matrix structural analysis", Tata Mc Graw Hill Company.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Remote Sensing & GIS				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001506	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

The purpose of this course is to provide an understanding of physical concepts and underlying various engineering and technological applications in remote sensing. In addition, the course is expected to understand the basic principles of remote sensing and its applications.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Perceive the basics of remote sensing
CO 2	Pick out the characteristics of the instruments used for remote sensing
CO 3	Analyze the need and standard techniques used for image processing
CO 4	Perceive the basics of GIS
CO 5	Study the areas of application using Remote Sensing and GIS

UNIT-I

Remote Sensing – 1

Introduction to Basic Concepts: Definition – Physics of Remote Sensing – Electro Magnetic Radiation (EMR) – Interaction of EMR with atmosphere, Earth surface features – Vegetation, soils, water – Spectral reflectance curves – Atmospheric windows

UNIT – II

Remote Sensing – 2

Remote Sensing Systems: Platforms: Introduction – Types – Satellites and orbits, - Spectral, radiometric and spatial resolutions, temporal resolution of satellites - Some remote sensing satellites and their features.

UNIT – III

Image Processing Techniques

Digital Image Processing: Image enhancement – Contrast stretch, Spatial filtering and edge enhancement; Classification – Supervised unsupervised classification – Visual image interpretation techniques.

UNIT – IV

Geographical Information Systems (GIS)

Basic Principles – Definition – Components – Data Structures – Raster and Vector formats – Functioning of GIS – Data Input – Data Manipulation – Data Retrieval – Spatial Data Analysis

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

– Computational Analysis Methods (CAM) – Visual Analysis Methods (VAM) - Data Display – Data Base Management Systems

UNIT – V

Remote Sensing Applications

Remote Sensing Applications: Water resources - Drought Assessment - Environmental Monitoring.

Text Books:

1. Thomas Lillesand, Ralph W Kiefer and Jonathan Chipman, "Remote Sensing and Image Interpretation", John Wiley & Sons, India.
2. M Anji Reddy, "Remote Sensing & GIS", B.S Publications, Hyderabad.
3. C P Lo and Albert K W Yeung, "Concepts and Techniques in Geographical Information Systems", Prentice Hall of India, New Delhi.
4. Tor Bernhardsen, "Geographic Information systems – An Introduction", Wiley India Publication, 3rd Edition, 2010.

Reference Books:

1. Floyd F Sabins Jr., "Remote Sensing Principles and Interpretation", Freeman and Co., San Francisco.
2. J R Jensen, "Remote Sensing of the Environment: An Earth Resource Perspective", Prentice Hall of India, New Delhi.
3. Michael N. Demers, "Fundamentals of Geographic Information systems", 4th Edition, Wiley Publishers, 2012.
4. Basudeb Bhatta, "Remote Sensing and GIS", Oxford University Press, 2nd Revised Edition, 2011

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Disaster Management					B. Tech. V Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE101	Open Elective (OEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To make the student to provide basic conceptual understanding of disasters and its relationships with planning management.
- To make the student to gain an understanding of the scope and extent to which natural and manmade disasters influence vulnerability profile of India.
- To make the student able to relate disasters impact on social, economical and political environment.
- To make the students to understand approaches of Disaster Risk Reduction and the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To make the student able to enhance awareness of Disaster Risk Management and build skills to respond at disasters.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Define and describe the terminology used within disaster planning and management
CO 2	Understand the scope, extent, and complexity of natural and man-made disasters.
CO 3	Justify the knowledge gained from disaster impacts on health, psycho-social issues and demographic aspects
CO 4	Discuss effective means to plan, mitigate, respond, and recover from disasters and emergencies, natural and man-made
CO 5	Understand the problems associated with government collaboration and assistance to state and local governments and non-governmental organizations.

UNIT-I

Introduction

Concepts and definitions: disaster, hazard, vulnerability, risks severity, frequency and details, capacity, impact, prevention, mitigation.

UNIT – II

Disasters

Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills,

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA 516 003. (A.P.)

transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT – III

Disaster Impacts

Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT – IV

Disaster Risk Reduction (DRR)

Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); sustainable and environmental friendly recovery; reconstruction and development methods.

UNIT – V

Environment and Development

Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Text Books:

1. Pradeep Sahni and Madhavi Ariyabandu, "Disaster Risk Reduction in South Asia", PHI Learning Pvt. Ltd., Delhi.
2. B. K. Singh, "Handbook of Disaster Management: Techniques and Guidelines", Rajat Publications, Delhi.
3. Inter-Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC.
4. Inter-Agency Standing Committee (IASC) (Feb. 2007) IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

Reference Books:

1. G. K. Ghosh, "Disaster Management", APH Publishing Corporation, New Delhi.
2. http://ndma.gov.in/ (Home page of National Disaster Management Authority.
3. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
4. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Basics of Civil Engineering				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
20OE102	Open Elective (OEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To include the essentials of civil engineering field to the students of all branches of Engineering
- To provide the students an illustration of the significance of the civil engineering profession in satisfying social needs.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Illustrate the fundamental aspects of Civil Engineering.
CO 2	Plan and set out a building
CO 3	Explain the concepts of planning and functioning of building
CO 4	Illustrate the introduction various building area items
CO 5	Discuss about various building construction and services in a building

UNIT-I

General introduction to Civil Engineering

Various disciplines of civil engineering, Relevance of civil engineering in the overall infrastructural development of the country. Introduction to types of buildings as per NBC, selection of sites for buildings.

UNIT – II

Building Components

Components of residential buildings and their functions; Introduction to industrial buildings – office/factory/software development office/power house/electronic equipment service centre.

UNIT – III

Building planning

Introduction to planning of residential buildings- site plan, orientation of a building, open space requirement, position of doors and windows, size of rooms; preparation of a scaled sketch of the plan of a single storeyed residential building in a given site plan.

UNIT – IV

Building area items

Introduction to the various building area items – computation of plinth area / built up area, floor area / carpet area – for a single storeyed building; setting out of a building.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – V

Building construction

Foundations; Bearing capacity of soil (definition only) - Functions of foundations, Types - shallow and deep (sketches only)

Brick masonry – header and stretcher bond, English bonds – Elevation and Plan (one brick thick walls only)

Roofs – functions, types, roofing materials

Floors – functions, types; flooring materials

Paints and Painting – Purpose, types

Text Books:

1. Gopi, S., "Basic Civil Engineering", Pearson Publishers
2. S.S Bhavikatti, "Basics civil engineering", New international publishers
3. Rangwala, S.C and Dalal, K. B., "Building Construction", Charotar Publishing house
4. Rangwala, S.C., "Essentials of Civil Engineering", Charotar Publishing

Reference Books:

1. Mckay, W.B. and McKay, J. K., "Building Construction Volumes 1 to 4", Person India Education Services
2. Minu, S., "Basic Civil Engineering", Karunya Publication
3. Chudley, R., "Construction Technology, Vol. I to IV", Longman Group, England
4. Kandya, A. A., "Elements of Civil Engineering", Charotar Publishing house.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Building Materials				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
20OE103	Open Elective (OEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- The importance and fundamental knowledge of building materials such as stones and aggregates its properties for better construction.
- The laboratory, field tests conducted on Bricks and Cement to identify better construction materials with strength & durability.
- The ability to understand the properties of Lime and Timber.
- Understand various Masonry works used in the construction field.
- To study the Modern Engineering materials used in construction.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Recognize appropriate building materials used in the civil engineering applications for obtaining better performance of structures.
CO 2	Identify various properties of Bricks and Cement used in construction of structures.
CO 3	Select appropriate building timber for different types of constructions.
CO 4	Choose suitable Masonry works for modern construction to enhance the elegance and performance.
CO 5	Distinguish the difference of use among Galvanized Iron, Fiber-reinforced Polymers, Steel and Aluminium in construction

UNIT-I

Stones and Aggregates

Properties of building stones – Classification of stones – Stone quarrying, precautions in blasting – Dressing of stone, Fine aggregate: Natural and manufactured – Sieve analysis – Different tests on fine aggregate, Coarse aggregate: Natural and manufactured – Importance of size, shape and texture.

UNIT – II

Bricks

Composition – Types of bricks – Manufacturing process of bricks – Test on bricks – Standard requirements and grades.

Steel

Types and grades of steel, tests on steel, applications.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – III

Cement

Introduction – Chemical Composition – Types of cement with their specific uses – Grade of cement as per BIS – Engineering properties of cement – Field and Laboratory test of cement as per BIS.

Timber

Types of timber – Uses and application of timber – Defects in timber and wood – Seasoning Wood – Wood products with specific uses

UNIT – IV

Masonry Works

Masonry - Stone Masonry - Rubble Masonry - Brick Masonry - Bond - Types of bonds - English and Flemish bonds - Composite masonry - Concrete Masonry - Reinforced masonry - Types of walls - Types of Partition walls.

UNIT – V

Modern Building Materials

Aluminum – Fiber Reinforced Polymers – Ferro cement – Composite materials – Light Weight Roofing Materials – GI Sheets – Ceramics – Other Modern Materials.

Text Books:

1. Rajput R.K. "Engineering Materials", S. Chand & Company Ltd. New Delhi, Third Edition2009.
2. P C Varghese, "Building Materials", PHI Learning Pvt. Ltd., Delhi.
3. G C Sahu, Joygopal Jena, "Building Materials and Construction", McGraw hill Pvt Ltd 2015.
4. Arthur Lyons De, "Materials for Architects and Builders", Montfort University, Leicester, UK.

Reference Books:

1. S C Rangwala, "Engineering Materials", Charotar Publishing House Pvt. Ltd., Anand, Gujarat.
2. S K Duggal, "Building Materials", New Age International (P) Limited, Publishers, New Delhi.
3. S. C. Rangwala, "Building Construction", Charotar Publishing House Pvt. Ltd., Anand, Gujarat.
4. R. Chubby, "Construction Technology – Vol – I & II", Longman UK

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Concrete Technology Lab				B. Tech. V Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2001507	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
Mid Exam Duration: ---						End Exam Duration: 3 Hrs		

Course Objectives:

- To conduct laboratory tests to find suitability of materials for design of concrete mixes

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Conduct Quality Control tests on concrete ingredients, fresh & hardened concrete
CO 2	Study the behaviour of fresh concrete and its level of acceptance
CO 3	Know the difference of OPC and PPC and their strength variance.

List of Experiments:

1. Determination of fineness & Physical properties of cement (OPC & PPC)
2. Determination of normal consistency of standard cement paste
3. Determination of specific gravity of cement (OPC & PPC)
4. Determination of initial and final setting times of cement (OPC & PPC)
5. Determination of the compressive strength of cement for OPC & PPC
6. Determination of fineness modulus of coarse and fine aggregate
7. Specific Gravity of coarse and fine aggregate
8. Determination of bulking of fine aggregate
9. Determination of workability of concrete by slump cone test & compaction factor test
10. Determination of hardened properties of concrete by compressive strength, Split Tensile Strength for different Grades of concrete

Text Books:

1. M S Shetty "Concrete Technology – Theory and Practice", S Chand & Company Limited, New Delhi.

Reference Books:

1. Hemant Sood, L N Mittal and P D Kulkarni "Laboratory Manual on Concrete Technology", C B S Publishers and Distributors, New Delhi.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	Structural Analysis and Design Lab (Staad Pro)				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001508	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
Mid Exam Duration: ---					End Exam Duration: 3 Hrs			

Course Objectives:

- Learn how to achieve user specified design parameters to customize design
- Know how to perform code check, member selection and optimized member selection consisting of analysis or design cycles
- Apply the fundaments of reinforced concrete to design structures like beams, slabs, columns, retaining walls, water tanks, and other structures.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Apply the core, multidisciplinary knowledge for understanding the problems in structural engineering and allied fields.
CO 2	Identify and analyse the impact of structural engineering in development projects and find a suitable solution from number of alternatives
CO 3	Demonstrate in-depth knowledge of Structural Engineering and build capability to apply that knowledge to real problems.

Exercises:

1. Analysis and design of Beam
2. Analysis and design of Column
3. Analysis and design of 2-D portal frame
4. Analysis and design of 3-D portal frame
5. Analysis and design One-way slab
6. Analysis and design of Two-Way Slab.
7. Analysis and design of Retaining Wall
8. Analysis and design of Water Tank
9. Analysis and design of steel tabular truss
10. Analysis and design of transmission tower

Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

11. Earthquake load & wind load application to RC structures along with the design for different load combinations.

Any of the eight experiments are mandatory

Text Books /Reference Books:

1. Dr.M.N. Sesha Prakash And Dr.C.S.Suresh, "Computer Aided Design Lab Manual" Laxmi Publications.
2. T.S. SARMA, "STAAD.PRO V8i for Beginners with indian Examples".
3. Prof. SHAM TICKOO, "Leaning Bentley STAAD.PRO V8i for Structural Analysis", Publisher : Dreamtech Press, USA.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., V Semester

Course Title	SketchUp-3D modelling				B. Tech. V Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
20015S3	Skill (SC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		1	0	2	2	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To know the basic drawing tool to draw the building plans
- To create 3D models of building components and to proved customised outputs.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Use the skechUp Layout and SkechUp for civil engineering drawing.
CO 2	Create 2D and 3D models of build components
CO 3	Use V-ray for beatification of SketchUp outputs

Exercises:

1. Introduction to sketchup Layout.
2. Drawing building plan using sketchup Layout.
3. Introduction to Sketchup 2D and 3D.
4. Drawing building components:- doors, windows, etc.
5. Creating 3D model of a singly story building from given plan.
6. Developing interior design for a singly story building.
7. Drawing sanitary connections.
8. Basic rendering tools for V-ray.
9. Creating high definition 2D picture using sketchup.
10. Creating 3D motion videos using sketch.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Text Books:

1. Bill Fane, Mark Harrison, Josh Reilly, "SketchUp for Dummies", For Dummies, 1st edition, 2020.
2. Michael Brightman, "The SketchUp Workflow for Architecture: Modeling Buildings, Visualizing Design, and Creating Construction Documents with SketchUp Pro and LayOut", Wiley, 2nd edition, 2018.
3. N. Sreenivasulu, S. Rama Rao, "Civil Engineering Drawing-I", Radiant Publishing House.
4. N. Sreenivasulu, "Civil Engineering Drawing-II", Radiant Publishing House.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

VI Semester
Syllabus

B. Tech., VI Semester

Course Title	Environmental Engineering				B. Tech. VI Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001601	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To get the knowledge of water sources, standards, treatment of water for distribution to the domestic purpose.
- To estimate sewage and storm water from towns and to design the sewage
- To understand the design and operation of wastewater treatment units.
- To illustrate solid waste, air and noise pollutions.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Get an idea of water supply, its need, and objectives to the public, to know the sources, Quality and Standards of water.
CO 2	An acquaintance with different treatments for protected water supply in removal of various constituents, different water distribution systems, and its design.
CO 3	To understand the estimation of sewage and hydraulic design of sewers.
CO 4	Understanding the physical and chemical composition of sewage and applying the knowledge of sewage treatment and efficient design of conventional treatment processes.
CO 5	Understanding of solid waste management system requires application of waste management.

UNIT-I

Introduction, Sources & Impurities

Introduction - Water supply - Objectives of water supply systems - Water supply scheme - Quantity of water - Design period – Per Capita Consumption - Fluctuations in demand pattern - population forecast – Arithmetic, Incremental, Geometric methods.

Sources of water – Surface and Sub Surface – Quality of water - Physical, chemical and biological aspects - Impurities in water - Waterborne diseases – Drinking water quality standards.

UNIT – II

Treatment

Flowchart of water treatment plant - Treatment methods (Theory and Design) – Sedimentation - Coagulation – Filtration – slow sand, rapid sand - Disinfection – Aeration - Softening of Water – Defluoridation.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – III

Water Distributions: Requirements - Layout of Water distribution systems – Design by Hardy Cross method - Laying of pipe lines – Waste detection and prevention.

Waste water & Estimation: Definition of Terms – Sewage, Sullage, Storm Water and Sludge, Estimation of Sewage – Dry weather Flow and Wet weather flow – Average, Peak and Minimum Sewage Flows - problems.

UNIT – IV

Collection of Sewage: Separate and Combined Sewers with their Merits and Demerits – Hydraulic Design of Sewers for Full and Partial Flow System – Self Cleansing Velocity of Sewers – Sewer Appurtenances and their Location.

Characterization of Sewage: Chemical Composition of Sewage – Solids, BOD and COD, Nutrients and Biological Impurities – Numerical Problems on BOD Equation – Population Equivalent.

UNIT – V

Biological Treatment: Preliminary – Design of Screen, Grit Chamber - Primary Sedimentation Tank - Secondary – Design of Suspended and Attached Growth of Biological System – Oxidation Ponds - Tertiary treatment – Removal of Nitrogen, Phosphorus - Standards for Disposal of Treated Sewage into Inland Surface Waters, Marine Disposal and on Land for Irrigation - Design of Septic Tank and Soak Pits.

Text Books:

1. B C Punmia, Ashok Kumar Jain & Arun Kumar Jain "Wastewater Engineering", Lakshmi Publications, New Delhi.
2. G.S. Birdie and J. S. Birdie, "Water Supply and Sanitary Engineering", 8th Edition, Dhanpat Rai and Sons Publishers, New Delhi, 2010.
3. K.N. Duggal, "Elements of Environmental Engineering", 1st Edition, S.Chand Publishers, New Delhi, 2010
4. S.K. Garg, "Environmental Engineering (Vol. I): Water Supply Engineering", 20th Revised Edition, Khanna Publishers, New Delhi, 2011.

Reference Books:

1. K.N. Duggal, "Elements of environmental engineering", S. Chand Publishers
2. H S Peavy and D R Rowe, "Environmental Engineering" Tata McGraw-Hill Companies, Inc. New York.
3. Met Calf & Eddy, "Wastewater Engineering – Treatment and Reuse", Tata McGraw-Hill Companies, Inc. New York.
4. G.S. Birdi, Dhanpat, "Water supply and sanitary Engineering", Rai & Sons Publishers.

B. Tech., VI Semester

Course Title	Water Resources Engineering				B. Tech. VI Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2001602	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To study the different measures to prevent damages of Floods and their remedial measures.
- To study the various factors considering for construction of different head works i.e., canal head works, cross drainage works etc.
- To study the different components and their applications
- To study the various design procedures and their engineering significances
- To study the different tools required for knowing performance of water resources projects

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Develop and design different energy dissipation methods and safety structures to mitigate Flood damages.
CO 2	Knowing design principles and different design approaches in Canals.
CO 3	Know the responsibility of a civil engineer for constructions of canal outlets, canal escapes; cross drainage works in reducing the floods.
CO 4	Design hydraulic structures and regulatory works using different methods.
CO 5	Predict the cost benefit analysis and give insights for the benefit of society.

UNIT-I

Spillways

Types of Spillways – Necessity and Components of Spillways – Applications of Spillways – Design Principles of Ogee Spillways – Types of Spillway Gates – Energy Dissipation Methods.

UNIT – II

Canal Structures – 1

Types of Falls and Their Location – Design Principles of Sarda type Fall – Trapezoidal Notch Fall and Straight Glacis Fall.

UNIT – III

Canal Structures – 2

Canal Regulation Works – Principles of Design of Distribution and the Head Regulator – Canal Outlets – Types of Canal Modules – Proportionality Sensitivity and Flexibility.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – IV

Cross Drainage Works

Types of Selection of Site – Design Principles of Aqueduct – Siphon Aqueduct and Super Passage.

UNIT – V

Water Resources Planning

Introduction to Indian Water Resources – Scenario of Water Use – Purpose of Water Resource Development – Classification of Water Resources – Development Projects – Project Evaluation – Strategies for Future – Planning Strategies – Management Strategies.

Text Books:

1. G L Asawa "Irrigation and Water Resources Engineering", New Age International (P) Limited, Publishers, New Delhi.
2. R S Varshney, S C Gupta and R L Gupta "Theory and Design of Irrigation Structures", Nem Chand & Bros Publishers, Roorkee, Uttarakhand.
3. Loucks D.P. and van Beek E., "Water Resources Systems Planning and Management", UNESCO Publishing, The Netherlands.

Reference Books:

1. Satya Narayana Murty Challa "Water Resources Engineering – Principles and Practice", New Age International (P) Limited, Publishers, New Delhi.
2. B C Punmia, Pande B B Lal, Ashok Kumar Jain & Arun Kumar Jain "Irrigation and Water power Engineering", Lakshmi Publications, New Delhi.
3. David A. Chin, "Water-Resources Engineering", SI Edition, Third Edition, Pearson Education, 2019.
4. Larry W. Mays, "Water Resources Engineering", Wiley, 2nd edition, 2010.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., VI Semester

Course Title	Design of Reinforced Concrete Structures				B. Tech. VI Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001603	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To define and introduce the different design philosophies of Reinforced Cement Concrete (RCC).
- To implement the Limit State Method for design of rectangular section beams.
- To design two way slabs and dog-legged staircase
- To design the short and long columns for axial load, uniaxial and by-axial bending conditions
- To Design the isolated and combined footings.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Compare the different design philosophies of Reinforced Concrete Structures and can analyse using Limit State Method.
CO 2	Apply the Limit State Method for the design of RCC beams under different loading conditions.
CO 3	Design the RCC slabs with different support conditions and staircases.
CO 4	Design the RCC short and long columns axially loaded along with uniaxial bending conditions.
CO 5	Design isolated and combined footing.

UNIT-I

Introduction

Introduction to working stress and limit state methods-characteristic values & partial safety factors, Stress-strain curves for concrete & steel. Limit State Method: Stress Block Parameters as per IS 456 -2000, Under reinforced-over reinforced-balanced sections, analysis of rectangular section beams using limit state methods.

UNIT – II

Limit State Design for Flexure, Shear, Torsion and Bond

Design of singly & double reinforced rectangular beams for flexure. Design of rectangular sections for shear and torsion. Design for Bond –Anchorage and Development length of bars

UNIT – III

Design of Slabs and Staircase

Design of two way slabs with different end conditions (IS Code Method). Design of dog-legged staircase.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT – IV

Design of Compression Members

Short Column - Columns with axial loads, uni-axial and bi-axial bending – Use of design charts- Long column – Design of long columns - IS Code provisions

UNIT – V

Design of Foundation

Different types of footings –Design of flat isolated square, rectangular, circular footings and combined footings for two columns.

Text Books:

1. B C Punmia, Ashok Kumar Jain & Arun Kumar Jain "Comprehensive RCC Design", Laxmi Publications, New Delhi.
2. N. Subramanian, "Design of Reinforced Concrete Structures", Oxford University Press
3. S. Unnikrishna Pillai & Devdas Menon, Reinforced Concrete Design, TMH, New Delhi. 3rd Edition 2009
4. M.L. Gambhir, "Fundamentals of Reinforced concrete design", PHI, New Delhi.2nd Edition 2010

Reference Books:

1. Ashok. K Jain "Reinforced Concrete: Limit State Design", Nem Chand & Bros, Roorkee.
2. N Krishna Raju and R N Pranesh "Reinforced Concrete Design: IS: 456-2000 Principles and Practice", New Age International (P) Limited, Publishers, New Delhi.
3. P.C. Varghese, "Limit state designed of reinforced concrete", PHI Learning Pvt. Ltd.
4. N.C. Sinha and S.K Roy, "Fundamentals of Reinforced Concrete", 4th Edition, S. Chand publishers, 2004.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., VI Semester

Course Title	Pre-Stressed Concrete				B. Tech. VI Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001604	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To give idea on methods available on pre-stressed concrete and analysis of pre-stressed members and design of members.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Calculate the effect of pre-stressing on statically determinate structures and statically indeterminate structures
CO 2	Design, analysis, detailing and construction of pre-stressed concrete structures
CO 3	Distinguish between pre-tensioning and post-tensioning technology
CO 4	List the differences between pre-tensioning and post-tensioned systems for structures
CO 5	Design and analyze pre-stressed concrete and concrete composite structures

UNIT-I

Introduction: General Principles of Pre-Stressed Concrete Members – Advantages and Limitations of Pre-Stressed Concrete – Comparison of Pre-Stressed Concrete Beams with Reinforced Concrete Beams.

Systems of Pre-Stressing: Classification of Pre-Stressed Concrete Members, System of Pre-Stressing, Pre-Tensioned System, Stability of the System. Hoyer System, Magnel Blaton System, Freyssinet System, Gifford Udall System, P.S.C Mono Wire System, C.C.L Standard System, LEE-MCCALL System.

UNIT – II

Losses of Pre-Stresses: Loss of Pre-Stress in Pre-Tensioned and Post-Tensioned Due to Various Causes Like Elastic Shortening of Concrete, Shrinkage of Concrete, Creep of Concrete, Relaxation of Stress in Steel, Slip in Anchorage Bending of Member and Wobble Frictional Losses.

UNIT – III

Analysis and design of sections for flexure: Assumptions, Analysis by Stress Concept – Elastic Analysis of Concrete Beams Pre-Stressed with Straight, Concentric, Eccentric, Bent and Parabolic Tendons – Design of Pre-Stressed Concrete Beams – I.S Recommendations as

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

per IS 1343 Code Book – Design of Rectangular and an I-Section of a Beam – Lever Arm Concept – Kern Distance.

UNIT – IV

Shear Design of PSC Beam: Design of Shear based on IS 1343 Code Book – Design of Beam.

UNIT – V

Deflections of Pre-Stressed Concrete Beams: Importance of Control of Deflections – Factors Influencing Deflections – Short Term Deflections of Uncracked Members Prediction of Long Term Deflections.

Text Books:

1. S Ramamrutham, "Pre-Stressed Concrete", Dhanpat Rai Publishing Company (P) Limited, New Delhi.
2. N Krishna Raju, "Pre-Stressed Concrete", Tata McGraw-Hill Companies, Inc. New York.
3. N Rajagopalan, "Pre-Stressed Concrete", Narosa Publishing House, New Delhi.
4. M.K.Hurst, "Prestressed Concrete Structures", Tata Mc.Graw Hill Publications, 2nd Edition,2009.

Reference Books:

1. IS 1343-2012 "Indian Standard Code of Practice for Prestressed Concrete", Bureau of Indian Standards, New Delhi.
2. P.Dayaratnam, "Pre-stressed Concrete Structures", Oxford &IBH Publishers, Fourth Edition.
3. K. U. Muthu, Agmil Ibrahim, Maganti Janardhana, M. Vijayanand, "Pre-stressed Concrete", PHI Publishers, 2016
4. T.Y. Lin & N.H. Burns, "Design of Pre-stressed Concrete Structures", John Wiley & Sons, 3rd Edition, 2005.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., VI Semester

Course Title	Bridge Engineering				B. Tech. VI Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001605	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs		

Course Objectives:

- The students acquire knowledge about bridges and its component – different types of loading s and IRC classification of loading and its importance.
- Students understand about analysis and design about square box culvert.
- To make the students able to analyze deck slab bridges and its importance.
- Students develop the knowledge about analysis and design of T-beam bridges and various types of class 'AA' loadings acting on T-beam bridges.
- Students easily understand about piers, abutments, various forces acting on piers & abutments. And also design principles of various bridge bearings.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Students are effectively learned the bridges; its components and various loads are acting on the bridge structure.
CO 2	Students understand the analysis & Design of square box culvert easily
CO 3	Student effectively analyze and design the deck slab bridge according to IRC codes
CO 4	Students known about analysis & design of T-beam bridge and subjected to loading of class 'AA' tracked vehicles
CO 5	Students develop the knowledge about piers and abutment of bridges, various forces acting on it and different types of bridge foundations. Also known about the design principles of bridge bearings

UNIT-I

Introduction

Importance of Site Investigation in Bridge Design – Highway Bridge Loading Standards – Impact Factor – Railway Bridge Loading Standards (B.G & M G Bridges) – Various Loads in Bridges.

UNIT – II

Design of Box Culvert

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

General Aspects – Design Loads – Design of Box Culvert Subjected to R C Class AA Tracked Vehicles only.

UNIT – III

Design of Deck Slab Bridge

General Features – Effective Width Method of Analysis; Design of Deck Slab Bridge (Simply Supported) subjected to Class AA Tracked Vehicles only.

UNIT – IV

Design of T-Beam Bridge

General Features – Design of Interior Panel of Slab – Pigeaud's Method – Design of a T- Beam Bridge Subjected to Class AA Tracked Vehicles only.

UNIT – V

Piers, Abutments and Bridge Bearings

General Features – Bed Block – Material Piers & Abutments – Types of Piers – Forces Acting on the Piers – Stability Analysis of Piers – General Features of Abutments – Forces Acting on Abutments – Stability Analysis of Abutments – Types of Wing Walls – Approaches – Types of Bridge Foundations (Excluding Design)

Bridge Bearings

General Features – Types of Bearings – Design Principles of Rocker & Roller Bearings – Design of Steel Rocker Bearings – Design of Elastomeric Pad Bearings

Text Books:

1. S Ponnuswamy, "Bridge Engineering", Tata McGraw-Hill Companies, Inc. New York.
2. N Krishna Raju, "Design of Bridges", Oxford & IBH Publishing Company (P) Limited, New Delhi.
3. V.N. Vazirani and M.M. Ratwani M.G. Aswani, "Design of Concrete Bridges", Khanna Publishers, 1995.
4. B.C. Pumai, Jain & Jain, "Design of RC Structures", Lakshmi Publications.

Reference Books:

1. IS 800-2007 "Indian Standard Code of Practice for General Construction in Steel", Bureau of Indian Standards, New Delhi.
2. IS 456-2000 "Indian Standard Plain and Reinforced Concrete – Code of Practice", Bureau of Indian Standards, New Delhi.
3. IRC 6-2000 "Standard Specifications and Code of Practice for Different Types of Loadings Acting on the Bridge Structure", The Indian Roads Congress, New Delhi.
4. IRC 22-2000 "Standard Specifications and Code of Practice for Road Bridges and Different Materials used in Bridge Structures and Reinforcement Details", The Indian Road Congress, New Delhi.
5. IRC 24-2000 "Standard Specifications and Code of Practice for Permissible Bending Stresses in Steel and its Properties", The Indian Road Congress, New Delhi.
6. IRC 83-2000 "Standard Specifications and Code of Practice for Different Types of Bridge Bearings used in the Bridges and its Detailed Specifications", The Indian Road Congress, New Delhi.
7. Pigeaud's Charts.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA-516 003. (A.P.)

B. Tech., VI Semester

Course Title	Traffic Engineering				B. Tech. VI Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001606	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 1.5 Hrs					End Exam Duration: 3 Hrs		

Course Objectives: To set a solid and firm foundation in

- Traffic engineering management.
- Traffic regulation means and measures.
- Concept of highway capacity.
- Road safety
- Concepts of traffic flow theory

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Justify the need for traffic management
CO 2	Implement different traffic regulations
CO 3	Apply highway capacity concept for designing and evaluating various traffic management means and measures
CO 4	Design and implement various road safety enhancement measures.
CO 5	Interpret, analyze and for simple situations predict the main characteristics of traffic flow

UNIT-I

Traffic Management

Traffic management – scope of traffic management measures – restrictions to turning movements – one-way streets – tidal flow operations-Traffic segregation –Traffic calming-Exclusive bus lanes, Introduction to ITS

UNIT – II

Traffic Regulation

Regulation of traffic – Need and scope of traffic regulations- Motor Vehicle Act – Speed limit at different locations- regulation of the vehicle – regulations concerning the driver rules of the road enforcement

UNIT – III

Highway Capacity

Highway capacity: Its importance in transportation studies – basic, possible and practical capacity – determination of theoretical maximum capacity -passenger car units – level of service – concept in HC manual – factors affecting level of service.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA-516 003. (A.P.)

UNIT – IV

Traffic Safety

Road Accidents-Causes and Prevention-Road and its effect on accidents-The Vehicle-The Driver-Weather and its effect on accidents-Speed in Relation of Safety-Collection of accident data-Condition Diagram and Collision Diagram-Traffic Management Measures and their Influence on Accident Prevention.

UNIT – V

Traffic Flow

Theory of traffic flow – scope – definition and basic diagrams of traffic flow- basic concepts of light hill – Whitham's theory – Introduction to Car 'following theory and queuing'.

Text Books:

1. Khanna, S.K. and C.E.G. Justo, C.E.G., "Highway Engineering", Khanna Publishers, Roorkee, 2001.
2. Kadiyali, L.R., "Traffic Engineering and Transport Planning" Khanna Publishers, New Delhi
3. Donald Drew, Traffic Flow Theory Chapter 14 in Differential Equation Models, Springer,1983
4. Papa Costas C.S., "Fundamentals of Transportation Engineering", Prentice Hall, India

Reference Books:

1. Martin Whol & Brian V Martin, "Traffic system Analysis for Engineers and Planners", McGraw Hill, NY, 1967.
2. Highway Capacity Manual: HCM 2010 (3 volume set), TRB Publications, 2010
3. Jotin Khisty, C. and Kent Lall, B., "Transportation Engineering – An Introduction", Prentice- Hall.
4. Salter, R.J. and Hovnsell, N.B., "Highway Traffic Analysis and Design", 3rd Edition, Macmillan Press Ltd, 1996.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., VI Semester

Course Title	Environmental Engineering Lab				B. Tech. VI Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2001607	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
Mid Exam Duration: ---						End Exam Duration: 3 Hrs		

Course Objectives:

- To get exposure about water analysis.
- The laboratory provides knowledge of estimating various parameters like pH, Chlorides, and different solids in water.
- For effective water treatment, the determinations of optimum dosage of coagulant and chloride demand are also included.
- The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Identify the BIS and WHO standards of water for domestic consumption and also for various industrial and agricultural purposes.

List of Experiments:

1. Determination of various forms of Acidity
2. Determination of various forms of Alkalinity
3. Determination of pH in water
4. Determination of Chlorides content
5. Determination of Residual Chlorine
6. Determination of Turbidity
7. Determination of various forms of Solids
8. Determination of Hardness
9. Determination of Dissolved oxygen
10. Determination of Chemical Oxygen Demand
11. Determination of Biological Oxygen Demand

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

12. Determination of Optimum Dosage of Coagulant

Text Books:

1. Dr. G Kotaiah and Dr. N Kumara Swamy "Environmental Engineering Lab Manual", Charotar Publishing House, Anand, Gujrat.
2. S.K. Garg, "Environmental Engineering (Vol.I): Water Supply Engineering", 20th Revised Edition, Khanna Publishers, New Delhi, 2011.

Reference Books:

1. Clair N Sawyer, Perry L Mccarty and Gene F Parkin "Chemistry for Environmental Engineering and Science", Tata McGraw-Hill Edition, New Delhi.
2. CPHEEO, Ministry of Urban Development (1996), Manual on water supply and Treatment, New Delhi.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

B. Tech., VI Semester

Course Title	Computer Aided Design and Drafting Lab				B. Tech. VI Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2001608	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
Mid Exam Duration: ---						End Exam Duration: 3 Hrs		

Course Objectives:

- To know how to apply engineering drawing using computers
- To make the student to understand about the scope of Auto CAD software
- To teach detailing of different reinforced cement concrete components.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the process of detailing of different building components.
CO 2	Apply AutoCAD tool for drawing and detail of civil engineering components.
CO 3	Provide proper detailing drawing to customer.

Exercises:

1. Detailing of Reinforced Cement Concrete determinate beams.
2. Detailing of Continuous and indeterminate Reinforced Cement Concrete beams.
3. Detailing of circular and rectangular Columns.
4. Detailing of one way and two way slabs.
5. Detailing of Reinforced Concrete wall.
6. Detailing of Earth retaining structures
7. Detailing of rectangular and circular footing.
8. Detailing of different combined footings.
9. Detailing of different deep foundations.
10. Detailing of Over Head Water Tank.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Text Books:

1. N. Sreenivasulu, S. Rama Rao, "Civil Engineering Drawing-I", Radiant Publishing House.
2. N. Sreenivasulu, "Civil Engineering Drawing-II", Radiant Publishing House.

3. G C Sahu, Joy Gopal Jena, "Building Materials and Construction", McGraw hill Pvt Ltd 2015
4. Duggal, "Building Materials", New Age International

Reference Books:

1. P. J. Sha, "Engineering Graphics", S. Chand & Co.
2. S. Mahaboob Basha, "Civil Engineering Drawing-I", Falcon Publishers
3. M. G. Shah, "Building drawing", Tata McGraw-Hill Education.
4. R. Chubby, "Construction Technology – Vol – I & II", Longman UK

B. Tech., VI Semester

Course Title	Advanced Concrete Technology Lab				B. Tech. VI Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2001609	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	3	1.5	40	60	100
Mid Exam Duration: ---					End Exam Duration: 3 Hrs			

Course Objectives:

- To conduct laboratory tests to find suitability of design of concrete mixes

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Behaviour of fresh concrete with advanced methods
CO 2	Find out the crushing strength of hardened concrete and its crack pattern during the testing
CO 3	Behavior of concrete against severe exposure conditions
CO 4	Understand the effect of Chemicals on properties of concrete

List of Experiments:

1. Determination workability of concrete by Vee-bee Consistometer test
2. Determination workability of concrete by Kelly ball Test and Flow table test.
3. Determine Young's Modulus of concrete and draw the graph
4. Determine Compressive strength of the concrete using Non Destructive testing by Rebound Hammer
5. Determination of Rapid chloride permeability Number by using RCPT as a durability parameter.
6. Determine Compressive strength of concrete in Acid Curing and Compare its strength with Conventional concrete
7. Determine of Compressive strength of concrete in Sulphate solution curing and Compare its strength with Conventional concrete
8. Determination of carbonation depth of concrete

Beyond the syllabus:

1. Penetration Resistance Test (ASTM C803)
2. Ultrasonic Pulse Velocity (ASTM C597)
3. Pullout Test (ASTM C900)

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Text Books:

1. M S Shetty "Concrete Technology – Theory and Practice", S Chand & Company Limited, New Delhi.

Reference Books:

1. Hemant Sood, L N Mittal and P D Kulkarni "Laboratory Manual on Concrete Technology", C B S Publishers and Distributors, New Delhi.

Regulations for PG Programs in Engineering (R22PG)

(Effective from 2022-23)

M. Tech (R22) Syllabus

Geotechnical Engineering

Kandula Srinivasa Reddy Memorial College of Engineering (Autonomous)

Kadapa-516005. AP

(Approved by AICTE, Affiliated to JNTUA, Ananthapuramu, Accredited by NAAC)

(An ISO 9001-2008 Certified Institution)

Annexure – 1 Curriculum

Geotechnical Engineering (Civil Engineering)

1st Semester

S. No.	Course Codes	Course Name	Category	L	T	P	IM	EM	Credits
1	2212101	Advanced Soil Mechanics	PCC	3	0	0	40	60	3
2	2212102	Advanced Foundation Engineering	PCC	3	0	0	40	60	3
3	**Program Elective Course – I**		PEC	3	0	0	40	60	3
	2212103	Soil Structure Interaction							
	2212104	Ground Improvement Techniques							
	2212105	Geoenvironmental Engineering							
4	**Program Elective Course – II**		PEC	3	0	0	40	60	3
	2212106	Critical Soil Mechanics							
	2212107	FEM in Geotechnical Engineering							
	2212108	Pavement Analysis and Design							
5	2212109	Soil Mechanics – 1 Lab	PCC	0	0	4	50	50	2
6	2212110	Soil Mechanics – 2 Lab	PCC	0	0	4	50	50	2
7	2212111	Research Methodology & IPR	-	2	0	0	40	60	2
8	**Audit Course – I**		Audit	2	0	0	40	0	0
				16	**0**	**8**	**340**	**400**	**18**

2nd Semester

S. No.	Course Codes	Course Name	Category	L	T	P	IM	EM	Credits
1	2212201	Experimental Geomechanics	PCC	3	0	0	40	60	3
2	2212202	Earth Retaining Structures	PCC	3	0	0	40	60	3
3	**Program Elective Course – III**		PEC	3	0	0	40	60	3
	2212203	Dynamics of Soil and Foundations							
	2212204	Foundations on Expansive Soils							
	2212205	Offshore Geotechnical Engineering							
4	**Program Elective Course – IV**		PEC	3	0	0	40	60	3
	2212206	Design of Under Ground Excavations							
	2212207	Design with Geosynthetics							
	2212208	Geotechnical Earthquake Engineering							
5	2212209	Subsoil Exploration Lab	PCC	0	0	4	50	50	2
6	2212210	Geotechnical Engineering Modeling Lab	PCC	0	0	4	50	50	2
7	2212211	Technical Seminar	-	0	0	4	100	0	2
8	**Audit Course – II**		Audit	2	0	0	40	0	0
				14	**0**	**12**	**400**	**340**	**18**

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

3rd Semester

S. No.	Course Codes	Course Name	Category	L	T	P	IM	EM	Credits
1	**Program Elective Course – V**		PEC	3	0	0	40	60	3
	2212301	Stability Analysis of Slopes							
	2212302	Foundations on Weak Rocks							
	2212303	Computational Geomechanics							
2	**Open Elective**		OEC	3	0	0	40	60	3
3	2212307	Dissertation Phase – 1 (to be continued nest semester)	Project	0	0	20	100	0	10
4	2212308	Co-Curricular Activities		0	0	0	0	0	2
				6	**0**	**20**	**180**	**120**	**18**

4th Semester

S. No.	Course Codes	Course Name	Category	L	T	P	IM	EM	Credits
1	2212401	Dissertation Phase – 2	Project	0	0	32	50	50	16
				0	**0**	**32**	**50**	**50**	**16**

List of Audit Courses offered:

Course Codes	Course Name
2270A01	English for Research Paper Writing
2270A02	Disaster Management
2270A03	Sanskrit for Technical Knowledge
2270A04	Value Education
2270A05	Constitution of India
2270A06	Pedagogy Studies
1870A07	Stress Management by Yoga
1870A08	Personality Development through Life Enlightenment Skills

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

List of Open Elective Courses offered to other branch students:

Course Codes	Course Name
22OE121	Solid Waste Management
22OE122	Waste to Energy
22OE123	Sub soil exploration techniques

I Semester
Syllabus

M. Tech., I Semester

Course Title	Advanced Soil Mechanics					M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212101	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To explain about the consolidation theory, strength behaviour of soil under various conditions, analyze the stress paths for different practical situations, study the critical parameters in soils, study the elastic and plastic deformations in soils

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Determination of consolidation properties
CO 2	Determine the shear strength properties and interpretation of the triaxial test results
CO 3	Draw the stress paths for drained and undrained conditions of the soil mass
CO 4	Determine the critical state parameters of the soils
CO 5	Understand the elastic and plastic deformations

UNIT-I

Compressibility of Soils

Consolidation theory (one, two, and three dimensional consolidation theories), consolidation in layered soil and consolidation for time dependent loading, determination of coefficient of consolidation (Casagrande method and Taylors method)

UNIT-II

Strength Behavior of Soils

Mohr Circle of Stress; UU, CU, CD tests, drained and undrained behavior of sand and clay, significance of pore pressure parameters; determination of shear strength of soil; Interpretation of triaxial test results.

UNIT-III

Stress Path

Drained and undrained stress path; Stress path with respect to different initial state of the soil; Stress path for different practical situations.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003 (A.P.)

UNIT-IV

Critical State Soil Mechanics

Critical state parameters; Critical state for normally consolidated and over consolidated soil; Significance of Roscoe and Hvorslev state boundary surface; drained and undrained plane. critical void ratio; effect of dilation in sands; different dilation models.

UNIT-V

Elastic and Plastic Deformations

Elastic wall; introduction to yielding and hardening; yield curve and yield surface, associated and non-associated flow rule.

Text books:

1. Das, B.M., Advanced Soil Mechanics, Taylor and Francis, 5th Edition, 2019.
2. Terzaghi, K., and Peck, R.B., Soil Mechanics in Engineering Practice, John Wiley & Sons, 1996.

Reference Books:

1. Atkinson, J.H. and Bransby, P.L, The Mechanics of Soils: An Introduction to Critical Soil Mechanics, McGraw Hill, 2013.
2. Wood, D.M., Soil Behavior and Critical State Soil Mechanics, Cambridge University Press, 1991.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Advanced Foundation Engineering				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212102	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To emphasize the importance of soil investigations including destructive and non-destructive methods
- To explain the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation system including settlement consideration
- To explain the need and how do analysis the pile and pile group under various soil conditions
- To explain the concepts of Terzaghi and IRC Methods and individual components
- To analyze the foundations under uplifting loads

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Prepare the exploration report and bring the correlations between the soil properties
CO 2	Design the footing and estimating the bearing capacity for various theories
CO 3	Estimate the load capacity, group action and settlement by various methods
CO 4	Design the well foundation and its components
CO 5	Design the foundations for uplifting loads

UNIT-I

Compressibility of Soils

Planning of Soil Exploration

Planning of Soil Exploration for Different Projects, Methods of Subsurface Exploration, Methods of Borings Along with Various Penetration Tests

UNIT-II

Compressibility of Soils

Shallow Foundations

Requirements for Satisfactory Performance of Foundations, Methods of Estimating Bearing Capacity, Settlements of Footings and Rafts, Proportioning of Foundations Using Field Test Data, IS Codes.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-III

Compressibility of Soils

Pile Foundations

Methods of Estimating Load Transfer of Piles, Settlements of Pile Foundations, Pile Group Capacity and Settlement, Negative Skin Friction of Piles, Laterally Loaded Piles, Pile Load Tests, Analytical Estimation of Load- Settlement Behavior of Piles, Proportioning of Pile Foundations, Lateral and Uplift Capacity of Piles.

UNIT-IV

Compressibility of Soils

Well Foundation

IS and IRC Codal Provisions, Elastic Theory and Ultimate Resistance Methods

UNIT-V

Compressibility of Soils

Coffer Dams

Various Types, Analysis and Design Foundations under Uplifting Loads

Text Books:

1. Bowles. J.E., Foundation Analysis and Design, Tata McGraw-Hill International Edition, 5th Edition, 1997.
2. Das B.M., Shallow Foundations: Bearing capacity and settlement, CRC Press, 2017.

Reference Books:

1. Tomlinson M.J., Pile design and construction Practice, Chapman and Hall Publication, 2008.
2. Poulos, H. G. and Davis, F. H., "Pile Foundation Analysis and Design", Wiley and Sons. 1980.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Soil Structure Interaction					M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212103	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To study the soil and foundation behaviour
- To analyze the beams on elastic foundations
- To analyze the plates on elastic medium
- To analyze the piles on elastic medium
- To analyze the load prediction on piles

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Apply different soil response models for specific problems based on the requirement
CO 2	Analyze the footings on elastic foundations
CO 3	Analyze the plates on elastic foundations
CO 4	Analyze the piles on elastic analysis and their settlement
CO 5	Compute pile response for various loading conditions for design purpose

UNIT-I

Soil-Foundation Interaction

Introduction to soil-foundation interaction problems, Soil behavior, Foundation behavior, Interface behavior, Scope of soil foundation interaction analysis, soil response models, Winkler, Elastic continuum, Two parameter elastic models, Elastic plastic behavior, Time dependent behavior.

UNIT-II

Beam on Elastic Foundation - Soil Models

Infinite beam, Two parameters, Isotropic elastic half space, Analysis of beams of finite length, Classification of finite beams in relation to their stiffness.

UNIT-III

Plate on Elastic Medium

Thin and thick plates, Analysis of finite plates, Numerical analysis of finite plates, simple solutions.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-IV

Elastic Analysis of Pile

Elastic analysis of single pile, Theoretical solutions for settlement and load distributions, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap.

UNIT-V

Laterally Loaded Pile

Load deflection prediction for laterally loaded piles, Subgrade reaction and elastic analysis, Interaction analysis, Pile-raft system, Solutions through influence charts. An introduction to soil-foundation interaction under dynamic loads.

Textbooks:

1. Selvadurai, A.P.S, Elastic Analysis of Soil-Foundation Interaction, Elsevier, 1979.
2. Poulos, H. G. and Davis, F. H., "Pile Foundation Analysis and Design", Wiley and Sons. 1980

Reference Books:

1. Structure Soil Interaction - State of Art Report, Institution of Structural Engineers, 1978.
2. Hemsley, J.A, Elastic Analysis of Raft Foundations, Thomas Telford, 1998.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Ground Improvement Techniques					M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212104	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To study the various modification methods, earth reinforcement techniques and their applications.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the mechanical modification and their importance
CO 2	Understand the chemical modification and their importance
CO 3	Understand the thermal modification and their importance
CO 4	Understand the mechanism of soil reinforcement and types of reinforcement
CO 5	Understand the applications of reinforcement, analysis and design

UNIT-I

Mechanical Modification

Dynamic compaction, impact loading, compaction by blasting, vibro-compaction; pre-compression, stone columns; Hydraulic modification: dewatering systems, preloading and vertical drains, electro-kinetic dewatering

UNIT-II

Chemical Modification

Modification by admixtures, stabilization using industrial wastes, grouting

UNIT-III

Thermal Modification

Ground freezing and thawing.

UNIT-IV

Soil Reinforcement

Reinforced earth, basic mechanism, type of reinforcements, selection of stabilization / improvement of ground using Geotextiles, Geogrid, geomembranes, geocells, geonets, and soil nails.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-V

Application of Soil Reinforcement

Shallow foundations on reinforced earth, design of reinforced earth retaining walls, reinforced earth embankments structures, wall with reinforced backfill, analysis and design of shallow foundations on reinforced earth, road designs with geosynthetics

Textbooks:

1. Hausmann, M.R., Engineering Principles of Ground Modification, McGraw-Hill International Editions, 2013.
2. Moseley, M.P., Ground Improvement, Blackie Academic & Professional, 2004.

Reference Books:

1. Xanthakos, P.P., Abramson, L.W. and Bruce, D.A., Ground Control and Improvement, John Wiley & Sons, 1994.
2. Koerner, R. M., Designing with Geosynthetics, Prentice Hall Inc. 2012.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Geo-Environmental Engineering				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212105	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To learn concepts of geo-environmental engineering, and planning and design of waste in landfills, ash ponds and tailing ponds.
- Explain the effects of pollutants in soil properties
- Awareness about the adverse effects of soil and ground water contaminants
- Analyze and apply the various techniques for remediation of the contaminants

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the soil-environment interaction and contaminants
CO 2	Design the landfill and its stability
CO 3	Identify the slurry waste, design the slurry ponds and its operations
CO 4	Identify the contaminated sites and design the barriers
CO 5	Identify the properties of the waste and reuse the material

UNIT-I

Introduction and Contamination

Industrialization and Urbanization, Pollution, Control and remediation. Surface contamination, Contamination transport, Soil-a Geotechnical trap, Effect of subsurface contamination, Detection of polluted zone, Monitoring and Effectiveness of designed facilities.

UNIT-II

Contaminants of Solid Waste in Landfills

Waste contaminants, landfills, types, shape and size of landfills. Liner and liner system, Cover and cover system, Stability of landfills. Landfill construction & operation, sustainable waste management.

UNIT-III

Contaminants of Slurry Wastes

Slurry transported wastes, slurry ponds, operation, Embankment construction and raising, Design aspects, Environmental Impact and control.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003.(A.P.)

UNIT-IV

Vertical Barriers for Contaminant

Contaminated sites, Types of barriers, Soil-Bentonite slurry trench walls, Cement-Bentonite slurry trench walls, construction, material and design aspects.

UNIT-V

Geotechnical Reuse of Waste Materials

Waste reduction, use in geotechnical construction, waste characteristics, transportation consideration, Engineering properties of Wastes, Waste material in Embankment and Fills.

Textbooks:

1. Geo-environmental Engineering by Sharma H.D & Reddy K.R, John Wiley & Sons, Inc, 2004.
2. Geo-environmental Engineering by Reddi L.N & Inyang. H.I, CRC Press, 2000.

Reference Books:

1. Geotechnical Geo – Environmental Engineering hand Book – Kerry Row, Springer Science, New York, 2001.
2. Ground Water Contamination: Bedient, Refai & Newell, Prentice Hall Publishers, 1999.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Critical Soil Mechanics				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212106	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To demonstrate basic mechanisms behind index properties and tests on soil, relate behaviour of soils subjected to various loading and drainage conditions within unified framework of Critical state soil mechanics.
- To analyze theory of elasticity and plasticity to characterize the stress – strain behaviour of soils and to formulate basic elasto-plastic model based on Critical State Soil Mechanics (CSSM) like Cam-clay

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the behaviour soil under various stress strain conditions
CO 2	Determine the critical state line for various drained conditions
CO 3	Understand the behaviour of over consolidated soils
CO 4	Understand the behaviour of sands in critical state
CO 5	Understand the behaviour of sails before failure by constructing elasto-plastic model

UNIT-1

Soil Behavior

State of Stress and Strain in Soils, Stress and Strain Paths and Invariants, Behavior of Soils under Different Laboratory Experiments

UNIT-1I

The Critical State Line and the Roscoe Surface

Families of Undrained Tests, Families of Drained Tests, The Critical State Line, Drained and Undrained Surfaces, The Roscoe Surface

UNIT-1II

Behavior of Over Consolidated Samples

The Hvorslev Surface: Behaviour of Over Consolidated Samples, Drained and Undrained Tests, The Hvorslev Surface, Complete State Boundary Surface, Volume Changes and Pore Water Pressure Changes

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-1V

Behaviour of Sands

The Critical State Line for Sands, Normalized Plots, The Effect of Dilation, Consequences of Taylor's Model

UNIT-V

Behaviour of Soils before Failure

Elastic and Plastic Deformations, Plasticity Theory, Development of Elastic-Plastic Model Based on Critical State Soil Mechanics, The Cam-Clay Model, The Modified Cam-Clay Model

Textbooks:

1. J. H. Atkinson and P. L. Bransby, "The Mechanics of Soils: An Introduction to Critical State Soil Mechanics", Mcgraw Hill, 1978
2. Wood, D.M., Soil Behavior and Critical State Soil Mechanics, Cambridge University Press, 1991

Reference Books:

1. B. M. Das, "Fundamental of Geotechnical Engineering", Cengage Learning, 2013
2. Das, B.M., Advanced Soil Mechanics, Taylor and Francis, 5th Edition, 2019.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	FEM in Geotechnical Engineering				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212107	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To explain the basic concepts of FEM
- To explain the principles and formulation of variational methods
- To analyze the displacements and explain the problems in soils and rocks
- To explain the applications of FEM in geotechnical engineering

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the behaviour soil under various stress strain conditions
CO 2	Determine the critical state line for various drained conditions
CO 3	Understand the behaviour of over consolidated soils
CO 4	Understand the behaviour of sands in critical state
CO 5	Understand the behaviour of sails before failure by constructing elasto-plastic model

UNIT-I

Basic Concepts

Basic concepts - Discretization of continuum, typical elements, the element characteristic matrix, Element assembly and solution for unknowns - Applications.

UNIT-II

Variational Principles

Variational principles, variational formulation of boundary value problems, Variational methods approximation such as Ritz and weighted residual (Galerkin) methods, Applications.

UNIT-III

Displacements Based Elements

Displacements based elements, finite elements for axial symmetry. One-dimensional problems of stress, deformation and flow, Assembly, Convergence requirements, Finite elements analysis of two-dimensional problems. The linear and quadratic triangle, Natural coordinates.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-1V

Iso-Parametric Formulation

Application of FEM to Problems in soils and rocks, Introduction to non-linearity, Finite difference method, Description and application to consolidation, seepage, Winkler foundation etc.,

UNIT-V

Applications in Geotechnical Engineering

Application of FEM to Problems in soils, Introduction to non-linearity, Finite difference method, Description and application to consolidation, seepage, Winkler foundations

Textbooks:

1. Cook, R.D., Malkus, D.S., and Plesha, M.E., Concepts and Applications of Finite Element Analysis, John Wiley, 2007.
2. Smith, I.M., Programming the Finite Element Method with Application to Geomechanics, John Wiley and sons, New Delhi, 2000.

Reference Books:

1. Reddy, J.N., An Introduction to the Finite Element Method, McGraw Hill, 2005.
2. Potts, D.M. and Zdramcovic, L., Finite Element analysis in Geotechnical Engineering - Application, Thomas Telford, 2001.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Pavement Analysis and Design				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212108	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To understand the different types of pavements, conduct analysis of flexible pavements for stresses, strains, and deflections in one-, two-, and three-layered systems, design flexible pavements using the AASHTO design procedure, conduct analysis of rigid pavements for stresses, strains, and deflections, To design rigid pavements using the AASHTO design procedure.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Identify the various types and components of pavements and design factors
CO 2	Understand the stress strain behaviour in flexible pavement
CO 3	Design the flexible pavement for highways and airports
CO 4	Understand the stress components in rigid pavements
CO 5	Design the rigid pavement and their components

UNIT-I

Introduction

Types and component parts of pavements, Factors affecting design and performance of pavements. Highway and airport pavements

UNIT-II

Stresses and Strains in Flexible Pavements

Stresses and strains in an infinite elastic half space use of Boussinesq's equations - Burmister's two layer and three layer theories; Wheel load stresses, various factors in traffic wheel loads; Equivalent single wheel load of multiple wheels. Repeated loads and EWL factors

UNIT-III

Flexible Pavement Design Methods for Highways and Airports

Empirical, semi-empirical and theoretical approaches; Development, principle, design steps of the different pavement design methods including AASHTO, Asphalt Institute, Shell Methods. IRC method of pavement design

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-IV

Stresses in Rigid Pavements

Types of stresses and causes; Introduction to Westergaard's equations for calculation of stresses in rigid pavement due to the influence of traffic and temperature; Considerations in rigid pavement analysis, EWL; wheel load stresses, warping stresses, frictional stresses, combined stresses.

UNIT-V

Rigid Pavement Design

Design of cement concrete pavement for highways and runways; Design of joints, reinforcements, tie bars, dowel bars. IRC method of design; Design of continuously reinforced concrete pavements

Textbooks:

1. Yoder R.J and Witchakm. W., Principles of Pavement Design, John Wiley, 2000.
2. Yang H Huang - Pavement Analysis and Design, 2nd Edition, Pearson Education, 2010.

Reference Books:

1. Guidelines for the Design of Flexible Pavements, IRC: 37 - 2001, the Indian Roads Congress, New Delhi.
2. Guideline for the Design of Rigid Pavements for Highways, IRC: 58-1998, the Indian Roads Congress, New Delhi.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Soil Mechanics-1 Lab					M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212109	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	4	2	50	50	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- Classify the soil by physical observation
- Carryout interpolation among the estimated soil design parameters

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Estimate index and engineering properties of soils (coarse and fine)
CO 2	Identify the soil classification

List of Experiments:

1. Determination of Moisture Content and Specific Gravity
2. Grain Size Analysis
3. Determination of Atterberg's Limits
4. Visual Classification Test for Soils
5. Determination of In-Situ Densities
   a) Core Cutter Method
   b) Sand Replacement Method
6. Proctor Compaction
   a) Standard Proctor Compaction
   b) Modified Proctor Compaction
7. Determination of Coefficient of Permeability
   a) Constant Head Method
   b) Variable Head Method
8. Consolidation Test

Textbooks:

1. S. Mittal and JP Shukla, Soil Testing for Engineers, Khanna Publishers, New Delhi, 2008.
2. KVS Apparao and VCS Rao, Soil Testing – Laboratory Manual & Question Bank, University Science Press, New Delhi, 2013.

Reference Books:

1. Compendium of Indian Standards on Soil Engineering: Part – 1 & 2, Laboratory and Field Testing of Soils for Civil Engineering Purposes.
2. Braja M. Das, Soil Mechanics Laboratory Manual, Oxford University Press, New York, 2016.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Soil Mechanics-2 Lab				M. Tech., I Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212110	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	4	2	50	50	100
Mid Exam Duration: 2 Hrs.					End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- Conduct the various tests to determine shear strength parameters of the soils
- Study the bearing and swell pressure, chemical components in soils

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Estimate shear strength and bearing pressure of the soils
CO 2	Estimate the swell pressure, amount of solids and amount $CaCO_3$ in soils

List of Experiments:

1. Direct Shear Test
2. Unconfined Compression Test
3. Triaxial Shear Test – UU, CU, CD Tests
4. California Bearing Ratio
5. Laboratory Vane Shear Test
6. Swell Pressure Test
7. Total Soluble Solids Content in Soils
8. Calcium Carbonate Content in Soils

Textbooks:

1. S. Mittal and JP Shukla, Soil Testing for Engineers, Khanna Publishers, New Delhi, 2008.
2. KVS Apparao and VCS Rao, Soil Testing – Laboratory Manual & Question Bank, University Science Press, New Delhi, 2013.

Reference Books:

1. Compendium of Indian Standards on Soil Engineering: Part – 1 & 2, Laboratory and Field Testing of Soils for Civil Engineering Purposes.
2. Braja M. Das, Soil Mechanics Laboratory Manual, Oxford University Press, New York, 2016.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Research Methodology &IPR				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212111	Mandatory Course (MC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	0	0	2	40	60	100
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- About the basics of how research problems are defined, research methods are adopted and/or developed, research is undertaken, and how research results are communicated to the peers.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand research problem formulation.
CO 2	Analyze research related information, follow research ethics
CO 3	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
CO 4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
CO 5	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT-I

Introduction

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II

Literature

Effective literature studies approaches, analysis Plagiarism, Research ethics

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-III

Technical Writing

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-IV

Nature of Intellectual Property

Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-V

Patent Rights and New Developments in IPR

Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Textbooks:

1. Stuart Melville and Wayne Goddard, "Research methodology: An Introduction for Science & Engineering Students", Juta Education, 1996.
2. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners", Sage Publications, 2011.

Reference Books:

1. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", Clause 8 Publishing, 2021.
2. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	English for Research Paper Writing				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2270A01	Audit	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	0	0	0	40	0	40
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- On how to improve your writing skills and level of readability.
- About what to write in each section (Abstract, Introduction, Methodology etc.) and what tenses to use. Of course, not all disciplines use the same section headings, but most papers nevertheless tend to cover similar areas.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand that how to improve writing skills and level of readability
CO 2	Learn about what to write in literature
CO 3	Understand the skills needed for writing the title
CO 4	Understand the skills needed for writing the results and conclusions
CO 5	Understand the skills needed for writing a title ensure the good quality of paper at very first time submission

UNIT-I

Planning and Preparation

Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness, Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

UNIT-II

Review of Literature

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT-III

Key Skills

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-IV

Skills needed to Write Results and Conclusions

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT-V

Paper Submission

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

Textbooks:

1. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
2. Day R, How to Write and Publish a Scientific Paper, Cambridge University Press, 2006.

Reference Books:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's Book.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Disaster Management					M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2270A02	Audit	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	0	0	0	40	0	40
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response
CO 2	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO 3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO 4	Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in
CO 5	Understand the risk assessment and applying the reduction techniques, implementing the disaster mitigation programs to bring awareness

UNIT-I

Introduction

Disaster: Definition, Factors and Significance; Difference Between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT-II

Repercussions of Disasters and Hazards

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Manmade disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering (Autonomous)
KADAPA - 516 003. (A.P.)

UNIT-III

Disaster Prone Areas in India

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

UNIT-IV

Disaster Preparedness and Management

Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data. From Meteorological and Other Agencies, Media Reports:

Governmental and Community Preparedness.

UNIT-V

Risk Assessment and Mitigation

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival. Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Textbooks:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, Issues and Strategies", New Royal Book Company, 2007.
2. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi, 2007.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., I Semester

Course Title	Sanskrit for Technical Knowledge				M. Tech., I Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2270A03	Audit	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	0	0	0	40	0	40
Mid Exam Duration: 2 Hrs.						End Exam Duration: 3 Hrs.		

Course Objectives: The course is designed to students,

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the basic Sanskrit language
CO 2	Ancient Sanskrit literature about science & technology can be understood

UNIT-I
Alphabets in Sanskrit
UNIT-II
Past/Present/Future Tense, Simple Sentences
UNIT-III
Order, Introduction of roots
UNIT-IV
Technical information about Sanskrit Literature
UNIT-V
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Textbooks:

1. "Teach Yourself Sanskrit" Prathama Deeksha - Vempati Kutumba Shastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication, 2012.
2. "Abhyas pustakam" – Dr. HR Vishwas, Samskrita-Bharti Publication, New Delhi, 2020.

Reference Books:

1. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi, 2006.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

II Semester
Syllabus

M. Tech., II Semester

Course Title	Experimental Geomechanics				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212201	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To identify the soil type of soil from a job site or in a professional setting, determine that soil's properties based on type and evaluate design decisions from your understanding of that soil's properties.
- To explore the scientific principles used to describe the major engineering properties of soil, and the engineering testing methods used to quantify these properties

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Plan subsurface investigation based on the requirement of civil engineering project and site condition. Can finalize depth and number of boreholes
CO 2	Execute different subsurface exploration tests
CO 3	Collect disturbed/undisturbed samples for laboratory tests and can suggest design parameters
CO 4	Expose different methods for estimation of dynamic soil properties required for design purpose.
CO 5	Develop instrumentation scheme for monitoring of critical sites

Unit - I

Introduction

Scopes and objectives of explorations – Planning a subsurface exploration – Stages in sub surface exploration – Explorations for preliminary and detailed design – Spacing and depth of exploration

Unit - II

Open Excavation and Borings of Exploration

Pits and Trenches – Drifts and Shafts – Methods of boring – Auger Borings – Wash Borings –Rotary Drilling –Percussion Drilling – Core Drilling

Unit - III

Soil Samples and Samplers

Types of soil samples – Disturbed samples –Undisturbed samples – Design features affecting the sample disturbance –Split spoon samplers – Scraper Bucket Samplers –Shell by Tubes

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

and Thin walled Samplers – Piston Samplers – Denis Samplers – Preservation and handling of samples

Unit - IV

In-Situ Testing

Field tests – Standard Penetration Tests – Cone Penetration Tests – In-situ Vane Shear Test– Plate Load Test, monotonic and cyclic –Field Permeability Tests – In-situ Tests using Pressure meter – Observation of Ground Water Table– Instrumentation in soil engineering, strain gauges, resistance and inductance type

Unit - V

Geophysical Methods and Wave Measurements

Geophysical Methods: Types–Electrical Resistivity Methods – Electrical Profiling Method – Electrical Sounding Method – Seismic Methods – Seismic refraction method – Sub-soil Investigation Report.

Wave Measurements: Cross Hole Tests (CHT), Downhole Tests (DHT), Spectral Analysis of Surface Waves, Seismic Refraction, Suspension Logging: Electromagnetic Wave Techniques: Ground Penetrating Radar (GPR), Electromagnetic Conductivity (EM), Surface Resistivity (SR), Magnetometer Surveys (MT)

Textbooks:

1. S.P. Brahma, Foundation Engineering, Tata McGraw-Hill Publishers, New Delhi, 1993.
2. V.N.S. Murthy,Soil Mechanics & Foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., India, 2017.

Reference Books:

1. Hvorslev, MJ, Sub Surface Exploration and Sampling of Soils for Civil Engineering Purpose, Water-ways Station, Vicksburg, Mississippi, 1949.
2. AraArman and NareshSamtani, Sub Surface Investigations, Federal Highway Administration, Arlington, Virginia, 2002.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Earth Retaining Structures				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212202	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To calculate earth pressure on various earth retaining structures such as gravity retaining walls, sheet pile, bulkheads, bracing/struts and coffer dams, design a relevant earth retaining structure for given soil condition, design of sheet pile with and without anchors, and to design the reinforced wall by using different materials

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Determine the earth pressure and point of application for various types of soils and surcharge
CO 2	Analyzing the stability of a retaining structure and drainage conditions
CO 3	Design of sheet pile wall and fixing the embedment length, design and analyze the caissons according to IRC guidelines
CO 4	Designing of lateral supporting system and their stability
CO 5	Design of reinforced earth wall

Unit – I

Earth Pressure

Rankine and Coulomb theories, active, passive and pressure at rest; concentrated surcharge above the back fill, earth pressure due to uniform surcharge, earth pressure of stratified backfills, saturated and partially saturated backfill.

Unit – II

Retaining Walls

Proportioning of retaining walls, stability of retaining walls, mechanically stabilized retaining walls/reinforced earth retaining walls

Unit – III

Sheet Pile Wall

Free Earth System, Fixed Earth System

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

Bulkheads

Bulkheads with free and fixed earth supports, equivalent beam method, Anchorage of bulkheads and resistance of anchor walls, spacing between bulkheads and anchor walls, resistance of anchor plates

Unit – V

Braced Excavations

Earth pressure against bracings in cuts, Heave of the bottom of cut in soft clays

Textbooks:

1. Das, B.M., Principles of Geotechnical Engineering, Cengage Learning India Private Limited, UP,2018.
2. Mandal, J.N., Reinforced Soil and Geo-textiles, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Reference Books:

1. McCarthy, D.F., Essentials of Soil Mechanics and Foundations: Basic Geo-techniques (Sixth Edition), Prentice Hall, 2002.
2. Militisky, J. and Woods, R., Earth and Earth Retaining Structures, Routledge, 1992.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Dynamics of Soil and Foundations				M. Tech. II Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212203	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- Study vibration concepts in soils, effect of liquefaction, dynamic elastic constants, cyclic plate load test, machine foundation design and bearing capacity of foundations

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understands theory of vibration and resonance phenomenon, dynamic amplification
CO 2	Understand propagation of body waves and surface waves through soil.
CO 3	Exposed to different methods for estimation of dynamic soil properties required for design purpose
CO 4	Predict dynamic bearing capacity and assess liquefaction potential of any site
CO 5	Apply theory of vibrations to design machine foundation based on dynamic soil properties and bearing capacity

Unit – I

Fundamentals of Vibrations and Wave Propagation

Single, two and multiple degree of freedom systems,vibration isolation, vibration absorbers, vibration measuring instruments. Wave propagation: elastic continuum medium, semi-infinite elastic continuummedium,soil behaviour under dynamic loading.

Unit – II

Liquefaction of Soils

liquefaction mechanism, factors affecting liquefaction, studies bydynamic tri-axial testing, oscillatory shear box, shake table and blast tests, assessment ofliquefaction potential.

Unit – III

Dynamic elastic constants of soil

Determination of dynamic elastic constants, variousmethods including block resonance tests, cyclic plate load tests, wave propagation tests,oscillatory shear box test.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

Machine Foundations

Design criteria for machine foundations; Elastic homogeneoushalf space and lumped parameter solutions, analysis and design of foundations for reciprocatingand impact type machines, turbines, effect of machine foundation on adjoining structures.

Unit – V

Bearing Capacity of Foundations

Introduction to bearing capacity of dynamicallyloaded foundations, such as those of water towers, chimneys and high rise buildings, response ofpile foundations.

Textbooks:

1. Das, B.M., "Fundamentals of Soil Dynamics", Elsevier,1983.
2. Prakash, S., Soil Dynamics, McGraw Hill, 1981.

Reference Books:

1. Kameswara Rao, N.S.V., Vibration Analysis and Foundation Dynamics, Wheeler Publication Ltd., 1998.
2. Prakash, S. and Puri, V.K., Foundation for Machines: Analysis and Design, John Wiley & Sons, 1998

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Foundations on Expansive Soils				M. Tech. II Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212204	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To study the behaviour, treatment and moisture control of the expansive soils and design steps for shallow and deep foundations and estimation of lateral pressure.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the behaviour of expansive soils
CO 2	Understand the treatment methods and moisture control techniques
CO 3	Design the shallow foundations on the expansive soils
CO 4	Design the deep foundations on the expansive soils
CO 5	Determine the lateral pressure and designing the support systems

Unit – I

Nature of Expansive Soils

Microscale Aspects of Expansive Soil Behavior, Macroscale Aspects of Expansive SoilBehavior, Identification of Expansive Soils, Characteristics of Expansive Soil Profiles

Unit – II

Soil Treatment and Moisture Control

Over excavation and Replacement, Pre-wetting Method, Chemical Admixtures, Moisture Control Alternatives

Unit – III

Design Methods for Shallow Foundations

Spread Footing Foundations, Stiffened Slab Foundations, Remedial Measures for Shallow Foundations

Unit – IV

Design Methods for Deep Foundations

Pier and Grade Beam Foundation, Patented Piers, Deep Foundation Design Examples, Remedial Measures for Deep Foundations

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – V

Lateral Pressure on Earth Retaining Structures

Computation of Lateral Pressure from Expansive Soils, Testing for Measuring Lateral Swelling Pressure, Reduction of Lateral Swelling Pressure, Design for Lateral Earth Pressure

Textbooks:

1. John D Nelson and Debora J Miller., "Expansive Soils – Problems and Practice in Foundation and Pavement Engineering", John Wiley & Sons, INC., 1997.
2. RamachandraPhani Kumar and Sana Suri., "Expansive Soils – Problems and Remedies", LAP Lambert Academic Publishing, 2013.

Reference Books:

1. D.R. Snethen., "A Review of Engineering Experiences with Expansive Soils in Highway Sub-grades", Federal Highway Administration, Washington DC., 1976.
2. F.H.Chen, Foundations on Expansive Soils, Elsevier Scientific Publishing Company, New York, 1988.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Offshore Geotechnical Engineering				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212205	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs		

Course Objectives:

- Execute investigation program for marine soil deposits and select necessary design parameters. Design suitable marine foundation as per project requirement. Can develop numerical model for response of marine foundation for offshore conditions

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the marine soil deposits and their properties
CO 2	Understand the behaviour of soils subjected to repeated loading
CO 3	Perform site investigation in marine environment
CO 4	Differentiate the offshore and nearshore foundation structures,
CO 5	Design the marine foundations by using FEM based analysis

Unit – I

Marine Soil Deposits

Offshore environment, Offshore structures and foundations, Specific problems related to marine soil deposits, Physical and engineering properties of marine soils

Unit – II

Behavior of Soils Subjected to Repeated Loading

Effect of wave loading on offshore foundations, Behavior of sands and clays under cyclic loading, Laboratory experiments including repeated loading, Cyclic behavior of soils based on fundamental theory of mechanics, Approximate engineering methods which can be used for practical cases

Unit – III

Site Investigation in the Case of Marine Soil Deposits

Challenges of site investigation in marine environment, Different site investigation techniques, sampling techniques, Geophysical methods, Recent advancements in site investigation and sampling used for marine soil deposits

Unit – IV

Foundations in Marine Soil Deposits

Different offshore and nearshore foundations, Gravity platforms, Jack-up rigs, pile foundations. Caissons, Spud Cans

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – V

Numerical Modeling of Marine Foundations Subjected to Wave Loading

Numerical modeling of cyclic behavior of soils, empirical models, elastic-plastic models, FEM analysis of marine foundations subjected to wave loading

Textbooks:

1. H. G. Poulos. "Marine Geotechnics", Unwin Hyman Ltd, London, UK, 1988
2. D. V. Reddy and M. Arockiasamy, "Offshore Structures", Volume: 1, R.E. Kreiger Pub and Co., 1991

Reference Books:

1. D. Thomson and D. J. Beasley, "Handbook of Marine Geotechnical Engineering", USNavy, 2012

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Design of Under Ground Excavations				M. Tech., II Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212206	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To know the planning and exploration of various underground projects, analyze the stress distribution, analyze the rock quality designation and also evaluate its strength
- To analyze the interaction between the rock mass and tunnel surface

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the applications and principles of underground excavations
CO 2	Understand the stress distribution around the tunnel with different shapes
CO 3	Performing the various tests to identify the classification of rock
CO 4	Designing the supporting system for tunnels
CO 5	Performing the tests on rock mass

Unit – I

Introduction

Introduction, planning of exploration for various underground construction projects, stereographic projection method, principle and its application in underground excavation design.

Unit – II

Stress Analysis for Tunnels

Elastic stress distribution around tunnels, stress distribution for different shapes and under different in-situ stress conditions, Greenspan method, design principles, multiple openings,openings in laminated rocks, elasto-plastic analysis of tunnels, Daemen's theory

Unit – III

Rock Mass Classification

Application of rock mass classification systems, ground conditions in tunneling, analysis of underground openings in squeezing and swelling ground, empirical methods, estimation of elastic modulus and modulus of deformation of rocks; uniaxial jacking / plate jacking tests, radial jacking and Goodman jacking tests, long term behaviour of tunnels and caverns, New Austrian Tunneling Method (NATM), Norwegian Tunneling Method (NTM), construction dewatering.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering (Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

Design of Support System

Rock mass-tunnel support interaction analysis, ground response and support reaction curves, Ladanyi'selasto-plastic analysis of tunnels, design of various support systems including concrete and shotcrete linings, steel sets, rock bolting and rock anchoring, combined support systems, estimation of load carrying capacity of rock bolts

Unit – V

Test on Rock Mass

In-situ stress, flat jack, hydraulic fracturing and over coring techniques and USBM type drill hole deformation gauge, single and multi-point bore hole extensometers, load cells, pressure cells, etc. Instrumentation and monitoring of underground excavations, during and after construction, various case studies

Textbooks:

1. Hoek, E and Brown, E. T.," Underground Excavations in Rocks", Institute of Mining Engineering, 1980.
2. Singh, B. and Goel, R.K., "Rock Mass Classification- A Practical Engineering Approach", Elsevier, 1999.

Reference Books:

1. Obert, L. and Duvall, W.I., "Rock Mechanics and Design of Structures in Rocks", John Wiley.
2. Singh, B. and Goel, R.K., "Tunneling in Weak Rocks", Elsevier

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Design with Geosynthetics				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212207	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs		

Course Objectives:

- To understand the emerging trends of Geosynthetic in Geotechnical Engineering
- To evaluate the different properties of including different tests
- To analyze the functions of geosynthetic and its suitability
- To design different structures using geosynthetics according to various applications

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the applications and principles of underground excavations
CO 2	Understand the stress distribution around the tunnel with different shapes
CO 3	Performing the various tests to identify the classification of rock
CO 4	Designing the supporting system for tunnels
CO 5	Performing the tests on rock mass

Unit – I

Overview of Geosynthetics

Basic description of Geosynthetics, Polymeric Material, Geotextiles, Geogrids, Geonets, Geomembranes, Geosynthetic Clay Liners, Geopipe, Geofoam, Geocomposites.

Unit – II

Designing with Geotextiles

Design Methods, Geotextile Functions, Mechanism, Properties, Test Methods, Separation, Roadway Reinforcement, Soil Reinforcement, Filtration, Drainage, Multiple Functions, Construction Methods and Techniques.

Unit – III

Designing with Geogrids

Properties and Test Methods, Designing for Geogrid Reinforcement, Design Critique, Construction Methods.

Unit – IV

Designing with Geonets

Properties and Test Methods, Designing for Geonet Drainage, Design Critique, Construction Methods.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering (Autonomous)
KADAPA - 516 003. (A.P.)

Unit – V

Designing with Geomembranes

Properties and Test Methods, Survivability Requirements, Liquid Containment Liners, Covers for Reservoirs, Water Conveyance Liners, Solid Material Liners, Landfill Covers and Closures, Under Ground Storage Tanks, Hydraulic and Geotechnical Applications.

Text Books:

1. "Designing with Geosynthetics by Robert M. KoernerPrantice Hall, Eaglewood cliffs, NJ, 2012.
2. "Engineering with Geosynthetics", by G. Venkatappa Rao and GVSSuryanarayana Raju – Tata McGraw Hill Publishing Company Limited – New Delhi, 1990.

Reference Books:

1. Jewell, R.A., Soil Reinforcement with Geotextile, CIRIA, London, 1996.
2. Jones, C.J.F.P., Earth Reinforcement and Soil Structures, Earthworks, London, 1988.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Geotechnical Earthquake Engineering				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212208	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To know the causes and quantification of earthquake.
- Exposed to the effect of earthquake and the design criterions to be followed for the design different geotechnical structures

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Determine size of earthquake and strong ground motion parameters from a recorded seismogram
CO 2	Analyze deterministic or probabilistic seismic hazard analysis considering the different soil properties and site conditions
CO 3	Study principles of wave propagation through rocks and soil media to derive transfer functions for ground response analysis
CO 4	Analyze liquefaction susceptibility of a site and determine factor of safety against liquefaction
CO 5	Design earthquake resistant geotechnical structures like shallow and deep foundations, retaining walls, slopes

Unit – I

Earthquake Seismology

Causes of Earthquake, Plate Tectonics, Earthquake Fault Sources, Seismic Waves, Elastic Rebound Theory, Quantification of Earthquake, Intensity and Magnitudes, Earthquake Source Models.

Unit – II

Earthquake Ground Motion

Seismograph, Characteristics of Ground Motion, Effect of Local Site Conditions On Ground Motions, Design Earthquake, Design Spectra, Development of Site Specification and Code-Based Design.

Unit – III

Ground Response Analysis

One-Dimensional Ground Response Analysis: LinearApproaches, Equivalent Linear Approximation of Non-Linear Approaches, Computer Code "SHAKE".

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

Liquefaction and Lateral Spreading

Liquefaction Related Phenomena, LiquefactionSusceptibility: Historical, Geological, Compositional and State Criteria. Evaluationof Liquefaction by Cyclic Stress and Cyclic Strain Approaches, Lateral Deformation and Spreading, Criteria for Mapping Liquefaction Hazard Zones.

Unit – V

Design of Foundations and Stability Analysis of Slopes

Seismic Design of Foundations, Seismic Slope Stability Analysis: Internal Stability and Weakening Instability and Seismic Design of Retaining Walls.

Textbooks:

1. Steven Kramer, "Geotechnical Earthquake Engineering", Pearson, 2008.
2. Ferrito, J.M, Seismic Design Criteria for Soil Liquefaction, Tech. Report of Naval Facilities service center, Port Hueneme, 1997.

Reference Books:

1. Seco e Pinto, P., Seismic Behaviour of Ground and Geotechnical Structure, CRC Press, 1997.
2. Naeim, F., The Seismic Design Handbook, Kluwer Academic Publication, 2nd Edition, 2001.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Subsoil Exploration Lab					M. Tech., II Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212209	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	4	2	50	50	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To estimate the soil properties, load carrying capacity and soil profile.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Classify the soil based on the collection of soils by borings and SPT
CO 2	Design the suitable foundation based upon the load carrying capacity of the soil

List of Experiments:

1. Auger Boring
2. Standard Penetration Test
3. Plate Load Test
4. Field CBR Test
5. Pile Load Test
6. Geophysical Exploration Tests

Textbooks:

1. S. Mittal and JP Shukla, Soil Testing for Engineers, Khanna Publishers, New Delhi, 2008.

Reference Books:

1. Compendium of Indian Standards on Soil Engineering: Part – 1 & 2, Laboratory and Field Testing of Soils for Civil Engineering Purposes.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Geotechnical Engineering Modeling Lab				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212210	Professional Core (PCC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	4	2	50	50	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs		

Course Objectives:

- To estimate the bearing capacity and settlement of footing and pile, safe design of the slope.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Design the bearing capacity and settlement of shallow and deep footings
CO 2	Design the slope and find the factor of safety against shear failure.

List of Experiments:

1. Ultimate, Net and Safe Bearing Capacity Using Terzaghi and IS Code Methods.
2. Net Settlement Pressure
3. Hyperbolic Curve Fitting of Tri-axial Compression Data
4. Terzaghi One dimensional consolidation solution by FDM (perform analysis of substructures by packages)
5. Beam on Elastic Foundation by FDM
6. FDM Solution for Raft Foundation
7. Axial Loaded Piles by Direct FEM
8. Laterally Loaded Piles by FDM & FEM
9. Stability Analysis by Bishop theory
10. Stability Analysis by Method of Slices.

Softwares:

1. GeoWizard
2. GeoStudio
3. Oyasis

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Technical Seminar					M. Tech., II Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212211	Project	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	4	2	100	0	100
Mid Exam Duration: ----						End Exam Duration: ----		

Course Objectives:

- To explain themselves with the latest developments, the State of art, in a Particular Area. It will be forum for the exchange of ideas with experts and the professional so with a view to acquiring additional knowledge acquainting each other with new research work, new methods and techniques of investigation or production

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Students will get an opportunity to work in actual industrial environment if they opt for internship
CO 2	In case of mini project, they will solve a live problem using software/analytical/computational tools
CO 3	Students will learn to write technical reports
CO 4	Students will develop skills to present and defend their work in front of technically qualified audience

Description:

Students can take up small problems in the field of design engineering as technical seminar. It can be related to solution to an engineering problem, verification and analysis of experimental data available, conducting experiments on various engineering subjects, material characterization, studying a software tool for the solution of an engineering problem etc.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Value Education				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2270A04	Audit	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	0	0	0	40	0	40
Mid Exam Duration: 2 Hrs					End Exam Duration: 0 Hrs		

Course Objectives:

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Know the self-development
CO 2	Learn the importance of human values
CO 3	Developing the personality
CO 4	Understanding the true friendship
CO 5	Understanding and improving the character

Unit – I

Values and Self-Development

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements.

Unit – II

Importance of Cultivation of Values

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline.

Unit – III

Personality and Behavior 1

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

Personality and Behavior 2

True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit – V

Character and Competence

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Textbooks:

1. Chakroborty, S.K. "Values and Ethics for Organizations Theory and Practice", Oxford University Press, New Delhi, 1999.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Constitution of India				M. Tech., II Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2270A05	Audit	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	0	0	0	40	0	40
Mid Exam Duration: 2 Hrs					End Exam Duration: 0 Hrs		

Course Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO 2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO 3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO 4	Discuss the passage of the Hindu Code Bill of 1956.

Unit – I

History and Philosophy of the Indian Constitution

History, Drafting Committee, (Composition & Working), Preamble, Salient Features

Unit – II

Contours of Constitutional Rights & Duties

Fundamental Rights,Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Unit – III

Organs of Governance

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

Local Administration

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit – V

Election Commission

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Textbooks:

1. The Constitution of India, 1950 (Bare Act), Government Publication., 2021.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Reference Books:

1. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
2. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., II Semester

Course Title	Pedagogy Studies				M. Tech., II Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2270A06	Audit	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	0	0	0	40	0	40
Mid Exam Duration: 2 Hrs						End Exam Duration: 0 Hrs		

Course Objectives:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
CO 2	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
CO 3	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Unit – I

Introduction and Methodology

Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

Unit – II

Thematic Overview

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit – III

Pedagogical Practices

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA-516 003. (A.P.)

Unit – IV

Professional Development

Alignment with classroom practices and follow- up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

Unit – V

Research Gaps and Future Directions

Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact

Textbooks:

1. Alexander RJ, Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell, 2001.
2. Akyeampong K, Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID., 2003.

Reference Books:

1. Ackers J, Hardman F, Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261., 2001.
2. Agrawal M, Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379., 2004.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

III Semester

Syllabus

M. Tech., III Semester

Course Title	Stability Analysis of Slopes				M. Tech., III Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212301	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To introduce the concepts of slope stability, introduce the concepts of slope stability analyses using simplified methods, and to describe some of the sophisticated methods of slope stability analyses.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the types of slopes and their failures
CO 2	Design the stability for finite and infinite slopes
CO 3	Check the stability of a slope when there is a seepage
CO 4	Adopt the advanced methods to strengthen the slope
CO 5	Investigate the failures in stability of slopes

Unit – I

Slopes

Types and Causes of Slope Failures, Mechanics of Slope Failure, Failure Modes.

Unit – II

Stability Analysis

Infinite and Finite Slopes with or Without Water Pressures; Concept of Factor of Safety, Pore Pressure Coefficients, Mass Analysis, Wedge Methods, Friction Circle Method; Method of Slices, Bishop's Method, Janbu's Method, Morgenstern and Price, Spencer's Method

Unit – III

Stability Analysis in the Presence of Seepage

Two Dimensional Flow – Laplace Equation and its Solution, Graphical Method, Determination of Phreatic Line, Flow Nets in Homogeneous and Zoned Earth Dams under Steady Seepage and Draw-Down Conditions, Seepage Control in Earth Dams, Influence of Seepage on Slope Stability Analysis of Dam Body During Steady Seepage

Unit – IV

Strengthening Measures

Stabilization of Slopes by Drainage Methods, Surface and Subsurface Drainage, Use of Synthetic Filters, Retaining Walls, Stabilization and Strengthening of Slopes, Shotcreting,

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Rock Bolting and Rock Anchoring, Instrumentation and Monitoring of Slopes, Slope Movements, Warning Devices, Maintenance of Slopes

Unit – V

Case studies of urban slope stability

Aims, Regional perspective, Landslide inventory, Stability analyses of three sites, Case study 1 – Site 64 in the suburb of Scarborough, Case study 2 – Site 77, Morrison Avenue – Wombarra, Case study 3 – Site 134, Woonona Heights, concluding remarks on the three case studies, Landslide-triggering rainfall, Landslide susceptibility and hazard, Observational approach and monitoring.

Textbooks:

1. Chowdhary R Phil Flentje and Bhattacharya G, "Geotechnical Slope Analysis", CRC Press., 2009.
2. YM Cheng and CK lau, "Slope Stability Analysis and Stabilization", CRC Press., 2017.

Reference Books:

1. Milton E. Harr., "Groundwater and Seepage", Dover Publications. 2012.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., III Semester

Course Title	Foundation on Weak Rocks				M. Tech., III Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212302	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To study the properties of weak rock and classification, analyze the effect of structural planes, study the requirements of satisfactory performance of foundation and analyze the pile on weak rock.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Estimate the properties of rock
CO 2	Understand the effect of weak rock on foundations
CO 3	Estimate the satisfactory conditions and bearing capacity
CO 4	Designing the shallow foundation on sloping ground and suggesting the treatment methods of foundations
CO 5	Design of pile foundations on rock and performing the load tests

Unit – I

Properties of Weak Rock

Engineering Properties of Weak Rocks, Different Rock Mass Classification Systems, Relative Merits and Demerits, Failure Criteria for Weak Rocks, Bi-Linear Mohr-Coulomb Failure Criterion, Hoek and Brown Criterion and Modified Hoek and Brown Failure Criterion Etc.

Unit – II

Effect of Weak Rock

Effect of Structural Planes on Rock Foundations, Possible Modes of Failure of Foundations on Rocks/ Rock Masses, Determination of In-Situ Shear Strength of Rocks and Rock Masses

Unit – III

Performance of Foundations

Requirements for Satisfactory Performance of Foundations, Bearing Capacity of Foundations on Rocks and Rock Masses, Allowable Bearing Pressure of Rock Foundations Using a Nonlinear Failure Criterion, Monotonic and Cyclic Plate Load Tests, Pressure-Settlement Characteristics, Effect of Layering, Anisotropy, Heterogeneity and Inelasticity

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

Shallow Foundations

Shallow Foundations, Shallow Foundations on Sloping Ground, Raft Foundations, Stilt Foundations, Foundations for Suspension Bridges, Transmission Line Towers, Framed Buildings etc., Treatment of Foundations - Open Joints, Solution Cavities, Weak Seams

Unit – V

Pile Foundations

Piles in Weak Rocks, Bearing Capacity and Settlement of Piles, Piles in Stratified Rock Masses, Field Load Tests on Piles in Weak Rocks, Behaviour of Bored / Driven Piles in Soft / Weathered Rocks

Textbooks:

1. Ramamurthy, T., "Engineering in Rocks", PHI Learning Pvt. Ltd., 2014.
2. Hoek, E., "Practical Rock Engineering", Rock Science., 2006.

Reference Books:

1. Wyllie Duncan C.," Foundations on Rock: Engineering Practice", E &FnSpon, Taylor and Francis., 2005.
2. Hudson J.A. and J.P. Harrison. Engineering Rock Mechanics: An Introduction to the Principles, 1997. Elsevier, Oxford

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., III Semester

Course Title	Computational Geomechanics				M. Tech., III Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
2212303	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To understand different numerical and statistical tools for analyzing various geotechnical engineering problems.
- To apply probabilistic approach for selection of design parameters and compute their impact on risk assessment.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Analyze linear and non-linear equations using numerical techniques
CO 2	Apply finite difference and finite element method for analyzing behaviour of geotechnical structures
CO 3	Apply correlation and regression analysis for the geotechnical data.
CO 4	Solve multilayered soil system by FEM and FDM
CO 5	Solve problem of consolidation and flow through porous media using numerical technique

Unit – I

Solution of Non-Linear and Linear Equations

Bisection, False Position, Newton-Raphson, Successive Approximation Method, Iterative Methods, Jacobi's Method, Gauss Seidal Method, Successive over Relaxation Method.

Unit – II

Finite Difference and Finite Element Method

Two Point Boundary Value Problems – Disichlet Conditions, Neumann Conditions; Ordinary and Partial Differential Equations. Fundamentals, Constitutive Finite Element Models for Soils.

Unit – III

Correlation and Regression Analysis

Correlation - Scatter Diagram, Karl Pearson Coefficient of Correlation, Limits of Correlation Coefficient; Regression –Lines of Regression, Regression Curves, Regression Coefficient, Differences Between Correlation and Regression Analysis.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – IV

One-Dimensional Consolidation

Theory of Consolidation, Analytical Procedures, Finite Difference Solution Procedure for Multilayered Systems, Finite Element Formulation

Unit – V

Flow through Porous Media and Risk Assessment in Geotechnical Engg.

Geotechnical Aspects, Numerical Methods, Applications and Design Analysis, Flow in Jointed Media. Probabilistic Site Characterization and Design of Foundations

Textbooks:

1. S. Chandrakant., Desai and John T. Christian, "Numerical Methods in Geotechnical Engineering", Mc. Graw Hill Book Company, 1977.
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, "Numerical Methods for Scientific and Engineering Computations", Third Edition, New Age International (P) Ltd. Publishers, New Delhi. 2019.

Reference Books:

1. D.J. Naylor and G.N. Pande, "Finite Elements in Geotechnical Engineering", Pineridge Press Ltd., UK., 1981.
2. Sam Helwany, "Applied Soil Mechanics", John Wiley & Sons, Inc,, 2007.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., III Semester

Course Title	Business Analytics					M. Tech., III Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212304	Professional Elective (PEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- Understand the role of business analytics within an organization.
- Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- To become familiar with processes needed to develop, report, and analyze business data.
- Use decision-making tools/Operations research techniques.
- Mange business process using analytical and management tools.
- Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Demonstrate knowledge of data analytics
CO 2	Demonstrate the ability of think critically in making decisions based on data and deep analytics
CO 3	Demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making
CO 4	Demonstrate the ability to translate data into clear, actionable insights

Unit – I

Business Analytics

Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modeling, sampling and estimation methods overview.

Unit – II

Trendiness and Regression Analysis

Modeling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – III

Organization Structure

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Unit – IV

Forecasting Techniques

Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

Unit – V

Decision Analysis

Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Textbooks:

1. Business Analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press, 2014.

Reference Books:

1. Business Analytics by James Evans, Persons Education., 2014.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003 (A.P.)

M. Tech., III Semester

Course Title	Solid Waste Management					M. Tech. III Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
22OE121	Open Elective (OEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To know the necessity of solid waste management
- To study various strategies for the collection of solid waste
- To understand various solid waste disposal methods
- To understand how to categorize the Hazardous Wastes

On successful completion of this course, the students will be able to

CO 1	Understand and identify the physical and chemical composition of solid waste.
CO 2	Understand the optimum route planning for transport of solid waste.
CO 3	Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid wastes.
CO 4	Understand the design of waste disposal systems.

Unit – I

Introduction to Solid Waste

Definition - Types of solid waste - sources of solid waste - Characteristics - properties of solid wastes - Sampling of Solid wastes - Elements of solid waste management

Unit – II

Solid Waste Management

Solid waste generation - onsite handling - storage and processing - collection of solid wastes - Stationary container system and Hauled container systems - Route planning - transfer and transport.

Unit – III

Resource and Energy Recovery

Processing techniques - materials recovery systems - Composting - types of composting - Problems with composing – Pyrolisis – Gasification - RDF - recovery of energy from conversion products - materials and energy recovery systems.

Unit – IV

Landfills

Types and Construction of landfills - Design considerations - Life of landfills - Landfill

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Problems - Lining of landfills - Leachate pollution and control - Landfills reclamation.

Unit – V

Hazardous Waste Management

Sources and characteristics - Effects on environment - Risk assessment - Disposal of hazardous wastes - Secured landfills, incineration - Biomedical waste disposal - E-waste management

Textbooks:

1. Tchobanoglous G, Theisen H and Vigil SA 'Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw-Hill, 1993.
2. Vesilind PA, Worrell W and Reinhart D, 'Solid Waste Engineering' Brooks/Cole Thomson Learning Inc., 2002.

Reference Books:

1. CPHEEO Manual on Municipal Solid Waste Management - 2000
2. Qian X, Koerner RM and Gray DH, 'Geotechnical Aspects of Landfill Design and Construction' Prentice Hall, 2002.
3. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, 'Environmental Engineering', McGraw Hill Inc., New York, 1985.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., III Semester

Course Title	Waste to Energy				M. Tech. III Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
22OE122	Open Elective (OEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs						End Exam Duration: 3 Hrs		

Course Objectives:

- To create awareness in students of energy conservation.
- To identify the use of different types of Bio waste energy resources.
- To understand different types of bio waste energy conservations.
- To detect different waste conversion into different forms of energy.

On successful completion of this course, the students will be able to

CO 1	Find different types of energy from waste to produce electrical power
CO 2	Estimate the use of bio waste to produce electrical energy
CO 3	Understanding different types of bio waste and its energy conversions
CO 4	Analyze the bio waste utilization and to avoid the environmental pollution

Unit – I

Introduction to Energy from Waste

Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digesters

Unit – II

Biomass Pyrolysis

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit – III

Biomass Gasification

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit – IV

Biomass Combustion

Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Unit – V

Biogas

Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion -Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

Textbooks:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Food, Feed and Fuel from Biomass, Chahal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.

Reference Books:

1. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1989.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., III Semester

Course Title	Sub soil exploration techniques				M. Tech. III Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
22OE123	Open Elective (OEC)	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 2 Hrs					End Exam Duration: 3 Hrs			

Course Objectives:

- To identify the soil type of soil from a job site or in a professional setting, determine that soil's properties based on type and evaluate design decisions from your understanding of that soil's properties.
- To explore the scientific principles used to describe the major engineering properties of soil, and the engineering testing methods used to quantify these properties

On successful completion of this course, the students will be able to

CO 1	Plan subsurface investigation based on the requirement of civil engineering project and site condition. Can finalize depth and number of boreholes
CO 2	Execute different subsurface exploration tests
CO 3	Collect disturbed/undisturbed samples for laboratory tests and can suggest design parameters
CO 4	Expose different methods for estimation of dynamic soil properties required for design purpose.

Unit - I

Introduction

Scopes and objectives of explorations – Planning a subsurface exploration – Stages in sub surface exploration – Explorations for preliminary and detailed design – Spacing and depth of exploration

Unit - II

Open Excavation and Borings of Exploration

Pits and Trenches – Drifts and Shafts – Methods of boring – Auger Borings – Wash Borings –Rotary Drilling –Percussion Drilling – Core Drilling

Unit - III

In-Situ Testing

Field tests – Standard Penetration Tests – Cone Penetration Tests – Plate Load Test, monotonic and cyclic –Field Permeability Tests – Instrumentation in soil engineering, strain gauges, resistance and inductance type

Unit - IV

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Geophysical Methods:
Geophysical Methods: Types–Electrical Resistivity Methods – Electrical Profiling Method – Electrical Sounding Method – Seismic Methods – Seismic refraction method – Sub-soil Investigation Report.

Unit - V
Wave Measurements:
Cross Hole Tests (CHT), Downhole Tests (DHT), Spectral Analysis of Surface Waves, Seismic Refraction, Suspension Logging: Electromagnetic Wave Techniques: Ground Penetrating Radar (GPR), Electromagnetic Conductivity (EM), Surface Resistivity (SR), Magnetometer Surveys (MT)

Textbooks:

1. S.P. Brahma, Foundation Engineering, Tata McGraw-Hill Publishers, New Delhi, 1993.
2. V.N.S. Murthy,Soil Mechanics & Foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., India, 2017.

Reference Books:

1. Hvorslev, MJ, Sub Surface Exploration and Sampling of Soils for Civil Engineering Purpose, Water-ways Station, Vicksburg, Mississippi, 1949.
2. AraArman and NareshSamtani, Sub Surface Investigations, Federal Highway Administration, Arlington, Virginia, 2002.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

M. Tech., III Semester

Course Title	Dissertation Phase – 1 (to be continued nest semester)				M. Tech., III Semester		
Course Code	Category	Hours/Week		Credits	Maximum Marks		
2212307	Project	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	20	10	100	00	100
Mid Exam Duration: ----					End Exam Duration: ----		

Course Objectives:

- The purpose of dissertation is to introduce to students, the research methods and to develop competencies for critically examining topics of their interest and present them. This will be a preparatory stage for the terminal or thesis project.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Students will be exposed to self-learning various topics
CO 2	Students will learn to survey the literature such as books, national/international refereed journals and contact resource persons for the selected topic of research
CO 3	Students will learn to write technical reports
CO 4	Students will develop oral and written communication skills to present and defend their work in front of technically qualified audience

Description:

The Project Work will start in semester 3rd and should preferably be a problem with research potential and should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. Seminar should be based on the area in which the candidate has undertaken the dissertation work as per the common instructions for all branches of M. Tech. The examination shall consist of the preparation of report consisting of a detailed problem statement and a literature review. The preliminary results (if available) of the problem may also be discussed in the report. The work has to be presented in front of the examiners panel set by Head and PG coordinator. The candidate has to be in regular contact with his guide and the topic of dissertation must be mutually decided by the guide and student.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

IV Semester

Syllabus

M. Tech., IV Semester

Course Title	Dissertation Phase – 2					M. Tech. III Semester		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2212401	Project	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		0	0	32	16	50	50	100
Mid Exam Duration: ----						End Exam Duration: ----		

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Use different experimental techniques, different software / computational / analytical tools
CO 2	Design and develop an experimental set up/ equipment/test rig
CO 3	Conduct tests on existing set ups/equipments and draw logical conclusions from the results after analyzing them
CO 4	Able to either work in a research environment or in an industrial environment, conversant with technical report writing
CO 5	Able to present and convince their topic of study to the engineering community

Description:

It is a continuation of Project work started in semester 3rd. He has to submit the report in prescribed format and also present a seminar. The dissertation should be presented in standard format as provided by the department. The candidate has to prepare a detailed project report consisting of introduction of the problem, problem statement, literature review, objectives of the work, methodology (experimental set up or numerical details as the case may be) of solution and results and discussion. The report must bring out the conclusions of the work and future scope for the study. The work has to be presented in front of the examiners panel consisting of an approved external examiner, an internal examiner and a guide, co-guide etc. as decided by the Head and PG coordinator. The candidate has to be in regular contact with his guide.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

K.S.R.M. COLLEGE OF ENGINEERING

(UGC-AUTONOMOUS)

Kadapa, Andhra Pradesh, India– 516 003

Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu.

An ISO 14001:2004 & 9001: 2015 Certified Institution

Department of Civil Engineering

The list of the value added/certificate courses conducted in the Civil Engineering Department during the AY 2022-23.

Sl. No.	Semester	Value Added Course
1	VI	Slope stability Analysis using GeoStudio
2	IV	MS office for documentation
3	V	Revit Architecture
4	V and VII	Storm Water Drainage System Design

Convener/HOD

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Syllabus of Value Added Course

Course Name: Slope Stability Analysis using GeoStudio

Course Objectives:

1. Develop a solid foundation in the fundamentals of slope stability analysis and its importance in geotechnical engineering.
2. Acquire the skills to perform slope stability analysis using both Limit Equilibrium methods and numerical methods.
3. Understand the significance of slip surface geometry, material properties, and field/lab evaluations in slope stability assessments.
4. Enhance critical thinking skills by analyzing case studies and real-world examples of slope stability issues.

Course Outcomes: Upon completing the course students will be able to:

1. Demonstrate a clear understanding of different types of slopes, their classifications, and the factors influencing their stability.
2. Utilize GeoStudio software effectively to create slope models, input material properties, define boundary conditions, and perform stability analyses.
3. Identify potential causes of slope failures, considering geological, geotechnical, and external factors that contribute to instability.
4. Analyze and evaluate material strength properties of different soils using both laboratory testing and field investigations.
5. Interpret the results of slope stability analyses, including factors of safety and failure modes, and make informed engineering judgments.

UNIT-I

Fundamentals on slopes, Types of slopes, Methods of analysis -Limit Equilibrium, Numerical Methods like Finite Element Methods, Finite Difference Methods, boundary Element methods, Universal Distinct Element Methods, Langranian Methods. Causes of Failures

UNIT-II

Different Limit equilibrium methods and its application to slopes, Introdcution about Geo Studio, Fundamentals on LE

UNIT-III

Different Shapes of Slip surfaces, Geometry of slope, various functions in Geo Studio, Material strength of different soils and evaluation of properties in lab and field

UNIT-IV

Examples on various site conditions – slope, Embankment, Layered Soil

Text Books/Reference Books:

1. Slope Stability Modeling with Geo Studio by Geo Slope International, Ltd.
2. Slope Stability and Stabilization Methods Glenn M. Boyce, Thoms S.Lee, Sunil Sharma, Lee W. Abramson, John Wiley & Sons Publishers

Reference Links:

1. https://www.seequent.com/products-solutions/geostudio/slope/

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Syllabus of Value Added Course

Course Name: MS office for documentation

Course Objectives:

- To create, edit, and format documents effectively using Microsoft Word, including setting margins, adjusting line spacing, and applying various font and alignment options.
- To become proficient in using essential Word tools, such as templates, the Ribbon interface, and the Quick Access Toolbar, to streamline their document creation process and enhance productivity.
- Acquire the skills to incorporate illustrations, images, and graphics into documents, as well as the ability to customize and format these elements to improve document visual appeal and communication

Course Outcomes: Upon completing the course students will be able to:

- Independently create, format, and edit documents in Microsoft Word, demonstrating mastery over features such as margins, line spacing, font styles, and text alignment.
- Skilled in utilizing Word's tools and interfaces, including templates, the Ribbon, and the Quick Access Toolbar, resulting in a more streamlined and efficient document creation process.
- Integrate illustrations, images, and graphics into documents and apply formatting techniques to enhance the visual impact of their documents, effectively conveying information to readers.
- Capable of collaborating with others on documents using features like track changes, allowing for efficient feedback and review cycles while maintaining version control and clarity in document revisions

Contents:

1. Launch Word
2. Window and Ribbon Features
3. File Tab
4. Templates
5. Window Options
6. Customize Your Ribbon
7. Quick Access Toolbar
8. Non-Printing Characters
9. Practice Document
10. Save a Document
11. Select Text
12. Margins
13. Line Spacing
14. Format a Document
15. Additional Font Options
16. Text Alignment
17. View Modes
18. Spelling and Grammar Checks

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

19. Page Breaks and Section Breaks
20. Tables
21. Edit a Table
22. Format a Table
23. Print a Document
24. Illustrations Demonstration
25. Illustrations Quick Reference
26. Track Changes Quick Reference
27. Additional Quick References

Textbooks:

1. ML Humphrey "Word for Beginners", ML Humphrey Publishers, New Yark.
2. Joan Lambert "Microsoft Word 2019 Step by Step", Microsoft, USA.
3. Guy Hart-Davis "Teach Yourself VISUALLY Word 2019", John Wiley & Sons, INc., Indianapolis, IN.

Reference Books:

1. Peter Schiessl "Microsoft Word 2019 - FIRST VOLUME - Training Book with many Exercises", by Lindemann Group Publishers.
2. Dan Gookin "Microsoft Word 2019 For Dummies"
3. Linda Foulkes "Learn Microsoft Office 2019", Packet publishing Limited, Mumbai, India.

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Syllabus of Certification Course

Course Name: Architectural Modeling Using REVIT

Table of Contents

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)

Textbooks:

1. Atefe Makhmalbaf (2022), Building Information Modeling using Revit for Architects and Engineers, Mavs Open Press.
2. Revit Essentials for Architecture by Paul F. Aubin, https://paulaubin.com/books/revit-essentials-for-architecture/.

KSNR
lives on

Syllabus for Certification Course
Course Name: Storm Water Drainage System Design

UNIT-1: INTRODUCTION

General, Status of urban drainage systems in India, Causes of urban flooding, Need for storm water drainage system.

UNIT-2: PROJECT PLANNING AND INVESTIGATION

Objectives of planning and investigation, Data collection, Survey and investigation, Permission, Environmental consideration

UNIT-3: HYDRAULIC DESIGN OF STROM WATER DRAINAGE SYSTEM

Inlet locations, Manholes and is locations, Pumping of storm runoff, Outfall structure, Natural stream/river, Instructional arrangement and capacity building, DPR Preparation

UNIT-4: RAIN FALL ANALYSIS

General, Measurements of rainfall, Steps for rainfall analysis, Alternative method of rainfall analysis, Runoff estimation, Estimation of runoff from rainfall, Methods of runoff Estimation.

UNIT-5: HYDRAULIC DESIGN OF STROM WATER DRAINS

Strom water Flows in channels & conduits, Design consideration for surface/ subsurface drainage.

Textbooks:

1. Stormwater Collection Systems Design Handbook:(McGraw-Hill Handbooks) 1st Edition by Larry W. Mays
2. Design of Urban Stormwater Controls: MOP 23 (2) (Wef Manual of Practice, 23)
3. Manual on storm water drainage system by CPHEEO

Head
Department of Civil Engineering
K.S.R.M. College of Engineering
(Autonomous)
KADAPA - 516 003. (A.P.)