

**SCHOOL OF ENGINEERING**  
**SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES**  
**Syllabus of Examination - AICTE Pattern**  
**Undergraduate Degree Courses in Engineering & Technology**  
**Department of Civil Engineering**

**Course Content**

**VII SEMESTER**

**CEA-701**  
**Quantity Surveying & Costing**

CEA-701	Quantity Surveying & Costing	3L:0T:0P	3 credits	3Hrs/Week
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**Preamble:-**

- The course objective is introducing the student to the fundamental of quantity surveying, cost estimating and specifications.
- To impart knowledge in estimation, tender practices, contract procedures, and valuation of Civil Engineering works.

**UNIT – I**

**9Hr**

**Introduction:** Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

**UNIT – II**

**8Hr**

**Rate Analysis:** Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

**UNIT – III**

**8Hr**

**Detailed Estimates:** Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as watersupply, drainage and electrification.

**UNIT – IV**

**8Hr**

**Cost of Works:** Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

**UNIT – V**

**9Hr**

**Valuation:** Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

**Outcome:-**

On completion of the course, the student is expected to be able to

- Explain the basic concept of quantity estimation for building, roads, canals and hydraulic structures by manual and software packages.
- Acquire the knowledge to calculate rate analysis and man-hours required for the common civil works by manual and software packages.

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- Develop the specification for the materials used in construction, online and offline tender procedures and tender document preparation and report preparation.
- Acquire the knowledge of construction contracts and contract document preparation.
- Identify the valuation for building, land and plant and machineries, calculation of rent, mortgage and lease.

**Reference Books:**

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala

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**CEA-701**  
**Quantity Surveying & Costing**

<b>CEA-701</b>	<b>Quantity Surveying &amp; Costing</b>	<b>0L:0T:2P</b>	<b>1 credits</b>	<b>2Hrs/Week</b>
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**Practical Works:**

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.

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**CEA- 702**  
**Environmental Engineering-II**

<b>CEA-702</b>	<b>Environmental Engineering-II</b>	<b>3L:0T:0P</b>	<b>3 credits</b>	<b>3Hrs/Week</b>
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**Preamble:-**

- To prepare students for the effective use of the conventional techniques and engineering analytical methods for design and operation of sewerage systems.
- To present the foundations of many basic Engineering tools and concepts related Environmental Engineering.

**UNIT - I**

**8Hr**

**Sewerage schemes and their importance**, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

**UNIT -II**

**10Hr**

**Characteristics and analysis of waste water**, rcycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis.

**UNIT -III**

**9Hr**

**Unit operations for waste water treatment**, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

**UNIT - IV**

**10Hr**

**Methods of Biological Treatment (Theory & Design)** - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

**12Hr**

**UNIT -V**

**Advanced Waste Water treatment** - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods.

**Rural sanitation** - collection & disposal of refuse, sullage & night soil Laboratory work shall be based on the topics of environmental engineering I & II and consist of experiments of water and waste water quality as per facility available in the institution.

**Outcome:-**

The students after completing this course will be able to

- Design and draw various units of sewage treatment plants.
- Recognize the design philosophy of water and wastewater treatment processes.

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- The students will learn to understand the theoretical and practical aspects of environmental engineering along with the design and management applications.
- The students will learn to understand the methods of biological treatment and its design.

**Reference Books :-**

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company,
2. (P) Ltd. New Delhi
3. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
4. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
5. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company  
New Delhi
6. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
7. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New  
Delhi

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**CEA- 702**  
**Environmental Engineering-II**

<b>CEA-702</b>	<b>Environmental Engineering-II</b>	<b>0L:0T:2P</b>	<b>1 credits</b>	<b>2Hrs/Week</b>
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**List of Experiment:-**

1. To study the various standards for waste water
2. To study the sampling techniques for waste water
3. To determine the alkalinity in water sample
4. To determine the acidity in water sample
5. Determination of Dissolved Oxygen in the water and waste water sample
6. Determination of Biological Oxygen demand of a waste water sample
7. Determination of Chemical Oxygen demand of a waste water sample
8. Determination of various types of solids in the waste water sample
9. Determination of bacterial number by membrane filter Technique
10. Determination of bacterial colonies by standard plat count method

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**Professional Elective-IV**

**CEA- 703 (A)**  
**Advanced Structural Design (RCC)-II**

CEA-703 (A)	Advanced Structural Design (RCC)-II	3L:0T:0P	3 credits	3Hrs/Week
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**Preamble:-**

•To impart knowledge on basic of concepts of design of reinforced concrete structures and to make the students able to design and detail the elements like sway non-sway building, shear wall, retaining wall, water tanks, silo, bunker and T-beam, slab bridges.

**UNIT - I** **10Hr**  
**Design of Multistory Buildings** - Sway and Non-sway buildings, Shear walls and other bracing elements.

**UNIT II** **8Hr**  
**Earth Retaining Structures:** Cantilever and counter fort types retaining walls.

**UNIT - III** **10Hr**  
**Water Tanks:** Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

**UNIT - IV** **10Hr**  
Silos and Bunkers

**UNIT - V** **10Hr**  
**T-beam & Slab bridges-** for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.

**Outcome:-**

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

- Explain various design concepts and design building under sway and non-sway condition.
- Design earth retaining structure.
- Design water tank and draw the reinforcement details.
- Design of silo and bunker and design of T-beam & slab bridges.

**Reference Books: -**

1. R.C.C. by O.P. Jain Vol. II
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge engineering – D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Design by N.K. RAJU
6. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.

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**Professional Elective-IV**

**CEA-703 (B)**  
**Design of Hydraulic Structures**

<b>CEA-703 (B)</b>	<b>Design of Hydraulic Structures</b>	<b>3L:0T:0P</b>	<b>3 credits</b>	<b>3Hrs/Week</b>
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**Preamble:-**

•This course is aimed to develop the understanding of basic principles and concepts of analysis and design of hydraulic structures on permeable foundation such as weirs and barrages, canal falls and various river training works along with the detailed insight in to the theories of sub-surface flow. The course also intends to learn the detailed design principles of canal transitions and regulation works.

**UNIT - I**

**12Hr**

**Reservoir Planning:** Investigations, Capacities, Zones of storage, Mass Inflow and Mass Demand curves, Life of Reservoir. Earth Dams: Types, causes of failure and design criteria, soils suitability for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

**UNIT - II**

**8Hr**

**Gravity dams:** Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, practical profile, evaluation of profile by method of zoning, foundation treatment, construction joints, galleries in gravity dams.

**UNIT - III**

**11Hr**

**Spillways:** Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways. Design of outlets and rating curves Energy dissipaters: Principles of energy dissipation Energy dissipaters based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles. Design of canal regulating structures, Design of Channel transitions,

**UNIT - IV**

**9Hr**

**Structures on Pervious formations:** Bligh's creep theory, limitations, Khosla's theory of independent variable, Khosla's corrections, Design of Weir and Barrages: design of waterways and crest levels, design of impervious floors and protection works.

**UNIT - V**

**8Hr**

**Canal Structures and Hydropower Plants:** Design of canal falls, Regulators, Cross drainage works, Introduction of Hydropower development, general features of hydro-electric schemes, selection of turbines.

**Outcome:-**

Upon successful completion of this course, it is expected that students will be able to-

- Understand the design aspects of various hydraulic structures on permeable foundation and their causes of failure.
- Plan and design the efficient silt control structures and relevant river training works.
- Plan and design suitable transition structures for subcritical and supercritical flow conditions using standard available methods.



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- Plan and design of canal regulation works.

**REFERENCE BOOKS: -**

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. by Punmia & Pandey B.B. Lal
5. Water Power Engineering by Dandekar

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**Open Core Elective-III**

**CEA- 704 (A)**  
**Traffic Engineering**

CEA-704 (A)	Traffic Engineering	3L:0T:0P	3 credits	3Hrs/Week
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**Preamble:-**

•To give an overview of Traffic engineering, various surveys to be conducted, traffic Regulation, management and traffic safety.

**UNIT -I**

**8Hr**

**Traffic Characteristics:** (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle.

**UNIT -II**

**10Hr**

**Traffic Studies:** (i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and destination Studies (O & D) : Various methods, collection and interpretation of data, planning and sampling. (iv) Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

**UNIT -III**

**10Hr**

**Traffic Operations and Control:** (i) Traffic regulations and various means of control.(ii) One way streets- advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal.

**UNIT -IV**

**9Hr**

**Street Lighting :** (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting. (v) Fundamental factors of night vision.

**UNIT -V**

**10Hr**

**Accident Studies & Mass Transportation:** (i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

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**Outcome:-**

Students who successfully complete this course will be able to-

- Understand the principles and standards adopted in Planning and Design of Traffic system.
- Apply the knowledge of science and engineering fundamentals in conducting traffic surveys and analyze the problems.
- Designing various types of control and regulatory measures to meet an efficient traffic network.
- Select appropriate methods to ensure the safety of the road users and analyze the environmental issues related to traffic network.
- Understand various traffic management measures in addressing the demand, pricing and ITS applications.

**REFERENCE BOOKS :-**

1. Traffic Engineering and Transport Planning by L.R. Kadiyali, Khanna Publishers, Delhi
2. Traffic Engineering by Matson, W.S. Smith & F.W. Hurd
3. G.J. Pingnataro, Principles of Traffic Engineering
4. D.R. Drew, Traffic Flow Theory
5. W.R. Mchne and R.P. Roess "Traffic Engg"
6. Wohl & Martin, Traffic System Analysis for Engineering & Planners

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**Open Core Elective-III**

**CEA- 704 (B)**  
**Construction Planning & Management**

CEA-704 (B)	Construction Planning & Management	3L:0T:0P	3 credits	3Hrs/Week
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**Preamble:-**

•To study and understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction project.

**UNIT -I**

**8Hr**

**Preliminary and detailed investigation methods:** Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

**UNIT -II**

**9Hr**

**Construction equipments:** Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

**UNIT -III**

**10Hr**

**Tenders & Contracts:** Different types of Tenders & Contracts, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

**UNIT -IV**

**10Hr**

**Specifications & Public Works Accounts:** Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

**UNIT-V**

**10Hr**

**Site Organization & Systems Approach to Planning:** Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line modals with their applications, shovel truck performance with waiting line method.

**Outcome:-**

• On completion of this course the students will know the development of construction planning, management procedure and different construction equipment, tender & contracts.

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**Reference Books:-**

1. Construction Equipment by Peurify
2. CPM by L.S. Srinath
3. Construction Management by S. Seetharaman
4. CPM & PERT by Weist & Levy
5. Construction, Management & Accounts by Harpal Singh
6. Tendering & Contracts by T.A. Talpasai

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**CEA-705**  
**Major Project-I**

CEA-705	Major Project-I	0L:0T:10P	5 credits	10 Hrs/Week
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**Preamble:-**

The object of Major project I or dissertation is to enable the student to extend further the investigative study taken up under civil engineering Construction projects, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry.

**GUIDELINES:-**

1. The Major-project is a team activity having 3-4 students in a team.
2. The Major project may be a complete hardware or a combination of hardware and software. The software part in Minor project should be less than 50% of the total work.
3. Minor Project should cater to a small system required in laboratory or real life.
4. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of Minor project.
5. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
6. The student is expected to exert on design, development and testing of the proposed work as per the schedule.

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**CEA-706**  
**Self Study/GD/Seminar**

CEA-706	Self-Study/GD/Seminar	0L:0T:2P	1 credits	2Hrs/Week
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**Preamble:-**

The main objective is to improve the mass communication and convincing/understanding skills of students and to give the students an opportunity to exercise their rights to express themselves. The evaluation will be done based on their presentation work and group discussion.

**Presentation Skills**

They will be able to make use of visual, audio and audio-visual material to support their presentation, and will be able to speak cogently with or without notes. Students will present either in groups or as individuals.

**Discussion Skills**

Students will be able to judge when to speak and how much to say, speak clearly and audibly in a manner appropriate to the subject, ask appropriate questions, use evidence to support claims, respond to a range of questions, take part in meaningful discussion

**Listening Skills**

Students will demonstrate that they have paid close attention to what others say and can respond constructively. Through listening attentively, they will be able to build on discussion fruitfully, supporting and connecting with other discussants. They will be able to follow academic discussions, infer meanings that are not overt, and take notes from a discussion or presentation.

**Argumentative Skills and Critical Thinking**

Students will develop persuasive speech, present information in a compelling, well-structured, and logical sequence, respond respectfully to opposing ideas, show depth of knowledge of complex subjects, and develop their ability to synthesize, evaluate and reflect on information.

**Questioning**

Through asking appropriate questions, students will demonstrate their understanding of discussions and spark further discussion.

**Interdisciplinary Inquiry**

Students will be able to reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to a single question or problem.

**Engaging with Big Questions**

Students will engage with important questions that stimulate discussion and debate.

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**Studying Major Works**

Students will engage with works that are widely held to be significant in the field of study, while recognizing cultural diversity and the ever-changing nature of what is regarded as important.

**Outcome:-**

In terms of content, students will be able to