1.2.2_file no: 3-CIVIL ENGINEERING-Structure Of Program Syllabus(2021-22)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(Autonomous)
Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2020-21)
CIVIL ENGINEERING (CE)

| INDUCTION PROGRAM (3 weeks duration) |
|---|
| ❖ Physical activity<br>❖ Creative Arts<br>❖ Universal Human Values<br>❖ Literary<br>❖ Proficiency Modules<br>❖ Lectures by Eminent People<br>❖ Visits to local Areas<br>❖ Familiarization to Dept./Branch & Innovations |

## Semester I (First year)

| Sl. No. | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CIE | SEE | Total |
| 1 | Basic Science course | 20ABS9901 | Algebra and Calculus | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Basic Science course | 20ABS9905 | Engineering Chemistry | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Humanities and Social science | 20AHS9901 | Communicative English | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | *Engineering Science Courses | 20AES0304 | Engineering Workshop Practice | 1 | 0 | 4 | 3 | 30 | 70 | 100 |
| 5 | Engineering Science Courses | 20AES0501 | Problem Solving and Programming | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Humanities and Social science LAB | 20AHS9902 | Communicative English Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Basic Science course (LAB) | 20ABS9910 | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Engineering Science Courses (LAB) | 20AES0503 | Problem Solving and Programming Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| Total credits | | | | | | | 19.5 | 240 | 560 | 800 |

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## Semester II (First year)

| Sl. No. | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CIE | SEE | Total |
| 1 | Basic Science courses | 20ABS9906 | Differential Equations and Vector Calculus | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Basic Science courses | 20ABS9903 | Engineering Physics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Engineering Science Courses | 20AES0202 | Basics of Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Engineering Science Courses | 20AES0509 | Basics of Python Programming | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Engineering Science Courses | 20AES0301 | Engineering Graphics | 1 | 0 | 4 | 3 | 30 | 70 | 100 |
| 6 | Engineering Science Courses (LAB) | 20AES0204 | Basics of Electrical and Electronics Engineering Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Basic Science course (LAB) | 20ABS9908 | Engineering Physics Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Engineering Science Courses (LAB) | 20AES0510 | Basics of Python Programming Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 9 | Mandatory course (AICTE suggested) | 20AMC9902 | Constitution of India | 2 | 0 | 0 | 0 | 30 | - | 30 |
| Total credits | | | | | | | 19.5 | 270 | 560 | 830 |

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## Semester III (Second year)

| Sl. No. | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CIE | SEE | Total |
| 1 | Basic Science courses | 20ABS9913 | Probability & Statistics, Partial differential equations | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Professional core course | 20APC0101 | Mechanics of Materials | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional core course | 20APC0102 | Surveying | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Professional core course | 20APC0103 | Fluid Mechanics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Humanities and social science | 20AHSMB01 | Managerial Economics and Financial Analysis | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Professional core courses (LAB) | 20APC0104 | Strength of Materials Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Professional core courses (LAB) | 20APC0105 | Surveying Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Professional core courses (LAB) | 20APC0106 | Fluid Mechanics Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 9 | **Skill Oriented Course*** | 20APC0107 | Basics of CAD | 1 | 0 | 2 | 2 | 100 | - | 100 |
| 10 | Mandatory course (AICTE suggested) | 20AMC9903 | Environmental Studies | 2 | 0 | 0 | 0 | 30 | - | 30 |
| Total credits | | | | | | | 21.5 | 370 | 560 | 930 |

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## Semester IV (Second year)

| Sl. No. | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CIE | SEE | Total |
| 1 | Basic Science courses | 20ABS9922 | Mathematical Modelling and optimization techniques | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Professional core course | 20APC0108 | Strength of Materials | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional core course | 20APC0109 | Hydraulic Engineering | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Professional core course | 20APC0110 | Structural Analysis-I | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Professional core course | 20APC0111 | Concrete Technology | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Humanity Science Courses | 20AHS9905 | Universal Human Values | 3 | 1 | 0 | 3 | 30 | 70 | 100 |
| 7 | Professional core courses (LAB) | 20APC0112 | Hydraulic Machinery Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Professional core courses (LAB) | 20APC0113 | Concrete Technology Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 9 | Professional core courses (LAB) | 20APC0114 | Computer-aided Civil Engineering Drawing Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 10 | **Skill Oriented Course*** | 20APC0115 | Land survey with 2D drafting /Soft skills | 1 | 0 | 2 | 2 | 100 | - | 100 |
| Total credits | | | | | | | 24.5 | 370 | 630 | 1000 |
| **Internship (Mandatory) 2 Months during summer vacation** | | | | | | | | | | |
| Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) | | | | 4 | 0 | 0 | 4 | 30 | 70 | 100 |

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## Semester V (third year)

| Sl. No. | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | C | CIE | SEE | Total |
| 1 | Professional core course | 20APC0116 | Soil Mechanics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Professional core course | 20APC0117 | Building Technology | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional core course | 20APC0118 | Engineering Geology | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Open Elective course / Job Oriented Elective | 20APE0417 | Sensor Networks | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| | | 20APC0323 | Operations Research | | | | | | | |
| | | 20AOE0301 | Management Science | | | | | | | |
| 5 | Professional Elective courses | 20APE0101 | Structural Analysis-II | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| | | 20APE0102 | Water Harvesting and Conservation | | | | | | | |
| | | 20APE0103 | Cost Effective Housing Techniques | | | | | | | |
| 6 | Professional core courses (LAB) | 20APC0119 | Soil Mechanics Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Professional core courses (LAB) | 20APC0120 | Engineering Geology Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | **Skill Oriented Course*** | 20APC0121 | Building planning & Drawing Lab | 1 | 0 | 2 | 2 | 100 | - | 100 |
| 9 | Mandatory course (AICTE suggested) | | Professional Ethics and Human Values | 2 | 0 | 0 | 0 | 30 | - | 30 |
| | Summer Internship 2 months (Mandatory) after second Year (to be evaluated during V semester | | | 0 | 0 | 0 | 1.5 | 50 | - | 50 |
| | **Total credits** | | | | | | **21.5** | **390** | **490** | **880** |
| | Honors/ Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) | | | **4** | **0** | **0** | **4** | **30** | **70** | **100** |

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-I Sem. (C.E)

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

## 15A01706 GROUND IMPROVEMENT TECHNIQUES
## (CBCC - II)

**Course *Objective*:-** *The knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils will be imparted to the students.*

**UNIT – I**

**DEWATERING**: Methods Of De-Watering- Sumps And Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells-Foundation Drains-Blanket Drains- Criteria For Selectioh Of Fill Material Around Drains –Electro-Osmosis.

**GROUTING:** Objectives Of Grouting- Grouts And Their Properties- Grouting Methods-Ascending, Descending And Stage Grouting- Hydraulic Fracturing In Soils And Rocks-Post Grout Test.

**UNIT – II**

**DENSIFICATION METHODS IN GRANULAR SOILS:-**

In – Situ Densification Methods In Granular Soils:– Vibration At The Ground Surface, Impact At The Ground Surface, Vibration At Depth, Impact At Depth.

**DENSIFICATION METHODS IN COHESIVE SOILS:–**

In – Situ Densification Methods In Cohesive Soils:– Preloading Or Dewatering, Vertical Drains – Sand Drains, Sand Wick Geodrains – Stone And Lime Columns – Thermal Methods.

**UNIT – III**

**STABILISATION:** Methods Of Stabilization-Mechanical-Cement- Lime-Bituminous-Chemical Stabilization With Calcium Chloride,Sodium Silicate And Gypsum

**UNIT – IV**

**REINFORCED EARTH:** Principles – Components Of Reinforced Earth – Factors Governing Design Of Reinforced Earth Walls – Design Principles Of Reinforced Earth Walls.

**GEOSYNTHETICS :** Geotextiles- Types, Functions And Applications – Geogrids And Geomembranes – Functions And Applications.



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**UNIT - V**

**EXPANSIVE SOILS:** Problems Of Expansive Soils – Tests For Identification – Methods Of Determination Of Swell Pressure. Improvement Of Expansive Soils – Foundation Techniques In Expansive Soils – Under Reamed Piles.

**TEXT BOOKS:**


1. Engineering Principles of Ground Modification, Haussmann M.R. (1990), McGraw-Hill International Edition.
2. Ground Improvement Techniques by Dr.P.Purushotham Raj, Laxmi Publications, New Delhi / University Science Press, New Delhi
3. Ground Improvement Techniques by Nihar Ranajan Patra. Vikas Publications, New Delhi


**REFERENCES:**


1. Ground Improvement, Blackie Academic and Professional by Moseley M.P. (1993), Boca Taton, Florida, USA.
2. Ground Control and Improvement by Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994), John Wiley and Sons, New York, USA.
3. Designing with Geosynthetics by Robert M. Koerner, Prentice Hall New Jercy, USA


**Course Outcomes:**

*On completion of this course the students will be able to*

1. *Identify the problems in Expansive soils*
2. *Implement the stabilization methods*
3. *Apply grouting and dewatering techniques*

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B. Tech III-II Sem. (C.E)

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**15A01606 REMOTE SENSING AND GIS**
**(CBCC – I)**

**Course Objectives:**

1. *To understand the Photogrammetric techniques, concepts, components of Photogrammetry*
2. *To introduce the students to the basic concepts and principles of various components of remote sensing.*
3. *To provide an exposure to GIS and its practical applications in Civil Engineering*
4. *Analyze the energy interactions in the atmosphere and earth surface features*

**UNIT – I**

**INTRODUCTION TO PHOTOGRAMMETRY:**

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

**UNIT – II**

**REMOTE SENSING :**

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

**UNIT – III**

**GEOGRAPHIC INFORMATION SYSTEM:**

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

**TYPES OF DATA REPRESENTATION:**

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.



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**UNIT – IV**

**GIS SPATIAL ANALYSIS:**

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

**UNIT – V**

**WATER RESOURCES APPLICATIONS:**

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

**TEXT BOOKS:**


1 Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2 Fundamentals of remote sensing by Gorge Joseph , Universities press, Hyderabad


**REFERENCES:**


1. Advanced Surveying : Total Station GIS and Remote Sensing – Satheesh Gopi – Pearson Publication.
2. Remote Sensing and its applications by LRA Narayana University Press 1999.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji Reddy ,B.S.Pubiliications,New Delhi.
5. GIS by Kang – Tsung Chang, TMH Publications & Co.,


**Course Outcomes:**

*On completion of the course the students will have knowledge on*

1. *Principles of Remote Sensing and GIS*
2. *Analysis of RS and GIS data and interpreting the data for modeling applications*



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B. Tech IV-II Sem. (C.E)

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**15A01802 ADVANCED STRUCTURAL ENGINEERING**
**(MOOCS – II )**

**Course *Objective:*** *To make the student more conversant with the design principles of multistoried buildings, roof system, foundation and other important structures.*

1. Design of a flat slab ( Interior panel only )
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of circular and rectangular water tank resting on the ground
5. Design of cantilever and counter forte retaining wall with horizontal back fill

**FINAL EXAMINATION PATTERN:**

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

**TEXT BOOKS :-**

1. Structural Design And Drawing (RCC And Steel) By Krishnam Raju, Universites .Press , New Delhi
2. R.C.C Structures By Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi

**Reference Books :-**

1. Design Of RCC Structures By M.L.Gambhir P.H.I. Publications, New Delhi.
2. Advanced RCC By P.C. Varghese , PHI Publications, New Delhi.
3. R.C.C Designs By Sushil Kumar , Standard Publishing House.
4. Fundamentals Of RCC By N.C.Sinha And S.K.Roy, S.Chand Publications, New Delhi.

**Course Outcomes:**

*On completion of this course the student will be able to*

1. *Design of roof systems with reference to Indian standards*
2. *Design of water retaining and storage structures*
3. *Design of silos and chimneys*



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| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

15A01803 PRESTRESSED CONCRETE
(MOOCS – III )

**Course Objectives:**

*To introduce the need for prestressing as well as the methods, types and advantages of prestressing to the students. Students will be introduced to the design of prestressed concrete structures subjected to flexure and shear.*

**UNIT – I**

**INTRODUCTION:**

Historic development – General principles of Prestressing, Pretensioning And Post Tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

**METHODS OF PRESTRESSING:-**

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System, Freyssinet system and Gifford – Udall System.

**UNIT – II**

**LOSSES OF PRESTRESS:-**

Loss of prestress in pre-tensioned and post-tensioned members 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 & DESIGN OF SECTIONS FOR FLEXURE;-**

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

**UNIT – IV**

**DESIGN OF SECTION FOR SHEAR :**

Shear and Principal Stresses – Design for Shear in beams.

**COMPOSITE SECTION:**

Introduction – Analysis of stress – Differential shrinkage – General design considerations.



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**UNIT – V**

**DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:**

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

**TEXT BOOKS:**

1 Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw HillPublications.
2 Prestressed Concrete by K.U.Muthu, PHI Publications.
3 Prestressed Concrete by Ramamrutham,Dhanpatrai Publications

**REFERENCE:**

1. Prestressed Concrete Design By Praveen Nagrajan, Pearson Publications, 2013 Editions.
2. Design Of Prestressed Concrete Structures (Third Edition) By T.Y. Lin & Ned H.Burns, John Wiley & Sons.
3. Prestressed Concrete By Pandit.G.S. And Gupta.S.P., CBS Publishers And Distributers Pvt. Ltd, 2012.
4. Prestressed Concrete By Rajagopalan.N, Narosa Publishing House, 2002.
5. Prestressed Concrete Structures By Dayaratnam.P., Oxford And IBH, 2013

**Codes/Tables:**

**Codes:** BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.

**Course Outcomes:**

*Student shall have knowledge on*

1. Methods of prestressing and able to design various prestressed concrete structural elements.
2. Analysis of sections to withstand shear and flexure.



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| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**15A01607 DISASTER MANAGEMENT AND MITIGATION**
**(CBCC – I)**

**Course *Objective:-*** *The objectives of this **subject** is to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazards and gives a suitable picture on the different types of hazard and disaster mitigation methods.*

**Unit-I**

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

**Unit –II**

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

**Unit–III**

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

**Unit –IV**

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures ( Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control



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measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters:- Population Explosion.

**Unit –V**

Emerging approaches in Disaster Management- Three Stages
1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

**Text books:**


1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Science and Management by Tushar Bhattacharya, TMH Publications.
3. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni
4. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning


**References:**


1. The Environment as Hazards by Kates, B.I & White, G.F, Oxford Publishers, New York, 1978
2. Disaster Management by R.B. Singh (Ed), Rawat Publication, New Delhi, 2000
3. Disaster Management by H.K. Gupta (Ed), Universiters Press, India, 2003
4. Space Technology for Disaster Mitigation in India (INCED) by R.B. Singh,, University of Tokyo,1994.


**Course Outcomes:**

*On completion of the course the students will have knowledge on*

1. *Types of disasters and their effects on environment*
2. *Causes of disasters*
3. *Disaster management through engineering applications*



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**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI**

**Year: III** **Semester: I** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19APE0101 | Building Planning and bye-laws | 2 | 0 | 0 | 2 |

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

1. Understand the Principles of Building Planning
2. Understand the Building Bye–Laws and Regulations
3. Understand the Planning of Residential Buildings Public Buildings
4. Understand the Buildings Safety And Comfort
5. Understand the sign conventions and bonds doors and windows

**UNIT – I**

**Principles of Building Planning**: Types of buildings, types of residential buildings – site selection for residential building, orientation of buildings; aspect; prospect grouping, circulation, privacy, economy, flexibility and practical considerations.

**UNIT – II**

**Building Bye–Laws and Regulations:** Introduction – Objectives of building bye-laws – Principles underlying building bye-laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness – Lighting and ventilation requirements.

**UNIT – III**

**Planning of Residential Buildings:** Introduction – Minimum standards for various parts of the buildings – Requirements of different rooms and their grouping – Veranda – Drawing room – Bed room – Kitchen – Dining room– Bath room

**Public Buildings**: Planning of Educational institutions, hospitals, Office buildings.

**UNIT – IV**

**Buildings Safety And Comfort**: Aspects of safety-structural, fire and constructional safety. Components of building automation system -fire-fighting, communication etc. design for thermal comfort, ventilation comfort, lighting comfort,

**UNIT – V**

**SIGN CONVENTIONS AND BONDS**: Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys, lead, zinc, tin,, earth, rock, timber and marble . English bond & Flemish bond; odd & even courses for one, one and half

**DOORS AND WINDOWS:** Paneled Door – paneled and glazed door; glazed windows – paneled windows;

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**TEXT BOOKS:**

1. Planning and Designing and Scheduling – Gurucharan singh and Jagadish singh- Standard publishers.
2. Building planning and design – N.Kumara swamy and A.Kameswara rao. Charitor publications.

**REFERENCE BOOKS:**

1. National Building Code of India 2016 (NBC 2016) - SP 7:2016
2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill.

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**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI**

**Year: III** **Semester: I** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19AOE0401 | Sensor Networks | 2 | 0 | 0 | 2 |

Course Outcomes: Students will be able to

1. Understand the concepts of Converters and Sensor data acquisition systems
2. Understand the concepts of Sensor Measurements in Structural Monitoring
3. Understand the concepts of commonly used sensing technologies and algorithms
4. Understand the concepts of Piezoelectric transducers for assessing and monitoring infrastructures
5. Understand the concepts of Fiber optic sensors for assessing and monitoring infrastructures

**Unit-1 Sensor data acquisition systems and architectures**

**Introduction,** General measurement system, Analog-to-digital converter architectures-Different types of ADCs – parallel comparator type ADC, Counter type ADC, successive approximation ADC and dual slope ADC Digital-to-Analog conversion-Basic DAC techniques, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Data acquisition systems-Analog Systems-Digital Systems

**Unit-II Sensors and Sensing Technology for Structural Monitoring**

**Introduction, Sensor Types,** Sensor Measurements in Structural Monitoring- Structural Responses- Environmental Quantities- Operational Quantities- Typical Quantities for Bridge Monitoring- Fibre Optic Sensors- Classification of Fibre Optic Sensors- Typical Fibre Optic Sensors in SHM- Fibre Optic Sensors for Structural Monitoring- Wireless Sensors- Components of Wireless Sensors- Field Deployment in Civil Infrastructure-Case Study

**Unit-III Commonly** used sensors for civil infrastructures and their associated algorithms

**Introduction, commonly used sensing technologies-** Displacement-Strain-Acceleration-Environment-Prevalence of commonly used sensors in SHM systems- **Associated algorithms-** Displacement sensors-Strain gages- Accelerometers- Environmental measurements- **Examples of continuous monitoring systems**

Unit-IV Piezoelectric transducers for assessing and monitoring civil infrastructures

Introduction, Principle of piezoelectricity, Piezoelectric materials and the fabrication of piezoelectric transducers, Piezoelectric transducers for SHM applications, Bonding effects, Limitations of piezoelectric transducers, SHM techniques using piezoelectric transducers

Unit-V Fiber optic sensors for assessing and monitoring civil infrastructures

**Introduction,** Optical fiber concepts, Sensing mechanisms, Sensor packaging, Cables, connectors, and splicing, **Common optical fiber sensors-** Coherent interferometers, Low-coherence interferometers, Fiber Bragg gratings, Brillouin and Raman scattering distributed sensors

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**Text Books:**

1. "Sensor Technologies for Civil Infrastructures", Volume 1 Sensing Hardware and Data Collection Methods for Performance Assessment Woodhead Publishing in Civil and Structural Engineering Ming L. Wang Jerome P. Lynch Hardcover ISBN: 9780857094322

2. "Wireless Sensor Networks for Civil Infrastructure Monitoring: A Best Practice Guide" ICE Publishing David Rodenas-Herráiz, Kenichi Soga, Paul R A Fidler and Nicholas de Battista

**References:**


1. Ghatak A and Thyagarajan K. (1998) Introduction to Fiber Optics; Cambridge University Press: Cambridge, UK.
2. Barthorpe, R.J. and Worden, K. (2009) Sensor Placement Optimization. Encyclopaedia of Structural Health Monitoring, Boller, Chang and Fujino (ed.), John Wiley & Sons, Chichester, UK.


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**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: TIRUPATI**

**Year: IV** **Semester: I** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19APE0111 | **GROUND IMPROVEMENT TECHNIQUES** | 2 | 0 | 0 | 2 |

**OUTCOMES:** On completion of the course, the students will be able to:
**CO1** : Understand the grouting techniques and their applications
**CO2** : Understand the densification methods used in granular soils and Cohesive soils
**CO3** : Understand the ground Improvement methods used to stabilize soil
**CO4** : Understand the reinforcement design principles and geosynthetic materials, functions and applications
**CO5** : Identify the problems in Expansive soils

**UNIT – I**

**GROUTING:** Introduction to ground modification, need and objectivesObjectives Of Grouting- Grouts And Their Properties- Grouting Methods Ascending, Descending And Stage Grouting- Hydraulic Fracturing In Soils And Rocks Post Grout Test.

**UNIT – II**

**IN-SITU DENSIFICATION OF COHESIVE AND COHESIONLESS SOILS:**

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

**UNIT – III STABILISATION:**

Methods of Stabilization-Mechanical-Cement- Lime, Chemical Stabilization With Calcium Chloride, Sodium Silicate And Gypsum

**UNIT – IV REINFORCED EARTH:**

Principles – Components of Reinforced Earth – Factors Governing Design Of Reinforced Earth Walls – Design Principles Of Reinforced Earth Walls.

**GEOSYNTHETICS:** Geotextiles- Types, Functions and Applications – Geogrids and Geomembranes – Functions and Applications.

**UNIT - V EXPANSIVE SOILS:**

Problems Of Expansive Soils – Tests for Identification – Methods of Determination Of Swell Pressure. Improvement Of Expansive Soils – Foundation Techniques in Expansive Soils – Under Reamed Piles.

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**TEXT BOOKS:**

1. Engineering Principles of Ground Modification, Haussmann M.R. (1990), McGraw-Hill International Edition.
2. Ground Improvement Techniques by Dr.P.Purushotham Raj, Laxmi Publications, New Delhi / University Science Press, New Delhi
3. Ground Improvement Techniques by Nihar Rahajan Patra. Vikas Publications, New Delhi

**REFERENCES:**

1. Ground Improvement, Blackie Academic and Professional by Moseley M.P. (1993), Boca Taton, Florida, USA.
2. Ground Control and Improvement by Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994), John Wiley and Sons, New York, USA.
3. Designing with Geosynthetics by Robert M. Koerner, Prentice Hall New Jercy, USA

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B. Tech IV-I Sem. (C.E)

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**15A01710 REHABILITATION AND RETROFITING OF STRUCTURES**
**(CBCC - III)**

**Course Objectives:**

*This course introduces to the student the causes of concrete structures failures and methods available to rehabilitate and for retrofitting the structures with economical applications.*

**UNIT – I**

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

**UNIT – II**

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

**UNIT – III**

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

**UNIT – IV**

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

**UNIT – V**

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

**TEXT BOOKS:**


1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
3. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press




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**REFERENCES**

1. Diagnosis And Treatment Of Structures In Distress By R.N.Raikar, Published By R&D Centre Of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.
2. Handbook On Repair And Rehabilitation Of RCC Buildings, Published By CPWD, Delhi, 2002.
3. Earthquake Resistant Design Of Structures By Pankaj Agarwal And Manish Shrikhande, Prentice-Hall Of India, 2006.

**Course Outcomes:**

***After the completion of the course, the student will be able to***

1. *Assess the strength and materials deficiency in concrete structures*
2. *Suggest methods and techniques used in repairing / strengthening existing concrete structures*
3. *Apply Non Destructive Testing techniques to field problems*
4. *Apply cost effective retrofitting strategies for repairs in buildings*

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**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI**

**Year: III** **Semester: II** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19APE0106 | Subsurface Investigation and Instrumentation | 2 | 0 | 0 | 2 |

**Course Outcomes:** After the completion of the course student should be able to

1. Understand the exploration and geophysical methods
2. Understand the exploration techniques
3. Understand the sampling of soil
4. Understand field testing of soil
5. Understand the usage of instrumentation in subsurface investigation

**UNIT -I**

**EXPLORATION AND GEOPHYSICAL METHODS:** Exploration program planning -methods of exploration- preliminary and detailed design spacing and depth of bores, data presentation. Geophysical exploration and interpretation, seismic and electrical methods, cross bore hole, single bore hole – up hole - down hole methods.

**UNIT –II**

**EXPLORATION TECHNIQUES:** Methods of boring and drilling, non-displacement and displacement methods, drilling in difficult subsoil conditions, limitations of various drilling techniques, stabilization of boreholes, bore logs.

**UNIT -III**

**SOIL SAMPLING:** Sampling Techniques – quality of samples – factors influencing sample quality - disturbed and undisturbed soil sampling advanced sampling techniques, offshore sampling, shallow penetration samplers, preservation and handling of samples.

**UNIT -IV**

**FIELD TESTING IN SOIL EXPLORATION:** Field tests, penetration tests, Field vane shear, Insitu shear and bore hole shear test, pressure meter test, dilatometer test - plate load test–monotonic and cyclic; field permeability tests

**UNIT -V**

**INSTRUMENTATION:** Instrumentation in soil engineering, strain gauges, resistance and inductance type, load cells, earth pressure cells, settlement and heave gauges, pore pressure measurements.

**TEXT BOOKS:**

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation", CBS Publishers and Distributors, New Delhi, 2006.

2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.

**REFERENCES:**

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.

2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).

3. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985. 4. Hunt F. E., "Geotechnical Engineering Investigation Manual", McGraw Hill, 1984.

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**Year: III** **Semester: II** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19A0EMB01 | Managerial Economics and Financial Analysis | 3 | 0 | 0 | 3 |

**Course Outcomes:**

- Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns.
- Evaluate the capital budgeting techniques.
- Define the concepts related to financial accounting and management and able to develop the accounting statements and evaluate the financial performance of business entity.

## UNIT – I MANAGERIAL ECONOMICS

Introduction – meaning, nature, meaning, significance, functions, and advantages, ME and its role in other fields. Demand - Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing forecasting, Methods.

## UNIT – II PRODUCTION AND COST ANALYSIS

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

## UNIT III BUSINESS ORGANIZATIONS AND MARKETS

Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies

## UNIT IV CAPITAL BUDGETING

Introduction to Capital, Sources of Capital. Short-term and Long-term Capital : Working capital, types, Estimating Working capital requirements. Capital Budgeting – Features, Proposals, Time value of money. Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR), Net Present Value (NPV), and Internal Rate Return (IRR) Method (simple problems).

## UNIT V FINANCIAL ACCOUNTING AND ANALYSIS

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). **Financial Analysis** - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

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**TEXTBOOKS:**

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

**REFERENCE BOOKS:**


1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, NewDelhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.


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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-II Sem. (C.E)

| L | T | P | C |
|---|---|---|---|
| 3 | 1 | 0 | 3 |

**15A01802 ADVANCED STRUCTURAL ENGINEERING**
**(MOOCS – II )**

**Course *Objective:*** *To make the student more conversant with the design principles of multistoried buildings, roof system, foundation and other important structures.*

1. Design of a flat slab ( Interior panel only )
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of circular and rectangular, water tank resting on the ground
5. Design of cantilever and counter forte retaining wall with horizontal back fill

**FINAL EXAMINATION PATTERN:**

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

**TEXT BOOKS :-**

1. Structural Design And Drawing (RCC And Steel) By Krishnam Raju, Universites .Press , New Delhi
2. R.C.C Structures By Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi

**Reference Books :-**

1. Design Of RCC Structures By M.L.Gambhir P.H.I. Publications, New Delhi.
2. Advanced RCC By P.C. Varghese , PHI Publications, New Delhi.
3. R.C.C Designs By Sushil Kumar , Standard Publishing House.
4. Fundamentals Of RCC By N.C.Sinha And S.K.Roy, S.Chand Publications, New Delhi.

**Course Outcomes:**

*On completion of this course the student will be able to*

1. *Design of roof systems with reference to Indian standards*
2. *Design of water retaining and storage structures*
3. *Design of silos and chimneys*



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**PG** **AK19 Regulations**

**Year: I** **Semester : I** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19DPE0102 | Advanced Concrete Materials and Technology | 3 | 0 | 0 | 3 |

**Course Outcomes:** After the completion of the course student should be able to

1. Understand various ingredients of concrete and their role.
2. Examine knowledge on the fresh and hardened properties of concrete.
3. Design concrete mixes using various methods.
4. Perceive special concretes for accomplishing performance levels.
5. Understand the durability of concrete and remedial methods.

**UNIT – I:**

**Introduction to concrete** – Mineral and chemical admixtures – Structure of hydrated cement paste – Calcium Aluminate Cement – Cement Production quality control - Transition zone in concrete – measurement of workability by quantitative empirical methods – concrete properties: setting and hardening.

**UNIT – II:**

**Durability of concrete and concrete construction**: Durability concept, pore structure and transport processes, Permeability of concrete, reinforcement corrosion, fire resistance, frost damage, sulphate attack, Acid attack, alkali silica reaction, delayed ettringite formation, methods of providing durable concrete, short-term tests to assess long-term behavior.

**UNIT – III:**

**Mix design:** Review of methods and philosophies of IS, BS and ACI methods, mix design for special purposes, Acceptance criteria for compressive strength of concrete.

Test methods: Analysis of fresh concrete, accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structures.

**UNIT – IV:**

**Special concretes**: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, Ferro Cement.

**UNIT – V:**

**Special concretes:** Self Compacting Concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete andGeopolymer concrete .

Text Book

1. Properties of Concrete, A.M.Neville, Longman 1995.
2. Concrete Technology Theory and Practice, M.S.Shetty, S.Chand& Company Ltd, New Delhi.

Reference

1. Concrete micro-structure, Properties and Materials, P.K.Mehta, J.M.Monteiro, Printice Hall INC & McGraw Hill, USA.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI

**Year: I** **Semester: I** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19DPE0105 | ENERGY EFFICIENT BUILDINGS | 3 | 0 | 0 | 3 |

**Course Outcomes:**

1. This course aims to provide an understanding of the concept of reduction in energy consumption through low energy building design.
2. Highlight strategies to integrate day lighting and low energy heating/cooling in buildings.
3. Understand the concept and theoretical background of low energy building design.
4. Apply simulation tools to achieve energy efficiency in buildings.
5. Understand importance of energy consumption.

**UNIT – I**

**Green Buildings, Energy and Environment:**Green Buildings within the Indian Context, Types of Energy, Energy Efficiency and Rebound Effect, Pollution, Better Buildings, Reducing energy consumption, Low energy design.

**Renewable Energy sources** :Solar energy, Passive Solar Heating, Passive Solar collection, Wind and other renewables. A passive solar strategy: Direct gain - Trombe wall, convective air loop, Photovoltaic's, Climate and Energy, Macro and Microclimate - Indian Examples.

**UNIT – II**

**Heating and Cooling :** Building Form Surface area and Fabric Heat Loss, utilizing natural energy, Internal Planning, Grouping of buildings – Robin's Spatial Proportion – Orientation of building –Heat transmission through buildings –Thermal properties of building materials – Thermal Comfort –Psychometric Chart –Heat transfer – Cosine Effect - Insulation - Cooling buildings, passive cooling, and mechanical cooling – Measurement of heating and cooling loads.

**Ventilation and Infiltration** :Natural ventilation and forced ventilation in commercial buildings, passive cooling, modelling air flow and ventilation – stack effect - ventilation calculation – Mass effect.

**UNIT -III**

**Day lighting and Artificial Lighting** :Illumination requirements - Concepts of daylight factors and day lighting, daylight assessment, sky dome - sun path diagram, sky exposure angle, sun protection, shading coefficient, visualising day lighting: Source-Path-Target and apparent size, illuminance calculation, penetration and spread of sky component, artificial lighting, efficacy, Radiant barriers - new light sources – luminaries - light shelves - Supplementary artificial lighting design – light distribution – electric lighting control.

**UNIT -IV**

**Design for Climatic Zones:**Energy efficient building strategies for various climatic zones – cold and cloudy – cold and sunny – composite – warm and humid – moderate – hot and dry – case studies.

**UNIT -V**

**Energy Assessment and Compliances Procedures** :Energy awareness, monitoring energy consumption, Building Environmental Assessment- environmental criteria – embodied energy of building materials - assessment methods - assessment tools (e.g. GRIHA, LEED) - Ecohomes - Sustainable architecture and urban design – principles of environmental architecture.

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**PG** **AK19 Regulations**

**Year: I** **Semester:II** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19DPE2007 | Design of Advanced Concrete Structures | 3 | 0 | 0 | 3 |

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

1. Analyze the deflections of Reinforced Concrete Beams And Slabs by understanding their behaviour.
2. Analyze and Design the Deep Beams by understanding their behaviour.
3. Analyze and Design the Flat Slabs by understanding their behaviour.
4. Analyze and Design the Shear Walls by understanding their behaviour.
5. Analyze and Design the concrete members for Fire Resistance

**UNIT I**

**Deflection Of Reinforced Concrete Beams And Slabs**: Limit state design - beams, slabs and columns according to IS Codes -Short-Term Deflection Of Beams And Slabs -Deflection Due To - Imposed Loads - Short- Term Deflection Of Beams Due To Applied Loads- Calculation Of Deflection Of Continuous Beams - Deflection Of Cantilevers - Deflection Of Slabs- Redistribution of Moments in Reinforced Concrete Beams.

**UNIT II**

**Estimation Of CrackWidth In Reinforced Concrete Members:** Introduction - Factors Affecting Crack width In Beams - Mechanism Of Flexural Cracking Calculation Of Crack Widths - Simple Empirical Method - Estimation Of Crack width In -Beams - Shrinkage And Thermal Cracking.

**Deep Beams:** Introduction - Minimum Thickness - Steps Of Designing Deep Beams - Design By IS 456 - Design According To British Practice - ACI Procedure For Design Of Deep Beams - Checking For Local Failures - Detailing Of Deep Beams.

**UNIT-III**

**Design of Flat Slabs:**

Introduction - Checking For One-Way (Wide Beam) Shear - Two-Way (Punching) Shear Permissible Punching Shear - Shear Due To Unbalanced Moment (Torsional Moments) Calculation Of J Values - Strengthening Of Column Areas For Moment Transfer By Torsion Which Produces Shear - Shear Reinforcement Design - Effect Of Openings In Flat Slabs - Recent Revisions In ACI 318 - Shear In Two – Way Slabs With Beams.

**UNIT-IV**

**Design of Plain Concrete Walls and Shear Walls:**

Introduction - Braced And Unbraced Walls - Slenderness Of Walls- Eccentricities Of Vertical Loads At Right Angles To Wall - Empirical Design Method For Plane Concrete Walls Carrying Axial Load - Design Of Walls For In-Plane Horizontal Forces - Rules For Detailing Of Steel In Concrete Walls

**Design of Shear Walls:** Introduction - Classification Of Shear Walls - Classification According To Behavior - Loads In Shear Walls - Design Of Rectangular And Flanged Shear Walls - Derivation Of Formula For Moment Of Resistance Of Rectangular Shear Walls

**UNIT-V**

**Design of Elevated Water Tanks.Design of rectangular and circular water tanks both below and above ground level – Design of circular slab.**

**Reference Books:**

1. P.Purushothaman, Reinforced Concrete Structural Elements: Behaviour, Analysis And Design, Tata Mcgraw Hill.

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**PG** **AK19 Regulations**
**Year: II** **Semester:I** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19DPE2015 | Design of Industrial Structures | 3 | 0 | 0 | 3 |

Course Outcomes: At the end of the course, the student will be able to:
1. Design Steel Gantry Girders.
2. Design Steel Portal, Gable Frames.
3. Design Steel Bunkers
4. DesignSilos.
5. Design Chimneys and Water Tanks.

**UNIT – I**

Plastic Analysis: Introduction, Limit analysis of steel structures, Mechanical properties of structural steel, Plastic hinge, Moment curvature relations, Limit load, Coplanar load, Upper lower bound theorems.

Planning and functional requirements- classification of industries and industrial structures- planning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations.

**UNIT – II**

**Design of Gantry Girders** – Introduction, loads acting on gantry girder, permissible stress, types of gantry girders and crane rails, crane data, maximum moments and shears, construction detail, design procedure.

**UNIT – III**

**Design of welded plate girders** – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediate stiffeners – Design of web splice and flange splice

**UNIT – IV**

**Design of Portal Frames** – Design of portal frame with hinge base, design of portal frame with fixed base -Gable Structures – Lightweight Structures

**UNIT -V**

**Design of Communication Towers**: Analysis of Transmission line Towers: Loads on towers, Sag (dip) and Tension in uniformly loaded conductors, Analysis of towers (analysis as coplanar assembly), Design of members in towers, Design of foundation of towers. Design of Steel Chimneys for wind and gravity loads.

**Reference Books:**


1. Design of Steel Structure, Punmia B. C., Jain Ashok Kr., Jain Arun Kr., 2nd Ed., Lakshmi Publishers, 1998.
2. Design of Steel Structures, Ram Chandra, 12th Ed., Standard Publishers, 2009.
3. Design of Steel Structures, Subramaniyam.


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**PG** **AK19 Regulations**
**Year: II** **Semester:I** **Branch of Study: CE**

| Subject Code | Subject Name | L | T | P | Credits |
|---|---|---|---|---|---|
| 19DOE2002 | Project Management | 3 | 0 | 0 | 3 |

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

1. Able to understand the importance of construction project management, organization and leadership capabilities
2. Able to apply theoretical and practical aspects of project management planning techniques to achieve project goals.
3. Possess ideas on contract, tender and arbitration in construction projects.
4. Understand to apply knowledge and skills of quality and safety management in construction.
5. Have necessary knowledge in resource planning, costing and accounting.

**Unit I**

**Introduction to Project management:**Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Planning Process, Establishing Project organization.

**UNIT-II**

**Project Planning:**Planning techniques- Bar Chart, Gantt Charts- Networks: basic terminology, preparation of CPM-computation of float values, critical paths-PERT-Determination of three time estimates- Comparison between CPM and PERT

**UNIT-III**

**Resources Management:**Flow chart of Resources Management, Labour's requirement, Factors behind the selection of equipment, Material Management- flow chart and functions.

**Cost and Accounts Management:**Cost–volume relationship-BasicCost Control System-Principle of accounting, Account process, Balance sheet.

**Unit IV**

**Project Implementation:** Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management.

**UNIT-V**

**Quality management**

Inspection, quality control and quality assurance in projects- Cost of quality, cost versus quality levels- ISO standards- benefits-ISO 9001-2000 family of standards- Audit- types, ISO 9001-2000 for internal audit.

**Safety management**

Cause for accident in construction site- -Principle of safety- Role of safety personnel's - General safety conditions

***Text/Reference Books:***

**REFERENCES:**


1. Kumar Neeraj Jha, Construction Project Management Theory & Practice, Pearson Education Ltd., 2014.
2. Chitkara.K.K., Construction Project Management Planning Scheduling and Controlling, TataMcGraw-Hill, 2014


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