G.PULLA REDDY ENGINEERING COLLEGE (Autonomous): KURNOOL

CIVIL ENGINEERING DEPARTMENT

Honors in Civil Engineering

(Scheme – 2023)

Scheme of Instruction and Examination

(Effective for the students admitted from the academic year 2023-24 onwards)

S. No.	Semester	Course Code	Course Title	Scheme of Instruction periods/week		Credits	Scheme of Examination Maximum Marks		
				L	T/P		Continuous Internal Assessment	End Exam Assessment	Total
1.	V	HCE101	Water Supply Distribution System	3	0	3	30	70	100
2.	V	HCE102	Intelligent Transportation Systems	3	0	3	30	70	100
3.	V	HCE103	GIS Lab	0	3	1.5	30	70	100
4.	VI	HCE104	Advanced Foundation Engineering	3	0	3	30	70	100
5.	VI	HCE105	Irrigation and Drainage Systems Engineering	3	0	3	30	70	100
6.	VI	HCE106	ETABS Lab	0	3	1.5	30	70	100
7.	VII	HCE107	Advanced Design of Steel Structures.	3	0	3	30	70	100
			Total	**15**	**6**	**18**			

WATER SUPPLY DISTRIBUTION SYSTEM (WSDS)

B.Tech (Honors) : CE						Scheme : 2023		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
HCE101	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	**-**	**-**	**3**	**30**	**70**	**100**
Sessional Exam Duration : 2 Hrs.					**End Exam Duration: 3 Hrs.**			

Course Outcomes : At the end of the course the student will be able to	
CO1: Understand the types of water supply systems.	
CO2: Plan the water supply systems.	
CO3: Formulate the equation for distribution system.	
CO4: Analyse the distribution system.	
CO5: Apply the linear programming techniques for optimization.	

UNIT – I

Introduction: Water requirement – Sources of water – Water demand – Reservoir storage nodal hydraulic gradient level values – Water supply consideration – Types of water supply systems – Piping system – Distribution network labeling – Network components – Network models.

UNIT - II

Hydraulic Parameters and Network Parameters: Energy and hydraulic gradient line– Head loss in links – Equivalent pipe – Pipes in series – Pipes in parallel – Pipe material.

Need for Transport of water – Water quality – Planning of water supply systems – Intake structures.

UNIT – III

Types of Distribution Systems: Equivalent pipe – Parameters in distribution system analysis – Parameters interrelationship – Formulation of equation. Gravity and rising main – Location and design principles.

UNIT – IV

Analysis of Water Distribution System: Methods of analysis: Hardy–Cross method, Newton-Raphson method and Linear theory method.

UNIT - V

Design and Optimization of Water Distribution System: Design: Trial and error method of design – Cost- head loss ratio method – Optimization using linear programming techniques – Surge analysis in water distribution systems – Pump duty stations and detailing valves – Pressure transients in pipe flow.

Text Books

1. Bhave P R, *Analysis of Flow in Water Distribution Network*, Technomic Publishing Co.,

Lancaster, USA.
2. Bhave P R, *Optimal Design Of Water Distribution Networks*, Narosa Publishing House, New Delhi.
3. Streter V L and Wylie E D, *Fluid Transients*, McGraw Hill Book Co.
Reference Books
1. Pramod R. Bhave and Rajesh Gupta, *Analysis of Water Distribution Networks*, Narosa Publishing House, New Delhi and Alpha-Science Publication, UK.
Question Paper Pattern:
Sessional Exam: The question paper for Sessional Examination shall be for 40 marks. The question paper shall consist of Four Questions and all questions are compulsory. Question No.1 contains Five short answer questions (2marks each) for a total of 10 marks. Remaining Three Questions shall be EITHER/OR type descriptive questions for 10 marks each. Each of these descriptive questions may contain sub-questions.
End Exam: The question paper for End Examination shall be for 70 marks. The question paper shall contain Six Questions and all questions are compulsory. Question No.1 shall contain Ten short answer questions (2 marks each) for a total of 20 marks, with Two short answer questions from each unit. Remaining Five Questions (each question covering one unit of syllabus) carrying 10 marks each shall be EITHER/OR type descriptive questions and may contain sub-questions.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

B.Tech (Honors) : CE							Scheme : 2023	
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
HCE102	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	-	-	3	30	70	100
Sessional Exam Duration : 2 Hrs.					**End Exam Duration: 3 Hrs.**			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the data collection and data acquisition using ITS

CO2: Understands the requirements for telecommunications

CO3: Apply the various ITS methodologies

CO4: Design the transit system by considering all important parameters

CO5: Define the significance of ITS under Indian conditions

UNIT – I

Introduction to Intelligent Transportation Systems (ITS): Definition of ITS and identification of ITS objectives – Historical background – Benefits of ITS – ITS data collection techniques – Detectors – Automatic Vehicle Location (AVL) – Automatic Vehicle Identification (AVI) – Geographic Information Systems (GIS) – Video data collection.

UNIT - II

Telecommunications in ITS: Importance of telecommunications in the ITS system, Information management – Traffic Management Centres (TMC) – Vehicle–Road side communication – Vehicle positioning system

UNIT – III

ITS Functional Areas: Advanced Traffic Management Systems (ATMS) – Advanced Traveler Information Systems (ATIS) – Commercial Vehicle Operations (CVO) – Advanced Vehicle Control Systems (AVCS) – Advanced Public Transportation Systems (APTS) – Advanced Rural Transportation Systems (ARTS).

UNIT – IV

ITS User Needs and Services: Travel and traffic management – Public transportation management – Electronic payment – Commercial vehicle operations – Emergency management – Advanced vehicle safety systems – Information management.

UNIT - V

Automated Highway Systems: Vehicles in platoons – Integration of automated highway systems – ITS Programs in the World – Overview of ITS implementations in developed countries – ITS in developing countries.

Text Books

1. Kan Paul Chen, John Miles, *ITS Hand Book 2000: Recommendations for World Road Association (PIARC)*.
2. Sussman, J. M., *Perspective on ITS*, Artech House Publishers, 2005.
3. Chowdhury, M. A. and Sadek, A, *Fundamentals of Intelligent Transportation Systems Planning*, Artech House, 2003.
Reference Books
1. *National ITS Architecture Documentation*, US Department of Transportation, 2007, (CD-ROM).
Question Paper Pattern:
Sessional Exam: The question paper for Sessional Examination shall be for 40 marks. The question paper shall consist of Four Questions and all questions are compulsory. Question No.1 contains Five short answer questions (2marks each) for a total of 10 marks. Remaining Three Questions shall be EITHER/OR type descriptive questions for 10 marks each. Each of these descriptive questions may contain sub-questions.   **End Exam:** The question paper for End Examination shall be for 70 marks. The question paper shall contain Six Questions and all questions are compulsory. Question No.1 shall contain Ten short answer questions (2 marks each) for a total of 20 marks, with Two short answer questions from each unit. Remaining Five Questions (each question covering one unit of syllabus) carrying 10 marks each shall be EITHER/OR type descriptive questions and may contain sub-questions.

GEOGRAPHICAL INFORMATION SYSTEMS LAB [GIS(P)]

B.Tech (Honors) : CE							Scheme : 2023
Course Code	Category	Hours / Week			Credits	Maximum Marks	
HCE103	PCL	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		-	-	3	1.5	30	70	100
					End Exam Duration : 3 Hrs			

Course Outcomes: At the end of the course students will be able to

CO1: Understand the spatial and non-spatial data.

CO2: Analyze the vector features.

CO3: Apply the techniques to manage attribute data.

CO4: Evaluate the spatial analysis techniques by building a data model.

CO5: Assess the generation of high quality spatial maps.

***Introduction*:** Investigation of geographic information systems (GIS) including theory and applications areas. A major portion of the course will be based on use of a current widely-used GIS computer software system. Aspects of geographic data entry and editing, spatial analysis, and map development and display will be considered.

List of Experiments

1. Georeferencing a Toposheet

2. Digitization of a Toposheet

3. Image to Map Registration

4. a) Adding X,Y data
b) Join and Relate

5. Attribute data management

6. Usage of analysis tools to perform vector data analysis

7. Spatial analysis

8. Model Builder

9. Raster processing (Mosaic and clip)

10. Map Layout

Reference Books :

1. Kang Tsung Chang, *Introduction to Geographic Information Systems*, McGraw Hill, India

2. Anji Reddy, *Textbook of Remote Sensing and Geographical Information Systems*, BS Publications, Hyderabad.

ADVANCED FOUNDATION ENGINEERING (AFE)

B.Tech (Honors) : CE					Scheme : 2023		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
HCE104	PC	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	-	-	3	30	70	100
Sessional Exam Duration : 2 Hrs.					End Exam Duration: 3 Hrs.		

Course Outcomes : At the end of the course the student will be able to

CO1: Determine the bearing capacity of Soil under inclined loads and on layered soils.

CO2: Determine the bearing capacity of soil under raft foundation and design foundation.

CO3: Determine the settlements for the design of shallow footings.

CO4: Design the pile foundations under vertical and lateral loads.

CO5: Design the foundations on problematic soils.

UNIT – I

Shallow Foundations: Bearing Capacity – General formulae – Effect of water table – Footing with eccentric or inclined loads – Foundations on layered soils – Foundations on finite layer with rigid base at shallow depth – Effect of compressibility of soil.

UNIT - II

Raft Foundations: Bearing capacity of raft foundation – Floating raft – Types of rafts – Beam on elastic foundation – Conventional methods of design – Determination of modulus of sub-grade reaction.

UNIT – III

Settlement: Components – Immediate, consolidation & creep – Stresses and displacements in homogeneous, layered and anisotropic soils – Consolidation settlement – One, Two & Three dimensional consolidation – Secondary compression settlement – Bearing pressure using SPT,CPT, Dilatometer and Pressuremeter – Settlement of foundations on sands – Schmertmann and Burland & Busbridge methods – Structure tolerance to settlement and differential settlements – Rotation of tall structures.

UNIT – IV

Pile Foundations: Single Pile: Vertically loaded piles – Static capacity α, β and λ methods – Dynamic formulae – Point bearing resistance with SPT and CPT results –Bearing resistance of piles on rock – Settlement – Pile load test – Uplift resistance – Laterally loaded piles – Ultimate lateral resistance – Negative skin friction – Batter piles – Under-reamed piles – Ultimate capacity of pile groups in compression, pullout & lateral load – Efficiency – Settlements of pile groups – Interaction of axially &laterally loaded pile groups.

UNIT - V

Foundations on Collapsible Soils: Origin and occurrence – Identification – Sampling and

testing – Preventive and remedial measures.

Foundations on Expansive Soils: The nature, origin and occurrence – Identifying, testing and evaluating expansive soils – Typical structural distress patterns and preventive design & construction measures.

Text Books

1. Das, B. M., *Principles of Foundation Engineering*, 7th Cengage Learning.

2. Donald P Coduto, *Foundation Design Principles and Practices*, Pearson Indian Edition.

3. Bowles, J.E., *Foundation Analysis & Design*, McGraw Hill Companies, Inc.

4. Poulos, H.G. & Davis, E.H., *Pile Foundation Analysis and Design*, John Wiley & Sons Inc.

Reference Books

1. Reese, L.C. & VanImpe, W.F., *Single Piles and Pile Groups under Lateral Loading*, Taylor & Francis Group.

2. Tomlinson, M.J., *Foundation Design and Construction*, Prentice Hall.

3. Lymon C. Reese, William M. Isenhower, Shin-Tower Wang, *Analysis and Design of Shallow and Deep Foundations*.

4. Salgado, R., *The Engineering of Foundations*, McGraw Hill, Boston.

Question Paper Pattern:

Sessional Exam: The question paper for Sessional Examination shall be for 40 marks. The question paper shall consist of Four Questions and all questions are compulsory. Question No.1 contains Five short answer questions (2marks each) for a total of 10 marks. Remaining Three Questions shall be EITHER/OR type descriptive questions for 10 marks each. Each of these descriptive questions may contain sub-questions.

End Exam: The question paper for End Examination shall be for 70 marks. The question paper shall contain Six Questions and all questions are compulsory. Question No.1 shall contain Ten short answer questions (2 marks each) for a total of 20 marks, with Two short answer questions from each unit. Remaining Five Questions (each question covering one unit of syllabus) carrying 10 marks each shall be EITHER/OR type descriptive questions and may contain sub-questions.

IRRIGATION AND DRAINAGE SYSTEMS ENGINEERING

B.Tech (Honors) : CE						Scheme : 2023		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
HCE105	**PC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	**-**	**-**	**3**	**30**	**70**	**100**
Sessional Exam Duration : 2 Hrs.					**End Exam Duration: 3 Hrs.**			

Course Outcomes : At the end of the course the student will be able to

CO1: Understand National water policy for water resources development.

CO2: Evaluate consumptive use and irrigation efficiencies.

CO3: Model the methods of irrigation.

CO4: Understand theSalt affected land and their reclamation.

CO5: Understand the surface and sub-surface drainage systems.

UNIT – I

Introduction: Available water resources and its present utilization – Development through five-year plans – Roles of various commissions on irrigation and agriculture – National water policy for development – Types of irrigation – Irrigation techniques and quality of irrigation water.

UNIT - II

Soil Water Crop Relationship: Determination of soil moisture – Estimation of consumptive use and frequency of irrigation – Irrigation efficiencies for economical use of water – Design of various irrigation methods – Assessment water charges – Conjunctive use of surface and ground water – Multi-crop irrigation scheduling.

UNIT – III

Modeling of Irrigation Systems: Governing equations and their solutions – Computation of inundation front – Cumulative infiltration estimation – Modeling for sprinklers and other methods of irrigation.

UNIT – IV

Salt Affected Land and their Reclamation: Salt accumulation in soil water – Classification of salts affecting the soils and their characteristics – Reclamation of saline and alkaline soils – Leaching and salinity control.

UNIT - V

Drainage of Irrigated Soils: Need and purpose of drainage, water logging of agricultural lands and its reclamation – Steady state and transient designs of surface and sub-surface drainage systems – Drainage by wells.

Soil Erosion and Conservation: Water and wind erosion – Design of various types of soil conservation measures.

Text Books
1. Asawa G L, *Irrigation and Water Resources Engineering*, New Age International Publishers, New Delhi.
2. Dan Yaron, *Salinity in irrigation and water resources*, Morcel Dekker Inc., New York.
3. Michael A M, *Irrigation theory and practices*, Vikas Publishing House, New Delhi.
Reference Books
1. Richard H Cuenca, *Irrigation system design–An Engineering Approach*, Prentice Hall, Englewood Cliffs, New Jercy.
2. Dilip Kumar Mujumdar, *Irrigation Water Management Principles and Practice*, PHI Publication, New Delhi.
Question Paper Pattern:
Sessional Exam: The question paper for Sessional Examination shall be for 40 marks. The question paper shall consist of Four Questions and all questions are compulsory. Question No.1 contains Five short answer questions (2marks each) for a total of 10 marks. Remaining Three Questions shall be EITHER/OR type descriptive questions for 10 marks each. Each of these descriptive questions may contain sub-questions.
End Exam: The question paper for End Examination shall be for 70 marks. The question paper shall contain Six Questions and all questions are compulsory. Question No.1 shall contain Ten short answer questions (2 marks each) for a total of 20 marks, with Two short answer questions from each unit. Remaining Five Questions (each question covering one unit of syllabus) carrying 10 marks each shall be EITHER/OR type descriptive questions and may contain sub-questions.

ETABS Lab

B.Tech (Honors) : CE						Scheme : 2023	
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	
HCE106	PCL	**L**	**T**	**P**	**C**	Continuous Internal Assessment	End Exam	Total
		-	-	3	1.5	30	70	100
						End Exam Duration : 3 Hrs		

Course Outcomes: At the end of the course students will be able to

CO1: Understand the ETABS, its features and usage.

CO2: Apply the preprocessing and Processing procedure of buildings.

CO3: Analyze result interpretation of buildings

CO4: Analyze the beam for various loading conditions.

CO5: Design the multi-storied building for gravity and lateral loads.

List of Experiments

1. Introduction to ETABS environment: ETABS's key features: Main Title Bar – Menu Bar – Toolbar – Display Title Bar.

2. Preprocessing: Object based model generation – Define materials – Define geometry – Define elements – Draw (line, area etc.) – Mesh (convert object based model to element based model) – Load application.

3. Processing: Analysis / Solution Static Analysis – Dynamic Analysis.

4. Post processing: Result interpretation (SFD, BMD, Displacement, Stress etc.) – Design.

5. Analyzing the beams for vertical loads and find out the supports Reactions, Maximum Shear force on beam, Maximum Bending moment on beam and deflection.

6. Analyze the following multi-storied residential building under dead and live loads and find out; Supports Reactions for foundation design – Column Axial forces – Beams forces.

7. Analyze the following multi-storied commercial building under dead, live, wind and seismic loads and find out; Supports Reactions for foundation design – Column Axial forces – Beams forces.

8. Submitting the design report for all the analysis and design problems executed.

Reference Books :

1. Kang Tsung Chang, *Introduction to Geographic Information Systems*, McGraw Hill, India.

2. Anji Reddy, *Textbook of Remote Sensing and Geographical Information Systems*, BS Publications, Hyderabad.

ADVANCED DESIGN OF STEEL STRUCTURES (ADSS)

B.Tech (Honors) : CE						Scheme : 2023	
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
HCE107	PC	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		3	-	-	3	30	70	100
Sessional Exam Duration : 2 Hrs					**End Exam Duration: 3 Hrs**		

Course Outcomes : At the end of the course the student will be able to

CO1: Understand the concepts of eccentric and moment connections and design of welded connections.

CO2: Design the Welded Plate Girders

CO3: Design the Gantry Girders

CO4: Design of Roof trusses

CO5: Design of Light gauge steel structures

UNIT – I

Eccentric and Moment Connections: Introduction – Beams-Column Connections – Connections Subjected to Eccentric Shear – Bolted Framed and Seat Connections – Welded Framed and bracket Connections – Moment Resistant Connections.

UNIT - II

Design of Welded Plate Girders: Elements of plate girders – Self-weight of plate girders – Economical depth – Shear buckling resistance of web – Design of bearing stiffeners – Weld for bearing stiffeners – Design of intermediate stiffeners and design of welded plate girder.

UNIT – III

Design of Gantry Girders: Loads, position of moving load for maximum effects – Profile of gantry girder and design of gantry girders.

UNIT – IV

Design of Roof trusses: Bracings, types of roof trusses – Pitch of trusses – Spacing of trusses – Purlins – Loads on trusses – Design of truss members – Design of joints – Design of tubular trusses.

UNIT - V

Light gauge steel structures: Light gauge steel – Types of sections – Specifications-Permissible stresses. Compression members – Local buckling of elements – Stiffened compression elements – Computation of permissible stresses – Design of columns. Flexural members – Bending – Deflection – Local buckling of compression elements – Laterally supported and unsupported beams.

Text Books

1. S. K. Duggal, *Limit State Design of Steel Structures*, McGraw Hill Education Private Ltd.

New Delhi.
2. K. S. Sairam, *Design of Steel Structures*, Pearson Education.
Reference Books
1. N. Subramanian, *Design of Steel Structures*, Oxford University Press.
2. Dr. Ramachandra &Vivendra Gehlot, *Design Steel Structures Volume–II*, Scientific Publishers Journals Department.
3. Indian Standard Code – IS – 800-2007 *General Construction in Steel- Code of Practice*.
4. Steel Tables.
Question Paper Pattern:
Sessional Exam: The question paper for Sessional Examination shall be for 40 marks. The question paper shall consist of Four Questions and all questions are compulsory. Question No.1 contains Five short answer questions (2marks each) for a total of 10 marks. Remaining Three Questions shall be EITHER/OR type descriptive questions for 10 marks each. Each of these descriptive questions may contain sub-questions.
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