

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI**  
**Scheme of Teaching and Examination 2018 – 19**  
**Outcome Based Education(OBE) and Choice Based Credit System (CBCS)**  
**(Effective from the academic year 2018 – 19)**

**Programme: CIVIL ENGINEERING**

**VII SEMESTER**

VII SEMESTER												
Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PCC	18CV71	Quality Surveying and Contract Management	Civil Engg.	3	--	--	03	40	60	100	3
2	PCC	18CV72	Design of RCC and Steel Structures	Civil Engg.	3	--	--	03	40	60	100	3
3	PEC	18CV73X	Professional Elective - 2	Civil Engg.	3	--	--	03	40	60	100	3
4	PEC	18CV74X	Professional Elective - 3	Civil Engg.	3	--	--	03	40	60	100	3
5	OEC	18CV75X	Open Elective -B	Civil Engg.	3	--	--	03	40	60	100	3
6	PCC	18CVL76	Computer Aided Detailing of Structures	Civil Engg.	--	2	2	03	40	60	100	2
7	PCC	18CVL77	Geotechnical Engineering Laboratory	Civil Engg.	--	2	2	03	40	60	100	2
8	Project	18CVP78	Project Work Phase - 1		--	--	2	--	100	--	100	1
9	Internship	--	Internship	(If not completed during the vacation of VI and VII semesters, it shall be carried out during the vacation of VII and VIII semesters )								
TOTAL					15	04	06	21	380	420	00	20

**Note:** PCC: Professional core, PEC: Professional Elective.


**Professional Elective - 2**

Course code under 18CV73X	Course Title
18CV731	Theory of Elasticity
18CV732	Air Pollution and Control
18CV733	Pavement Materials & Construction
18CV734	Ground Water Hydraulics
18CV735	Masonry Structures

**Professional Electives - 3**

Course code under 18CV74X	Course Title
18CV741	Earthquake Engineering
18CV742	Design Concepts of Building Services
18CV743	Reinforced Earth Structures

18CV744	Design of Hydraulic Structures
18CV745	Urban Transport Planning
<b>Open Elective -B</b>	
<b>Course code under 18CV75X</b>	<b>Course Title</b>
18CV751	Finite Element Method
18CV752	Numerical Methods and Applications
18CV753	Environmental Protection and Management
<p>Students can select any one of the open electives offered by other Departments except those that are offered by the parent Department (Please refer to the list of open electives under 18XX75X).</p> <p>Selection of an open elective shall not be allowed if,</p> <ul style="list-style-type: none"> <li>• The candidate has studied the same course during the previous semesters of the programme.</li> <li>• The syllabus content of open elective is similar to that of the Departmental core courses or professional electives.</li> <li>• A similar course, under any category, is prescribed in the higher semesters of the programme.</li> </ul> <p>Registration to electives shall be documented under the guidance of Programme Coordinator/ Advisor/Mentor.</p>	
<p><b>Project work:</b></p> <p>Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary project can be assigned to an individual student or to a group having not more than 4 students. In extraordinary cases, like the funded projects requiring students from different disciplines, the project student strength can be 5 or 6.</p> <p><b>CIE procedure for Project Work Phase - 1:</b></p> <p><b>(i) Single discipline:</b> The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.</p> <p>The CIE marks awarded for the project work phase -1, shall be based on the evaluation of the project work phase -1 Report (covering Literature Survey, Problem identification, Objectives and Methodology), project presentation skill and question and answer session in the ratio 50:25:25. The marks awarded for the Project report shall be the same for all the batch mates.</p> <p><b>(ii) Interdisciplinary:</b> Continuous Internal Evaluation shall be group wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable.</p> <p>The CIE marks awarded for the project work phase -1, shall be based on the evaluation of project work phase -1 Report (covering Literature Survey, Problem identification, Objectives and Methodology), project presentation skill and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.</p> <p><b>Internship:</b> All the students admitted to III year of BE/B. Tech shall have to undergo mandatory internship of 4 weeks during the vacation of VI and VII semesters and /or VII and VIII semesters. A University examination shall be conducted during VIII semester and the prescribed credit shall be included in VIII semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements.</p>	
<p><b>AICTE activity Points:</b> In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.</p>	

  
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 Dept. of Civil Engineering  
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**Programme: CIVIL ENGINEERING**

**VIII SEMESTER**

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
					L	T	P					
1	PCC	18CV81	Design of Pre-stressed Concrete	Civil Engg.	3	--	--	03	40	60	100	3
2	PEC	18CV82X	Professional Elective - 4	Civil Engg.	3	--	--	03	40	60	100	3
3	Project	18CVP83	Project Work Phase - 2	Civil Engg.	--	--	16	03	40	60	100	8
4	Seminar	18CVS84	Technical Seminar	Civil Engg.	--	--	2	03	100	--	100	1
5	Internship	18CVI85	Internship	Completed during the vacation/s of VI and VII semesters and /or VII and VIII semesters.)				03	40	60	100	3
<b>TOTAL</b>					<b>06</b>	<b>--</b>	<b>18</b>	<b>15</b>	<b>260</b>	<b>240</b>	<b>500</b>	<b>18</b>

**Note:** PCC: Professional Core, PEC: Professional Elective.

**Professional Electives - 4**

Course code under 18CV82X	Course Title
18CV821	Bridge Engineering
18CV822	Prefabricated Structures
18CV823	Advanced Foundation Engineering
18CV824	Rehabilitation & Retrofitting
18CV825	Pavement Design

**Project Work**

**CIE procedure for Project Work Phase - 2:**

**(i) Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.

The CIE marks awarded for the project work phase -2, shall be based on the evaluation of project work phase -2 Report, project presentation skill and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

**(ii) Interdisciplinary:** Continuous Internal Evaluation shall be group wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work phase -2, shall be based on the evaluation of project work phase -2 Report, project presentation skill and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

**SEE for Project Work Phase - 2:**

(i) **Single discipline:** Contribution to the project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted at the department.  
(ii) **Interdisciplinary:** Contribution to the project and the performance of each group member shall be assessed individually in semester end examination (SEE) conducted separately at the departments to which the student/s belongs to.

**Internship:** Those, who have not pursued /completed the internship, shall be declared as fail and have to complete during subsequent University examination after satisfying the internship requirements.

**AICTE activity Points:** In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

Activity points of the students who have earned the prescribed AICTE activity Points shall be sent the University along with the CIE marks of 8th semester. In case of students who have not satisfied the AICTE activity Points at the end of eighth semester, the column under activity Points shall be marked NSAP (Not Satisfied Activity Points).

  
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<b>B. E. CIVIL ENGINEERING</b> <b>Choice Based Credit System (CBCS) and Outcome Based Education (OBE)</b> <b>SEMESTER - VII</b>			
<b>QUANTITY SURVEYING AND CONTRACT MANAGEMENT</b>			
Course Code	<b>18CV71</b>	CIE Marks	40
Teaching Hours/Week(L:T:P)	(3:0:0)	SEE Marks	60
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b> This course will enable students to; <ol style="list-style-type: none"> <li>1. Estimate the quantities of work, develop the bill of quantities and arrive at the Cost of civil engineering Project</li> <li>2. Understand and apply the concept of Valuation for Properties</li> <li>3. Understand, Apply and Create the Tender and Contract document.</li> </ol>			
<b>Module -1</b>			
<b>Quantity Estimation for Building:</b> study of various drawing attached with estimates, important terms, units of measurements, abstract, Types of estimates. Estimation of building by Short wall and long wall method - centre line method. Estimate of R.C.C structures including Slab, beam, column, footings.			
<b>Module -2</b>			
Estimate of Steel truss, manhole and septic tanks and slab culvert. <b>Quantity Estimation for Roads:</b> Computation of volume of earthwork fully in banking, cutting, partly cutting and partly Filling by mid-section, trapezoidal and Prismoidal Methods.			
<b>Module -3</b>			
<b>Specification for Civil Engineering Works:</b> Objective of writing specifications essentials in specifications, general and detail specifications of different items of works in buildings and roads. <b>Analysis of Rates :</b> Factors Affecting Cost of Civil Works , Concept of Direct Cost , Indirect Cost and Project Cost Rate analysis and preparation of bills, Data analysis of rates for various items of Works, Sub-structure components, Rate analysis for R.C.C. slabs, columns and beams.			
<b>Module-4</b>			
<b>Contract Management-Tender and its Process:</b> Invitation to tender, Prequalification, administrative approval & Technical sanction. Bid submission and Evaluation process. Contract Formulation: Letter of intent, Award of contract, letter of acceptance and notice to proceed. Features / elements of standard Tender document (source: PWD / CPWD / International Competitive Bidding – NHAI / NHEPC / NPC). Law of Contract as per Indian Contract act 1872, Types of Contract, Joint venture. <b>Contract Forms:</b> FIDIC contract Forms, CPWD, NHAI, NTPC, NHEPC.			
<b>Module -5</b>			
<b>Contract Management-Post award :</b> Basic understanding on definitions, Performance security, Mobilization and equipment advances, Secured Advance, Suspension of work, Time limit for completion, Liquidated damages and bonus, measurement and payment, additions and alterations or variations and deviations, breach of contract, Escalation, settlement of account or final payment, claims, Delay's and Compensation, <b>Disputes &amp; its resolution mechanism</b> , Contract management and administration. <b>Valuation:</b> Definitions of terms used in valuation process, Purpose of valuation, Cost, Estimate, Value and its relationship, Capitalized value. Freehold and lease hold and easement, Sinking fund, depreciation–methods of estimating depreciation, Outgoings, Process and methods of valuation: Rent fixation, valuation for mortgage, valuation of land.			
<b>Course outcomes:</b> After studying this course, students will be able to: <ol style="list-style-type: none"> <li>1. Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil engineering works.</li> <li>2. Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works.</li> <li>3. Prepare the specifications and analyze the rates for various items of work.</li> <li>4. Assess contract and tender documents for various construction works.</li> <li>5. Prepare valuation reports of buildings.</li> </ol>			
<b>Question paper pattern:</b> <ul style="list-style-type: none"> <li>• The question paper will have ten full questions carrying equal marks.</li> </ul>			

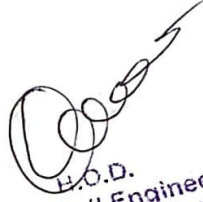
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

**Textbooks:**

1. Datta B.N., "Estimating and costing", UBSPD Publishing House, New Delhi.
2. B.S. Patil, "Civil Engineering Contracts and Estimates", Universities Press.
3. M. Chakraborti; "Estimation, Costing and Specifications", Laxmi Publications.
4. MORTH Specification for Roads and Bridge Works – IRC New Delhi.

**Reference Books:**

1. Kohli D.D and Kohli R.C, "Estimating and Costing", 12 th Edition, S.Chand Publishers, 2014.
2. Vazirani V.N and Chandola S.P, "Estimating and costing", Khanna Publishers, 2015.
3. Rangwala, C. "Estimating, Costing and Valuation", Charotar Publishing House Pvt. Ltd., 2015.
4. Duncan Cartlidge , "Quantity Surveyor's Pocket Book", Routledge Publishers, 2012.
5. Martin Brook, "Estimating and Tendering for Construction Work", A Butterworth-Heinemann publishers, 2008.
6. Robert L Peurifoy , Garold D. Oberlender , " Estimating Construction Costs" – 5ed , Tata McGraw-Hill , New Delhi.
7. David Pratt, "Fundamentals of Construction Estimating" – 3ed, Edition.
8. PWD Data Book, CPWD Schedule of Rates (SoR). and NH SoR – Karnataka FIDIC Contract forms.
9. B.S. Ramaswamy "Contracts and their Management" 3ed, Lexis Nexis(a division of Reed Elsevier India Pvt Ltd).

  
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<b>B. E. CIVIL ENGINEERING</b> <b>Choice Based Credit System (CBCS) and Outcome Based Education (OBE)</b> <b>SEMESTER - VII</b>			
<b>DESIGN OF RCC AND STEEL STRUCTURES</b>			
Course Code	18CV72	CIE Marks	40
Teaching Hours/Week(L:T:P)	(3:0:0)	SEE Marks	60
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b> This course will enable students to <ol style="list-style-type: none"> <li>1. Provide basic knowledge in the areas of limit state method and concept of design of RC and Steel structures</li> <li>2. Identify, formulate and solve engineering problems in RC and Steel Structures</li> <li>3. Give procedural knowledge to design a system, component or process as per needs and specifications of RC Structures like Retaining wall, Footing, Water tanks, Portal Frames and Steel Structures like Roof Truss, Plate Girder and Gantry Girder.</li> <li>4. Imbibe the culture of professional and ethical responsibilities by following codal provisions in the analysis, design of RC and Steel Structures.</li> <li>5. Provide factual knowledge on analysis and design of RC Structural elements, who can participate and succeed in competitive examinations.</li> </ol>			
<b>Module -1</b>			
<b>Footings:</b> Design of rectangular slab, slab-beam type combined footing. <b>Retaining Walls:</b> Design of cantilever Retaining wall and counter fort retaining wall. <b>Water Tanks:</b> Design of circular water tanks resting on ground (Rigid and Flexible base). Design of rectangular water tanks resting on ground. <b>As per IS: 3370 (Part IV).</b> <b>Design of portal frames with fixed and hinged based supports.</b>			
<b>Module -2</b>			
<b>Roof Truss:</b> Design of roof truss for different cases of loading, forces in members to given. <b>Plate Girder:</b> Design of welded plate girder with intermediate stiffener, bearing stiffener and necessary checks <b>Gantry Girder:</b> Design of gantry girder with all necessary checks.			
<b>Course Outcomes:</b> After studying this course, students will be able to: <ol style="list-style-type: none"> <li>1. Students will acquire the basic knowledge in design of RCC and Steel Structures.</li> <li>2. Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members.</li> </ol>			
<b>Question Paper Pattern:</b> <ul style="list-style-type: none"> <li>• Two questions shall be asked from each module. There can be maximum of three subdivisions in each question, if necessary.</li> <li>• One full question should be answered from each module.</li> <li>• Each question carries 50 marks.</li> <li>• Code books – IS 456, IS 800, IS 3370 (Part IV), SP-16, SP (6) – Steel Tables, shall be referred for designing. The same will be provided during examination.</li> </ul>			
<b>Textbooks:</b>			
<ol style="list-style-type: none"> <li>1. N Krishna Raju, “Structural Design and Drawing of Reinforced Concrete and Steel”, University Press</li> <li>2. Subramanian N, “Design of Steel Structures”, Oxford university Press, New Delhi</li> <li>3. K S Duggal, “Design of Steel Structures”, Tata McGraw Hill, New Delhi</li> </ol>			
<b>Reference Books:</b>			
<ol style="list-style-type: none"> <li>1. Charles E Salman, Johnson &amp; Mathas, “Steel Structure Design and Behavior”, Pearson Publications</li> <li>2. Nether Cot, et.al, “Behavior and Design of Steel Structures to EC -III”, CRC Press</li> <li>3. P C Verghese, “Limit State Design of Reinforced Concrete”, PHI Publications, New Delhi</li> <li>4. S N Sinha, “Reinforced Concrete Design”, McGraw Hill Publication</li> </ol>			

  
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<p align="center"><b>B. E. CIVIL ENGINEERING</b>  <b>Choice Based Credit System (CBCS) and Outcome Based Education (OBE)</b>  <b>SEMESTER - VII</b></p>			
<b>AIR POLLUTION AND CONTROL</b>			
Course Code	<b>18CV732</b>	CIE Marks	40
Teaching Hours/Week(L:T:P)	(3:0:0)	SEE Marks	60
Credits	03	Exam Hours	03
<p><b>Course Learning Objectives:</b> This course will enable students to</p> <ol style="list-style-type: none"> <li>1. Study the sources and effects of air pollution</li> <li>2. Learn the meteorological factors influencing air pollution.</li> <li>3. Analyze air pollutant dispersion models</li> <li>4. Illustrate particular and gaseous pollution control methods.</li> </ol>			
<b>Module-1</b>			
<b>Introduction:</b> Definition, Sources, classification and characterization of air pollutants. Effects of air pollution on health, vegetation & materials. Types of inversion, photochemical smog.			
<b>Module-2</b>			
<b>Meteorology:</b> Temperature lapse rate & stability, wind velocity & turbulence, plume behavior, measurement of meteorological variables, wind rose diagrams, Plume Rise, estimation of effective stack height and mixing depths.			
<b>Module-3</b>			
<b>Sampling:</b> Sampling of particulate and gaseous pollutants (Stack, Ambient & indoor air pollution), Monitoring and analysis of air pollutants (PM <sub>2.5</sub> , PM <sub>10</sub> , SO <sub>x</sub> , NO <sub>x</sub> , CO, NH <sub>3</sub> ). Development of air quality models-Gaussian dispersion model-Including Numerical problems.			
<b>Module-4</b>			
<b>Control Techniques:</b> Particulate matter and gaseous pollutants- settling chambers, cyclone separators, scrubbers, filters & ESP - Including Numerical problems. Site selection for industrial plant location.			
<b>Module-5</b>			
Air pollution due to automobiles, standards and control methods. Noise pollution- causes, effects and control, noise standards. Environmental issues, global episodes. Environmental laws and acts.			
<p><b>Course outcomes:</b> After studying this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the major sources of air pollution and understand their effects on health and environment.</li> <li>2. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.</li> <li>3. Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.</li> <li>4. Choose and design control techniques for particulate and gaseous emissions.</li> </ol>			
<p><b>Question paper pattern:</b></p> <ul style="list-style-type: none"> <li>• The question paper will have ten full questions carrying equal marks.</li> <li>• Each full question will be for 20 marks.</li> <li>• There will be two full questions (with a maximum of four sub- questions) from each module.</li> <li>• Each full question will have sub- question covering all the topics under a module.</li> <li>• The students will have to answer five full questions, selecting one full question from each module.</li> </ul>			
<b>Textbooks:</b>			
<ol style="list-style-type: none"> <li>1. M. N. Rao and H V N Rao, "Air pollution", Tata Mc-G raw Hill Publication.</li> <li>2. H. C. Perkins, "Air pollution". Tata McGraw Hill Publication.</li> <li>3. Mackenzie Davis and David Cornwell, "Introduction t o Environmental Engineering" McGraw-Hill Co.</li> </ol>			
<b>Reference Books:</b>			
<ol style="list-style-type: none"> <li>1. Noel De Nevers, "Air Pollution Control Engineering", Waveland Pr Inc.</li> <li>2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", Allied Publishers.</li> </ol>			

  
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**B. E. CIVIL ENGINEERING**  
**Choice Based Credit System (CBCS) and Outcome Based Education (OBE)**  
**SEMESTER - VII**

**ENVIRONMENTAL PROTECTION AND MANAGEMENT**

Course Code	18CV753	CIE Marks	40
Teaching Hours/Week(L:T:P)	(3:0:0)	SEE Marks	60
Credits	03	Exam Hours	03

**Course Learning Objectives:** This course will enable students to gain knowledge in Environmental protection and Management systems

**Module -1**

**Environmental Management Standards:** Unique Characteristics of Environmental Problems - Systems approach to Corporate environmental management - Classification of Environmental Impact Reduction Efforts - Business Charter for Sustainable Production and Consumption – Tools, Business strategy drivers and Barriers - Evolution of Environmental Stewardship. Environmental Management Principles - National policies on environment, abatement of pollution and conservation of resources - Charter on Corporate responsibility for Environmental protection.

**Module -2**

**Environmental Management Objectives:** Environmental quality objectives – Rationale of Environmental standards: Concentration and Mass standards, Effluent and stream standards, Emission and ambient standards, Minimum national standards, environmental performance evaluation: Indicators, benchmarking. Pollution control Vs Pollution Prevention - Opportunities and Barriers – Cleaner production and Clean technology, closing the loops, zero discharge technologies.

**Module -3**

**Environmental Management System:** EMAS, ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – environmental aspect and impact analysis – legal and other requirements- objectives and targets – environmental management programs – structure and responsibility – training awareness and competence- communication – documentation and document control – operational control – monitoring and measurement – management review.

**Module -4**

**Environmental Audit:** Environmental management system audits as per ISO 19011- – Roles and qualifications of auditors - Environmental performance indicators and their evaluation – Non conformance – Corrective and preventive actions -compliance audits – waste audits and waste minimization planning – Environmental statement (form V) - Due diligence audit.

**Module -5**

**Applications:** Applications of EMS, Waste Audits and Pollution Prevention Control: Textile, Sugar, Pulp & Paper, Electroplating, , Tanning industry. Hazardous Wastes - Classification, characteristics Treatment and Disposal Methods, Transboundary movement, disposal.

**Course outcomes:** After studying this course, students will be able to:

1. Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards.
2. Lead pollution prevention assessment team and implement waste minimization options.
3. Develop, Implement, maintain and Audit Environmental Management systems for Organizations.

**Question paper pattern:**

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

**Reference Books:**

1. Christopher Sheldon and Mark Yoxon, "Installing Environmental management Systems – a step by step guide" Earthscan Publications Ltd, London, 1999.
2. ISO 14001/14004: Environmental management systems – Requirements and Guidelines – International

Organisation for Standardisation, 2004

3. ISO 19011: 2002, "Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002
4. Paul L Bishop „Pollution Prevention: Fundamentals and Practice, McGraw- Hill International, Boston, 2000.
5. Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001.

  
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**SEMESTER - VII**

**COMPUTER AIDED DETAILING OF STRUCTURES**

Course Code	18CVL76	CIE Marks	40
Teaching Hours/Week(L:T:P)	(0:2:2)	SEE Marks	60
Credits	02	Exam Hours	03

**Course Learning Objectives:** This course will enable students to

1. Be aware of the Scale Factors, Sections of drawings,
2. Draft the detailing of RC and Steel Structural member.

**Module -1 Detailing of RCC Structures**

- Beams – Simply supported, Cantilever and Continuous.
- Slab – One way, Two way and One-way continuous.
- Staircase – Doglegged
- Cantilever Retaining wall
- Counter Fort Retaining wall
- Circular Water Tank, Rectangular Water Tank.

**Module -2 Detailing of Steel Structures**

1. Connections – Beam to beam, Beam to Column by Bolted and Welded Connections.
2. Built-up Columns with lacings and battens
3. Column bases and Gusseted bases with bolted and welded connections.
4. Roof Truss – Welded and Bolted
5. Welded Plate girder
6. Gantry Girder

**Course outcomes:** After studying this course, students will be able to:

- Prepare detailed working drawings

**Question paper pattern:**

1. Two questions shall be asked from each Module.
2. One full question should be answered from each Module.
3. Each question carries 50 marks.

**Textbooks:**

1. N Krishna Raju, "Structural Design and Drawing of Reinforced Concrete and Steel", University Press
2. Krishna Murthy, "Structural Design and Drawing – Concrete Structures", CBS Publishers, New Delhi

**Reference Books:**

1. SP 34: Handbook on Concrete Reinforcement and Detailing, Bureau of Indian Standards.
2. IS 13920, Ductile Design And Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces - Code Of Practice, Bureau of Indian Standard.

  
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<b>B. E. CIVIL ENGINEERING</b> <b>Choice Based Credit System (CBCS) and Outcome Based Education (OBE)</b> <b>SEMESTER - VII</b> <b>GEOTECHNICAL ENGINEERING LABORATORY</b>			
Course Code	18CVL77	CIE Marks	40
Teaching Hours/Week(L:T:P)	(0:2:2)	SEE Marks	60
Credits	02	Exam Hours	03
<b>Course Learning Objectives:</b> This course will enable students to; <ol style="list-style-type: none"> <li>1. To carry out laboratory tests and to identify soil as per IS codal procedures</li> <li>2. To perform laboratory tests to determine index properties of soil</li> <li>3. To perform tests to determine shear strength and consolidation characteristics of soils</li> </ol>			
<b>Modules</b>			
1. Field identification of soil, Specific gravity test (pycnometer and density bottle method). Water content determination by oven drying and Pycnometer method, rapid moisture meter method.			
2. Grain size analysis <ol style="list-style-type: none"> <li>i. Sieve analysis</li> <li>ii. Hydro meter analysis</li> </ol>			
3. In-situ density tests <ol style="list-style-type: none"> <li>i. Core-cutter method</li> <li>ii. Sand replacement method</li> </ol>			
4. Consistency limits <ol style="list-style-type: none"> <li>i. Liquid limit test (by Casagrande's and cone penetration method)</li> <li>ii. Plastic limit test</li> <li>iii. Shrinkage limit test</li> </ol>			
5. Standard compaction test (light and heavy compaction)			
6. Co-efficient of permeability test <ol style="list-style-type: none"> <li>i. Constant head test</li> <li>ii. Variable head test</li> </ol>			
7. Shear strength tests <ol style="list-style-type: none"> <li>i. Unconfined compression test</li> <li>ii. Direct shear test</li> <li>iii. Triaxial test (unconsolidated undrained test only)</li> </ol>			
8. Consolidation test :To determine pre consolidation pressure only(half an hour per loading-test).			
9. Laboratory vane shear test			
10. Demonstration of Swell pressure test, Standard penetration test and boring equipment			
<b>Course outcomes:</b> Students will be able to conduct appropriate laboratory/field experiments and interpret the results to determine <ol style="list-style-type: none"> <li>1. Physical and index properties of the soil</li> <li>2. Classify based on index properties and field identification</li> <li>3. To determine OMC and MDD, plan and assess field compaction program</li> <li>4. Shear strength and consolidation parameters to assess strength and deformation characteristics</li> <li>5. In-situ shear strength characteristics (SPT-Demonstration)</li> </ol>			
<b>Question paper pattern:</b> <ul style="list-style-type: none"> <li>• All experiments are to be included in the examination except demonstration exercises.</li> <li>• Candidate to perform experiment assigned to him.</li> <li>• Marks are to be allotted as per the split up of marks shown on the cover page of answer script.</li> </ul>			
<b>Reference Books:</b>			
<ol style="list-style-type: none"> <li>1. Punmia B C, Soil Mechanics and Foundation Engineering-(2017), 16<sup>th</sup> Edition, Laxmi Publications co., New Delhi.</li> <li>2. Lambe T.W., "Soil Testing for Engineers", Wiley Eastern Ltd., New Delhi.</li> <li>3. Head K.H., "Manual of Soil Laboratory Testing" Vol. I, II, III, Princeton Press</li> <li>4. Bowles J.E., "Engineering Properties of Soil and Their Measurements", -McGraw Hill Book Co. New York.</li> <li>5. Relevant BIS Codes of Practice: IS-2720 series</li> </ol>			

  
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<b>B. E. CIVIL ENGINEERING</b> <b>Choice Based Credit System (CBCS) and Outcome Based Education (OBE)</b> <b>SEMESTER - VIII</b> <b>REHABILITATION AND RETROFITTING</b>			
Course Code	18CV824	CIE Marks	40
Teaching Hours/Week(L:T:P)	(3:0:0)	SEE Marks	60
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b> This course will enable students to; <ol style="list-style-type: none"> <li>1. Investigate the cause of deterioration of concrete structures.</li> <li>2. Strategies different repair and rehabilitation of structures.</li> <li>3. Evaluate the performance of the materials for repair.</li> </ol>			
<b>Module -1</b>			
<b>General:</b> Introduction and Definition for Repair, Retrofitting, Strengthening and rehabilitation. Physical and Chemical Causes of deterioration of concrete structures, Evaluation of structural damages to the concrete structural elements due to earthquake.			
<b>Module -2</b>			
<b>Damage Assessment:</b> Purpose of assessment, Rapid assessment, Investigation of damage, Evaluation of surface and structural cracks, Damage assessment procedure, destructive, non-destructive and semi destructive testing systems.			
<b>Module -3</b>			
<b>Influence on Serviceability and Durability:</b> Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, and cathodic protection.			
<b>Module -4</b>			
<b>Maintenance and Retrofitting Techniques:</b> Definitions: Maintenance, Facts of Maintenance and importance of Maintenance Need for retrofitting, retrofitting of structural members i.e., column and beams by Jacketing technique, Externally bonding(ERB) technique, near surface mounted (NSM) technique, External post-tensioning, Section enlargement and guidelines for seismic rehabilitation of existing building.			
<b>Module -5</b>			
<b>Materials for Repair and Retrofitting:</b> Artificial fiber reinforced polymer like CFRP, GFRP, AFRP and natural fiber like Sisal and Jute. Adhesive like, Epoxy Resin, Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Techniques for Repair: Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shot Crete Epoxy injection, Mortar repair for cracks, shoring and underpinning.			
<b>Course outcomes:</b> After studying this course, students will be able to: <ol style="list-style-type: none"> <li>1. Identify the causes for structural (Concrete) deterioration.</li> <li>2. Assess the type and extent of damage and carry out damage assessment of structures through various types of tests.</li> <li>3. Recommend maintenance requirements of the buildings and preventive measures against influencing factors.</li> <li>4. Select suitable material and suggest an appropriate method for repair and rehabilitation.</li> </ol>			
<b>Question paper pattern:</b> <ul style="list-style-type: none"> <li>• The question paper will have ten full questions carrying equal marks.</li> <li>• Each full question will be for 20 marks.</li> <li>• There will be two full questions (with a maximum of four sub- questions) from each module.</li> <li>• Each full question will have sub- question covering all the topics under a module.</li> <li>• The students will have to answer five full questions, selecting one full question from each module.</li> </ul>			
<b>Textbooks:</b>			
<ol style="list-style-type: none"> <li>1. Sidney, M. Johnson, "Deterioration, Maintenance and Repair of Structures"</li> <li>2. Denison Campbell, Allen &amp; Harold Roper, "Concrete Structures – Materials, Maintenance and Repair"- Longman Scientific and Technical.</li> </ol>			
<b>Reference Books:</b>			

1. R.T.Allen and S.C. Edwards, "Repair of Concrete Structures"-Blakie and Sons
2. Raiker R.N., "Learning for failure from Deficiencies in Design, Construction and Service"- R&D Center (SDCPL).
3. CPWD Manual

  
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**B. E. CIVIL ENGINEERING**  
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**SEMESTER - VIII**

**PROJECT WORK PHASE-2**

Course Code	<b>18CVP83</b>	CIE Marks	40
Teaching Hours/Week(L:T:P)	-	SEE Marks	60
Credits	08	Exam Hours	03

**Course objectives:**

- To support independent learning.
- To develop interactive, communication, organization, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgment, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instill responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

**Project Work Phase - II:** Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

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

- Describe the project and be able to defend it.
- Develop critical thinking and problem solving skills.
- Learn to use modern tools and techniques.
- Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
- Develop skills to work in a team to achieve common goal.
- Develop skills of project management and finance.
- Develop skills of self learning, evaluate their learning and take appropriate actions to improve it.
- Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.

**Evaluation Procedure:**

- **As per University guidelines**
- **Internal Marks:** The Internal marks (100 marks) evaluation shall be based on Phase wise completion of the project work, Project report, Presentation and Demonstration of the actual/model/prototype of the project.
- **Semester End Examination:** SEE marks for the project (100 marks) shall be based on Project report, Presentation and Demonstration of the actual/model/prototype of the project, as per the University norms by the examiners appointed VTU.

  
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**SEMESTER - VIII**

**TECHNICAL SEMINAR**

Course Code	18CVS84	CIE Marks	100
Teaching Hours/Week(L:T:P)	--	SEE Marks	--
Credits	01	Exam Hours	03

**Course Learning Objectives:**

The objective of the seminar is to inculcate self-learning, face audience confidently, enhance communication skill, involve in group discussion and present and exchange ideas. Each student, under the guidance of a Faculty, is required to choose, preferably, a recent topic of his/her interest relevant to the course of specialization. Carryout literature survey; organize the Course topics in a systematic order.

- Conduct literature survey in the domain area to find appropriate topic.
- Prepare the synopsis report with own sentences in a standard format.
- Learn to use MS word, MS power point, MS equation and Drawing tools or any such facilities in the preparation of report and presentation.
- Present the seminar topic orally and/or through power point slides.
- Communicate effectively to answer the queries and involve in debate/discussion.
- The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

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

- Develop knowledge in the field of Civil Engineering and other disciplines through independent learning and collaborative study.
- Identify and discuss the current, real-time issues and challenges in engineering & technology.
- Develop written and oral communication skills.
- Explore concepts in larger diverse social and academic contexts.
- Apply principles of ethics and respect in interaction with others.
- Develop the skills to enable life-long learning.

**Evaluation Procedure:**

- As per University guidelines.
- The Internal Assessment marks for the seminar shall be awarded based on the relevance of the seminar topic, quality of the report, presentation skills, participation in the question and answer, and attendance in the seminar classes/sessions.

  
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**PROJECT WORK PHASE II**  
**[As per Choice Based Credit System (CBCS) scheme]**  
**(Effective from the academic year 2017 -2018)**

**SEMESTER – VIII**

Subject Code	18CVP85	IA Marks	100
Number of Lecture Hours/Week	06	Exam Marks	100
Total Number of Lecture Hours	--	Exam Hours	03


**CREDITS – 06**

**Description (If any):**

- Project: Carried out at the Institution or at an Industry.
- Project work shall preferably be batch wise, the strength of each batch shall not exceed maximum of four students
- Viva-voce examination in project work shall be conducted batch-wise.
- For Project Phase –I and Project seminar and Project Phase –II, the CIE shall be 100 respectively.
- The CIE marks in the case of projects in the final year shall be based on the evaluation at the end of VIII semester by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the project guide.
- Minimum requirement of CIE marks for Project work shall be 50% of the maximum marks.
- Students failing to secure a minimum of 50% of the CIE marks in Project work shall not be eligible for the Project examination conducted by the University and they shall be considered as failed in that/those Course/s. However, they can appear for University examinations conducted in other Courses of the same semester and backlog Courses if any. Students after satisfying the prescribed minimum CIE marks in the Course/s when offered during subsequent semester shall appear for SEE.
- Improvement of CIE marks shall not be allowed in Project where the student has already secured the minimum required marks
- For a pass in a Project/Viva-voce examination, a student shall secure a minimum of 40% of the maximum marks prescribed for the University Examination. The Minimum Passing Grade in a Course is 'E'.
- The student who desires to reject the results of a semester shall reject performance in all the Courses of the semester, irrespective of whether the student has passed or failed in any Course. However, the rejection of performance of VIII semester project shall not be permitted

**Course outcomes: The students should be able to:**

1. Identify a issue and derive problem related to society, environment, economics, energy and technology
2. Formulate and Analyze the problem and determine the scope of the solution chosen
3. Determine, dissect, and estimate the parameters, required in the solution.
4. Evaluate the solution by considering the standard data / Objective function and by using appropriate performance metrics.
5. Compile the report and take part in present / publishing the finding in a reputed conference / publications
6. Attempt to obtain ownership of the solution / product developed.

  
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