SCHEME AND SYLLABI FOR

SEVENTH SEMESTER

OF

BACHELOR OF

TECHNOLOGY IN

CIVIL ENGINEERING

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

7th Semester

Sl. No	Code	Subject	Hours / week			Marks		Sem-end Duration Hours	Credits
			L	T	P/D	Inte-rnal	Sem-end		
1	CE09 701	Structural Design III	4	1	-	30	70	3	5
2	CE09 702	Design of Hydraulic Structures	2	-	2	30	70	3	4
3	CE09 703	Environmental Engineering I	2	1	-	30	70	3	3
4	CE09 704	Construction Engineering & Management	2	1	-	30	70	3	3
5	CE09 Lxx	Elective II	3	1	-	30	70	3	4
6	CE09 Lxx	Elective III	3	1	-	30	70	3	4
7	*CE09 707(P)*	Computer Applications Lab	-	-	3	50	50	3	2
8	*CE09 708(P)*	Environmental Engineering Lab	-	-	3	50	50	3	2
9	*CE09 709(P)*	Project	-	-	1	100	-	3	1
		Total	**16**	**5**	**9**				**28**

CE09 701: STRUCTURAL DESIGN III

Teaching scheme **Credits:** 5
4 hours lecture and 1 hour tutorial per week

Objectives

- To provide knowledge in the structural Design of selected advanced structures of concrete and steel

Part A: Reinforced Concrete

Module I (20 hours)
Design of columns subjected to axial load, uni-axial and bi-axial eccentrically loaded short and slender columns using SP 16 of BIS by limit state method.
Different types of foundations-Design of isolated footing for axially loaded & eccentrically loaded columns, combined footing, design principles of strap/cantilever footings- design of pile foundation-pile cap.

Module II (17 hours)
Design of cantilever and counter fort retaining walls
Design of R.C.C. Slab Bridge for IRC loading –Detailing
Design of rectangular water tanks using IS code coefficients (IS 3370) -Design of circular water tanks-staging
Design of spherical and conical domes-detailing

Module III (17 hours)
Prestressed Concrete fundamentals -Materials, principles – methods of prestressing- pre and post tensioning -losses of prestress. Analysis of stresses in pre and post tensioned beams (rectangular and I sections) at stages of transfer and service-cable profiles (principles only), concept of Type I, II and III PSC structures as per IS. Stresses in anchorage zone in post-tensioned beams (description only; no design expected)

Part B Steel

Module IV (18 hours)
Design of plate girders-design of section for flexure, shear and deflection-connections-horizontal and vertical stiffeners-curtailment of flange plates - design of bearing stiffener, web splices. Plate girder Railway Bridges- Types, structural configurations, Assessment of loads and stresses, design of critical sections of deck type and through type bridges, design principles of bridge bearings.

Note:
All designs shall be done as per current I.S. specifications
Special importance shall be given to detailing in designs
S.I. units shall be followed
Limit state design shall be practiced wherever possible as per codes
Use of IS 3370 (1 to 4), IRC 21(1, 2, 3, 7, 9), IS 13743, IS 800, IS 875 and SP 6 and SP16 shall be permitted in the examination hall.

Text Books:
1. Pillai S.U. & Menon D., Reinforced Concrete Design. Tata McGraw Hill
2. Punmia .B.C., Jain A. K., Reinforced Concrete Structures, Lexmi Publications

3. Johnson D. Victor, Essentials of Bridge Engineering, Oxford & IBH
4. Krishnaraju, Prestressed Concrete, Tata McGraw Hill
5. Subramanian N, Design of steel Structures, Oxford University Press
6. Ram Chandra., Design of steel Structures, Standard Book House
7. Punmia .B.C., Jain A. K., Design of Steel Structures, Lexmi Publications

Reference Books:

1. Park & Paulay, Reinforced Concrete, McGraw Hill
2. Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India
3. Varghese P.C., Advanced Reinforced Concrete Design, Prentice Hall of India
4. Mallick S.K, and Gupta A.K., Reinforced Concrete. Oxford & IBH
5. Jain. A.K., Reinforced Concrete-Limit state Design, Standard Book House
6. Jain and Jaikrishna, Plain and Reinforced Concrete Vol I & II, Nemchand
7. Winter and Nelson, Design of concrete Structures.. Tata McGraw Hill
8. Lin. T.Y. and Burns, Design of Prestressed Concrete Structures., John Wiley
9. Arya and Ajmani, Design of Steel Structures., Nemchand
10. Lin and Bresler, Design in Structural Steel, John Wiley
11. T.R.Jagadeesh and M.A.Jayaram., Design of Bridge Structures., Prentice-Hall
12. Libby J., Prestressed concrete structures, CBS Publishers
13. Krishnaraju N., Sructural Design and Detailing, Reinforced concrete and steel, University Press
14. Gaylord and Stallmeyer, Steel structures, McGraw Hill

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination pattern

PART A: *Short answer questions* *5×2 marks=10 Marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.
PART B: *Analytical / Problem solving questions* *4×5 marks=20 Marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.
PART C: *Analytical / Problem solving questions.* *4×10 marks= 40 Marks*
Two questions from each module with choice to answer one question.
Maximum Total marks: 70

CE09 702: DESIGN OF HYDRAULIC STRUCTURES

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour drawing per week

Objective:

- Students are expected to know the details of major and minor irrigation structures and their design. A student, who successfully completes the course, should be able to carry out design of various hydraulic structures in the given field conditions. Also to make the students familiarize with the relevant I.S codes and to enhance the capability of reading the working drawings.

Module I (18 hours*)
Storage Head Works;
Types of dams - gravity dam - selection of site - forces acting on dams - drainage gallery - joints in dams - elementary profile - limiting height of gravity dam - high and low dam - practical profile of a high gravity dam- design methods and design by gravity analysis only- arch dam – design methods – design by cylinder theory only. spillways and their types

Module II (18 hours*)
Tank structures
Surplus works – types of surplus works- surplus weir –surplus escapes, core wall type – flush escape
Outlet works - tank sluice with tower head
Canal structures
Canal outlets-review of requirements and types-modular, semi modular, non-modular outlets- design of direct sluice
(Detailed design and drawing of surplus weir, tank sluice and direct sluice are expected)

Module III (18 hours*)
Diversion head works- Types – design of surface and subsurface weirs - design of regulator cum Road Bridge
Canal falls- design of trapezoidal notch canal fall - design of syphon well drop-
(Detailed designs and drawings of canal regulator cum road bridge, trapezoidal notch fall and siphon well drop are expected.)

Module IV (18 hours*)
Cross drainage works - necessity - types of cross drainage works - selection of suitable type of cross drainage works - types of aqueducts- design of aqueduct - syphon aqueduct (type II and III) super passage and canal syphon

(Detailed designs and drawings of aqueduct and syphon aqueduct (Type II) are expected).
* Hours are inclusive of drawing classes.

Text books:
1. Asawa, Irrigation Engineering, Wiley Eastern Publication
2. Sathyanarayana Murthy, Water Resources Engineering, Wiley Eastern
3. S. K Garg, Irrigation Engineering and Hydraulics, Khanna Publishers

Reference books:

1. Varshney R.S., Theory & Design of Irrig. Structures, Nem Chand
2. Punmia B.C., Irrigation & Waterpower Engg., Laxmi Publications
3. Serge Liliavsky, Irrigation & Hydraulic Design, Chapman and Hall
4. IS: 6512 (1984) – Criteria for design of storage gravity dams
5. IS 7784 (Part I (1993), Part II Section 1 to 5 (1995)) Design of cross drainage works – Code of Practice
6. IS: 6966 Part I (1989) – Hydraulic design of barrages and weirs – Guidelines
7. IS: 11130 (1984) – Criteria for structural design of barrages and weirs
8. IS:6531 (1972) – Criteria for design of canal head regulator
9. IS:7114(1973) – Criteria for hydraulic design of cross regulator for canal
10. IS:6936 (1992) – *Guide for location ,selection and hydraulic design of canal escapes*
11. IS:12331 – *General requirement of canal outlets*

Internal Continuous Assessment *(Maximum Marks-30)*

10 marks - Tests (minimum 2)
16 marks - Assignments (8 Drawing Sheets)
4 marks - Regularity in the class

Note: Since drawing shall be given more importance in this subject apportioning of marks are kept different.

University Examination pattern

PART A: *Short answer questions* *5×2 marks=10 Marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.
PART B: *Descriptive/derivative questions* *4×5 marks=20 Marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.
PART C: questions for presenting *Design and drawing* *1×40 marks= 40 Marks*
Two questions from any module other than Ist module, with choice to answer one question.
Maximum Total marks: 70

CE 09 703 ENVIRONMENTAL ENGINEERING I

Teaching scheme **Credits: 3**
2 hours lecture and 1 hour drawing per week

Objective:

- To provide detailed understanding regarding usage of water for drinking purpose - from identification of source, planning the treatment systems, distribution of treated water with development of distribution of layout and necessity of maintenance.

Module I (6 hours)

Water supply Engineering – Importance and necessity of community water supply schemes – essentials of water supply engineering – quantity of water – forecasting population – rate of consumption for various purposes – factors affecting consumption – fluctuations in demand.

Module II (10 hours)

Sources of water – surface water sources – suitability of the source with respect to quantity and quality – intakes of various surface water sources – design of intakes – ground water sources - development and protection of groundwater sources – estimation of yield from various ground water sources – construction of tube wells – maintenance.

Quality of water – drinking water standards – physical, chemical and bacteriological analysis of water.

Module III (10 hours)

Treatment of water – aeration – coagulation – flocculation – sedimentation – filtration – disinfection – design of all the units – miscellaneous treatments – removal of colour, taste and odor, iron and manganese, and hardness – fluoridation and deflouridation.

Module IV (10 hours)

Water supply schemes – gravitational, pumping and combined schemes – transmission of water – classification of conduits – shape and strength of conduits – location of conduits – materials of conduits – design of gravity and pumping main - distribution systems – different layout of pipe networks – analysis of pipe networks – house connection from mains – laying and joining of pipes – appurtenances – different valves – meters and hydrants – detection and prevention of leaks in distribution system – cleaning and maintenance of distribution system.

Text Books:

1. Garg S. K., *Environmental Engineering Vol I*, Khanna Publishers.
2. Birdie G.S & Birdie J.S, *Water Supply and Sanitary Engineering*, Dhanpat Rai & Sons.
3. Duggal K N, *Elements of Environmental Engineering*, S Chand & Co Ltd.

Reference Books:

1. Mark J Hammer Mark J Hammer Jr., *Water and Waste Water Technology*, Prentice Hall of India Pvt. Ltd.
2. Fair, Gayer and Okun, *Water and Waste water Engineering*, John Wiley.

3. Ernest W Steel, *Water Supply and sewerage*, McGraw Hill.

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination pattern

PART A: *Short answer questions* *5×2 marks=10 Marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.
PART B: *Descriptive/derivative questions* *4×5 marks=20 Marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.
PART C: questions for presenting *Design and drawing* *4×10 marks= 40 Marks*
Two questions from each module, with choice to answer one question.
Maximum Total marks: 70

CE09 704: CONSTRUCTION ENGINEERING AND MANAGEMENT

Teaching scheme **Credits: 3**

2 hours lecture and 1 hour drawing per week

Objective: To make the students familiar with the various facets of construction and its planning like project scheduling, resource and material management, construction procedures and professional ethics

Module I (10 hours)

Construction planning and management: Network Techniques: Introduction – Bar charts – Use of CPM and PERT for planning – Drawing network diagrams – time estimates – slack – critical path – Crashing and time-cost trade off - resource smoothing – resources levelling - construction, equipment, material and labour schedules. Preparation of job layout.

Module II (9 hours)

Construction methods and equipment: Factors for selection of equipment – equipment for excavation and transportation of earth – hauling equipment – piles and pile driving equipment – cranes.

Module III (9 hours)

Construction procedures: different methods of construction – types of contract - tenders – prequalification procedure - earnest money deposit – contract document – general and important conditions of contract - measurement and measurement book – arbitration.
Inspection and quality control - need, principles and stages.

Module IV (8 hours)

Concept of materials management – inventory – inventory control – Economic order quantity-ABC analysis.
Safety in construction – Safety measures in different stages of construction – implementation of safety programme.
Concept of ethics – Professional ethics – ethical problems – provisions of a professional code – Role of professional bodies.

Text Books:

1. L.S.Srinath – PERT and CPM –Principles and Applications, Affiliated East-West Press
2. Peurifoy and Schexnayder – Construction Planning, Equipment, and Methods, Tata McGraw Hill

Reference Books

1. Shrivastava, Construction Planning and Management, Galgotia Publications
2. Gahlot and Dhir, Construction Planning and Management, New Age International
3. F. Harris, Modern Construction and Ground Engineering Equipment and Methods, Prentice Hall.
4. P.P. Dharwadkar, Management in Construction Industry, Oxford and IBH
5. Charles D Fledderman, Engineering Ethics, Prentice Hall
6. BIS, National Building Code
7. Khanna, O.P., Industrial Engineering and Management., Dhanapat Rai Publications
8. V.N.Vazirani and S.P.Chandola, Heavy Construction

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination pattern

PART A: *Short answer questions* *5×2 marks=10 Marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.
PART B: *Analytical / Problem solving questions* *4×5 marks=20 Marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.
PART C: *Analytical / Problem solving questions.* *4×10 marks= 40 Marks*
Two questions from each module with choice to answer one question.
Maximum Total marks: 70

CE09 705 L xx – ELECTIVE II

CE09 706 L xx – ELECTIVE III

CE09 707(P): COMPUTER APPLICATIONS LABORATORY

Teaching scheme **Credits : 2**
3 hours practical per week

Objective:
To familiarize and give hands-on training to students in the following areas of civil engineering application software:

1. **Surveying** - Terrain mapping, computation of areas and volumes – Estimation of earth work
2. **Structural Engineering –** Plane and space frames (steel and R.C.C), spread sheet development for design of R.C.C/ steel structural elements.
3. **Water resources** –Circular Pipe Analysis / Trapezoidal Channel Analysis, analysis of pipe network for water distribution
4. **Geotechnical engineering –**stability analysis of slopes, computation of foundation settlement and stresses on layered soils, Geotechnical design of anchored and free retaining walls, Analysis and design of pile foundations.
5. **Road/railway system –** Fixation of vertical / horizontal alignment of highways, Design of rigid and flexible pavements.
6. **Environmental engineering**- Pipe Network Analysis
7. **Estimation and costing** - Use spread sheet / any standard software for estimation.
8. **Project management –** PERT and CPM**,** project scheduling, managing and documentation, Network Analysis.

Notes:
1. **Students are supposed to document each tutorial with drafting after each session.**
2. **At least five of the above eight areas shall be covered.**

Recommended software packages: The following packages or their equivalent are recommended for the above listed exercises:

- AutoCAD, Microstation, MS-Office, Matlab, Grapher/Sigmaplot
- Autocivil, SAP, StAAD, ANSYS, NISA, GTSTRUDL
- WaterCAD, FlowMaster, EPA NET, Geo4, Inroads
- MS-Project

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

Note: Students shall be encouraged to take up a term-project on any of the above listed areas and complete it within the semester

End Semester Examination *(Maximum Marks-50)*

70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

CE09 708(P): ENVIRONMENTAL ENGINEERING LABORATORY

Teaching scheme **Credits: 2**
3 hours practical per week

Objective

- To make students familiar with laboratory tests for water quality assessment.

List of Experiments

1. Determination of Solids (Total, dissolved and suspended) in water.
2. Determination of Turbidity of water and estimation of optimum coagulant dosage by jar test.
3. Determination of alkalinity of water.
4. Determination of hardness of water by EDTA titrimetric method.
5. Determination of chlorides in water.
6. Determination of iron and manganese in water
7. Determination of sulphates and sulphides in water.
8. Determination of dissolved oxygen in water.
9. Determination of available chlorine in bleaching powder and test for residual chlorine.
10. Determination of pH of water (by various methods).
11. Determination of B.O.D and C.O.D of wastewater sample.
12. Determination of MPN

Reference Books:

1. Standard methods for the examination of water and wastewater, 1995, ALPHA, AWWA, WPCF Publication.
2. Sawer and McCarty, Chemistry for Environmental Engineering, McGraw Hill.

Internal Continuous Assessment *(Maximum Marks-50)*

60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

Note: Students shall be made aware of Computer integrated test methods for water quality assessment.

End Semester Examination *(Maximum Marks-50)*

70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

CE09 709(P): PROJECT

Teaching scheme **Credits: 1**
1 hour per week

Objective

- *To develop the capacity of the students in converting the theoretical knowledge into practical systems either to perform creative works or to perform analysis and hence to suggest solutions to problems, pertaining to Civil Engineering domain.*

Project work is of duration of two semesters and is expected to be completed in the eighth semester. Each student group consisting of not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project work can be a planning and / or design project, experimental project, field surveying or computer application based project on any of the topics of civil engineering interest. HOD will frame the rules for forming batches. If required, HOD can combine project hours of many weeks together and allot a maximum of 4 weeks exclusively for project. The project batches are expected to fix their topics, complete preliminary studies like literature survey, field measurements etc. in the seventh semester.

Each project group should submit project synopsis within three weeks from start of seventh semester. Project evaluation committee consisting of three or four faculty members specialised in the various fields of civil engineering, shall study the feasibility of each project work before giving consent.

As far as possible, students should execute the project work using the facilities of the institute. However, external projects can be taken up in government departments/institutions, reputed construction industries, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work and there must be an internal guide for such projects.

The assessment of all the projects should be done at the end of the seventh semester by the project evaluation committee formed as mentioned earlier. The students will present their project details and progress of their project to the committee. The complete project report is not expected at the end of the seventh semester. However, a three-four page typed report based on the work done should be submitted by each student to the assessing committee. The assessment committee and project guides will award the marks for the individual students in a project as follows:
50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

Internal Continuous Assessment:
20% - Technical relevance of the project
40% - Literature survey and data collection
20% - Progress of the project and presentation
10% - Report
10% - Regularity in the class