



RAMAIAH
Institute of Technology

CURRICULUM

Outcome Based Education

Academic Year 2026– 2027

**VII & VIII Semester B. E.
B.E. CIVIL ENGINEERING
Batch- 2023**

RAMAIAH INSTITUTE OF TECHNOLOGY
(Autonomous Institute, Affiliated to VTU)
Bangalore – 560054

About the Institute:

Dr. M. S. Ramaiah a philanthropist, founded 'Gokula Education Foundation' in 1962 with an objective of serving the society. M S Ramaiah Institute of Technology (MSRIT) was established under the aegis of this foundation in the same year, creating a landmark in technical education in India. MSRIT offers 18 UG programs and 15 PG programs. All these programs are approved by AICTE. All eligible UG and PG programs are accredited by National Board of Accreditation (NBA). The institute is accredited with '**A***' grade by NAAC in March 2021 for 5 years. University Grants Commission (UGC) & Visvesvaraya Technological University (VTU) have conferred Autonomous Status to MSRIT for both UG and PG Programs since 2007. The institute has also been conferred autonomous status for Ph.D. program since 2021. The institute is a participant to the Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. The institute has 380 competent faculty out of which 70% are doctorates. Some of the distinguished features of MSRIT are: State of the art laboratories, individual computing facility for all faculty members, all research departments active with sponsored funded projects and more than 300 scholars pursuing Ph.D. To promote research culture, the institute has established Centre of Excellence for Imaging Technologies, Centre for Advanced Materials Technology, Centre for Antennas and Radio Frequency systems (CARFS), Center for Cyber Physical Systems, Schneider Centre of Excellence & Centre for Bio and Energy Materials Innovation.

The Entrepreneurship Development Cell (EDC) and "Ramaiah Evolute" have been set up on campus to incubate startups. MSRIT has a strong Placement and Training department with a committed team, a good Mentoring/Proctorial system, a fully equipped Sports department, large air-conditioned library with good collection of book volumes and subscription to International and National Journals. The Digital Library subscribes to online e-journals from Elsevier Science Direct, IEEE, Taylor & Francis, Springer Link, etc. The Institute is a member of DELNET, CMTI and VTU E-Library Consortium. The Institute has a modern auditorium, recording studio, and several hi-tech conference halls with video conferencing facilities. The institute has excellent hostel facilities for boys and girls. MSRIT Alumni have distinguished themselves by occupying high positions in India and abroad and are in touch with the institute through an active Alumni Association.

As per the National Institutional Ranking Framework (NIRF), MoE, Government of India, M S Ramaiah Institute of Technology has achieved 75th rank among 1584 top Engineering Institutions & 31st Rank among 131 Schools of Architecture in India for the year 2025.

About the Department:

The Department of Civil Engineering was started as the third department in the institute with an intake of 60 students in the year 1971. Structural Engineering was first Post Graduate program started in the year 1983 of the institute with an intake of 10 students. The UG and PG programs have been accredited by NBA for three years 2021-2024 and 2024-2027 respectively. After obtaining the autonomous status in the year 2007, the department focused towards providing state of the art curriculum development, offering electives of the present day need and techno innovative projects. These initiatives resulted in enhanced performance of the students in terms of increase in placement, increase in the number of students writing competitive examinations and pursuing higher education in the foreign universities.

Further Department of Civil Engineering was recognized as a research centre in the year 1994 leading to PhD/MSc in Civil Engineering under Bangalore University till 1994 and later it was brought under State Technological University VTU. The research centre has attracted 24 research scholars to pursue their degree from this research centre and 30 scholars have completed PhD degree. The areas of research include Structural Engineering, Transportation Engineering, Geotechnical Engineering, Water Resources Engineering and Environmental Engineering.

The Department has close interaction with number of industries and Government agencies through R&D, and consultancy works. It also has MOU's with industries and other institutes for improved interactions and coordination with outside world.

VISION OF THE INSTITUTE

To be an Institution of International Eminence, renowned for imparting quality technical education, cutting edge research and innovation to meet global socio-economic needs

MISSION OF THE INSTITUTE

MSRIT shall meet the global socio-economic needs through

1. Imparting quality technical education by nurturing a conducive learning environment through continuous improvement and customization
2. Establishing research clusters in emerging areas in collaboration with globally reputed organizations
3. Establishing innovative skills development, techno-entrepreneurial activities and consultancy for socio-economic needs

QUALITY POLICY

We at M. S. Ramaiah Institute of Technology strive to deliver comprehensive, continually enhanced, global quality technical and management education through an established Quality Management System complemented by the synergistic interaction of the stake holders concerned

VISION OF THE DEPARTMENT

To become a premier Department by adopting state-of-the-art technical knowledge through effective learning processes with research ambience in producing global quality ethical civil engineers, for the development of sustainable society.

MISSION OF THE DEPARTMENT

1. To transform the young minds into employable professionals by providing contemporary technical knowledge and appropriate professional skills through suitable teaching learning process.
2. To provide rigorous training, acquaint the students with necessary skills and leadership qualities along with ethical values to address the complex and multi-faceted civil engineering problems.
3. To provide opportunity to develop their potential by fostering intellectual curiosity to promote them for pursuing higher studies and research through exposure to the modern engineering tools and techno innovative projects.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

Bachelor of engineering graduates of Civil Engineering program of M S Ramaiah Institute of Technology shall attain the following PEO's within three to four years of graduation.

PEO1	To perform well in Engineering profession as competent professionals using contemporary technical knowledge and professional skills.
PEO2	To pursue higher education and show intellectual curiosity for lifelong learning.
PEO3	To communicate effectively to work in multi-disciplinary environments embedded with ethical values and social responsibilities.

PROGRAM OUTCOMES (POs):

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities

with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Apply the knowledge of basic sciences, geology and environmental science along with the conceptual knowledge of engineering sciences to illustrate the process involved in planning, analysis and design of sustainable civil engineering systems.

PSO2: Conduct laboratory experiments/field investigations, and analyze/interpret the experimental results for appropriate conclusions and recommendations to a real-world civil engineering problem with a significant perspective of economy, society and environment.

PSO3: Demonstrate professional ethics and implement the principles of project management, business and public policy to lead the project execution as per the design requirement, with the state-of-the-art technology and contemporary skills.

Curriculum Course Credits Distribution Batch 2022-26

Semester Course Category	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Total Credits
Basic Sciences (BSC)	08	08	03	03	--	--	--	--	22
Engineering Sciences (ESC)	08	09	--	--	--	--	--	--	17
Humanities, Social Sciences and Management (HSMC)	02	02	--	--	03	03	--	--	10
Ability Enhancement Course (AEC)	02	01	01	01	01	--	--	--	06
Universal Human Values (UHV)	--	--	02	--	--	--	--	--	02
Professional Core Courses (PCC)	--	--	11	12	12	06	04	--	45
Integrated Professional Core Course (IPCC)	--	--	04	04	03	--	04	--	15
Professional Elective Courses (PEC)	--	--	--	--	03	06	03	--	12
Institutional Open Elective Courses (IOE)	--	--	--	--	--	03	03	--	06
Internship (INT)	--	--	--	✓	--	--	--	05	05
Mini Project / Project Work (PW)	--	--	--	--	--	04	--	13	17
Skill Development Course (SDC)	--	--	--	--	--	01	02	--	03
Non Credit Mandatory Courses (NCMC)	--	--	--	--	✓	✓	--	--	--
Total Credits	20	20	21	20	22	23	16	18	160

SCHEME OF TEACHING VII SEMESTER

Sl. No	Subject Code	Subject	Teaching Department	Category	Credits				Total contact hours /week
					L	T	P	Total	
1.	CV 71	Geotechnical Engineering -II	Civil	IPCC	3	0	1	4	5
2.	CV 72	Estimation, Costing and Valuation Engineering	Civil	PCC	2	1	0	3	4
3.	CV 73X	Program Elective Course – 4	Civil	PEC	3	0	0	3	3
4.	CVOE0x*	Institutional Open Elective - 2	Civil	IOE	3	0	0	3	3
5.	CVL74	Computer Aided Design Laboratory	Civil	PCC	0	0	1	1	2
6.	CVL75	Skill Enhancement Lab	Civil	AEC	0	1	1	2	4
Total					11	2	3	16	20

Professional Elective – IV

Sl. No	Sub Code	Subject
1	CVE 731	Fundamentals of Structural Dynamics & Seismic Resistant Design
2	CVE 732	Air Pollution Control Technologies
3	CVE 733	Foundation Engineering
4	CVE 734	Pavement Design
5	CVE 735	Design of tall structures.

Nomenclature: **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **PEC:** Professional Elective Courses, **IOE:** Institutional Open Elective, **AEC**–Ability Enhancement Courses.

L –Lecture, T – Tutorial, P- Practical/ Drawing

Note: CVE73x , where x=1,2,3,4,5,.
CVOE03,4 ... continued from previous

Professional Elective Courses: A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in Engineering and Technology curriculum. Multidisciplinary courses that are added to supplement the latest trend and advanced technology in the selected stream of engineering. Each group provides an option to select one course out of five courses. The minimum student's strength for offering professional electives is 10.

Open Elective Courses:

Students belonging to a particular stream of Engineering and Technology are not entitled for the open electives offered by their parent department. However, they can take an elective offered by other departments, provided they satisfy the prerequisite condition, if any. Registration to open electives shall be documented under the guidance of the Proctor.

Selection of an open elective shall not be allowed if,

The candidate has studied the same course during the previous semesters of the program.

The syllabus content of open electives is similar to that of the Departmental core courses or professional electives.

A similar course, under any category, is prescribed in the higher semesters of the program.

The minimum students' strength for offering open electives is 10.

AICTE Activity Points to be earned by students admitted to BE program:

Every regular student, who is admitted to the 4-year degree program, is required to earn 100 activity points in addition to the total credits earned for the program. Students entering 4 years Degree Program through lateral entry are required to earn 75 activity points in addition to the total credits earned for the program. The activity points earned by the student shall be reflected on the students VIII Semester grade card. The activities to earn the points can be spread over the duration of the course. However, minimum prescribed duration should be fulfilled. Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression. In case student fail to earn the prescribed activity points; VIII semester Grade Card shall be issued only after earning the required activity Points. Students shall be eligible for the award of degree only after the release of the VIII Semester grade card.

SCHEME OF TEACHING VIII SEMESTER

Sl. No.	Subject Code	Subject	Teaching Department	Category	Credits				Total contact hours /week
					L	T	P	Total	
1	CVP81	Project Work		PW	0	0	14	14	-
2	INT82	Research / Industrial Internship		INT	0	0	5	5	-
Total					0	0	19	19	
3	PE83	Physical Education		NCMC	All students have to register compulsorily for any one of the courses with the concerned coordinator (Yoga Teacher/ Physical Education Director/ NSS Coordinator) in the beginning of the III semester. Attending the registered course from III to VIII semesters. Qualifying is mandatory for the award of the degree				
	YO83	Yoga							
	NS83	NSS							

Nomenclature: **PW:** Project Work, **INT** – Internship, **NCMC:** Non-credit Mandatory Course

L –Lecture, **T** – Tutorial, **P-** Practical/ Drawing

PROJECT WORK: The objective of the Project work is to encourage independent learning and the innovative attitude of the students. The Project work will address meeting of the Program Outcome & Program Specific Outcomes and can be interdisciplinary. The CIE marks shall be awarded by a committee constituted by of the Head of the concerned department. The CIE marks awarded for the Project Work shall be based on the evaluation of project report, project presentation skill, and question and answer session as per the rubrics defined by the department. SEE will be conducted by the two examiners appointed by the Institute. SEE marks awarded for the Project Work shall be based on the evaluation of project work report, project presentation skill and question and answer session.

Internship - All the students admitted shall have to undergo mandatory internship of 6 - 8 weeks during the vacation of VI/VII semester. **A Viva-Voce CIE examination** shall be conducted during VIII semester as per the rubrics defined by the department 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 examination after satisfying the internship requirements.

VII SEMESTER

GEOTECHNICAL ENGINEERING - II	
Subject Code: CV71	Credits: 3:0:1
Pre requisites: - Nil	Contact Hours: 42L+14P
Course Coordinator: Dr. J Sumalatha	

Course Content

Unit I

Subsurface Exploration

Importance of exploration program, Types of soil exploration, Types of samples-undisturbed, disturbed and representative samples, Samplers, sample disturbance, area ratio, Recovery ratio, clearances, Typical bore log, Number and depth of borings for various civil engineering structures; Soil exploration report. Geophysical methods. Need and objectives of ground improvement, Factors to be considered in the selection of best ground improvement technique. Classification of ground improvement techniques - Economic considerations and suitability.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: <https://www.youtube.com/watch?v=WcpDIAqyipQ>
<https://www.youtube.com/watch?v=8Q8CZW9-jXE&t=207s>
<https://archive.nptel.ac.in/courses/105/108/105108075/>

Unit II

Lateral Earth Pressure

Active and Passive earth pressures, Earth pressure at rest, Earth pressure coefficients. Earth pressure theories: Rankine's and Coulomb's theories. Lateral earth pressure in cohesive and cohesion-less soils. Graphical solutions for active earth pressure (for cohesion-less soil only) – Culmann's and Rebhann's graphical methods.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: https://www.youtube.com/watch?v=gxsKH5zRWVI_
<https://www.youtube.com/watch?v=qZfz8QyL8Mo>

Unit III

Stability of Earth Slopes

Types of Slopes, causes of failure and types of failure of slopes. Definitions of factor of safety; Stability of finite slopes using Method of Slices, Friction Circle method,

Fellinius method and Taylor's Stability Number. Stability of Rock slopes.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations, &Videos
- Links: -<https://www.youtube.com/watch?v=8oDVvXo9WJM>

Unit IV

Bearing Capacity of Shallow Foundations

Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure; Terzaghi's bearing capacity equations-assumptions and limitations, Effect of ground water table on the bearing capacity of soil. IS Code's bearing capacity equations, Bearing capacity of footings subjected to eccentric loading. Standard penetration test - Bearing capacity based on corrected SPT value.

Foundation Settlement: Calculation of settlement - Immediate, Consolidation and Secondary settlements (no derivations), differential settlement, tilt, permissible settlements & tilts as per B.I.S. Design of foundations on Rock strata

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations, &Videos
- Links: -<https://www.youtube.com/watch?v=lnZgalXmbqs>
- <https://www.youtube.com/watch?v=HkjVWkyLfig>

Unit V

Deep Foundations

Types of Deep Foundations; Load Transfer in Pile Foundations, Classification of pile foundations based on load transfer only; bored piles and driven piles. Ultimate bearing capacity of different types of piles in different soil conditions using IS code Method, Bearing capacity & settlement of Pile groups, negative skin friction on single pile and pile groups. Static and dynamic pile load tests, Importance of Pile load test.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -<https://www.youtube.com/watch?v=ord1fTt10Rc>

Text Books:

1. Punmia B.C. (2005), "Soil Mechanics and Foundation Engg.", 16th Edition, Laxmi Publications Co., New Delhi.
2. Gopal Ranjan and Rao A.S.R. (2000), "Basic and Applied Soil Mechanics", New Age International (P) Ltd., New Delhi.
3. Murthy V.N.S. (2009) "Soil Mechanics and Foundation Engineering", 4th Edition, UBS Publishers and Distributors, New Delhi.

References Books:

1. Bowles J.E. (1996), 'Foundation Analysis and Design'" 5th Edition, McGraw Hill Pub. Co. New York.
2. Alam Singh and Chowdhary G.R. (1994), "Soil Engineering in Theory and Practice" CBS Publishers and Distributors Ltd., New Delhi.

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=8Q8CZW9-jXE>
2. <https://www.youtube.com/watch?v=YJsLYhkIoYY>
3. https://www.youtube.com/watch?v=j_Dd04hgPUw&t=346s
4. <https://www.youtube.com/watch?v=urt09bSPEqY>
5. <https://www.youtube.com/watch?v=qoJNmaOIf0w>
6. <https://www.youtube.com/watch?v=oYYsXvy1qd8>
7. <https://www.youtube.com/watch?v=6mAaqD7BdmI>
8. <https://www.youtube.com/watch?v=6Z1JrbsdD1M>
9. <https://www.youtube.com/watch?v=A63Q3G0RaVQ>

Course Outcomes (COs):

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

1. Prepare a detailed site investigation report based on geotechnical data. (PO - 1, 2, 10 & PSO-1)
2. Analyze the earth pressure on retaining structures. (PO - 1, 2,3, 10 & PSO - 1)
3. Evaluate the stability of slopes based on different methods of analyses. (PO - 1, 2, 3, 10 & PSO - 1)
4. Assess the bearing capacity of soils and foundation settlements. (PO - 1, 2,3, 10 & PSO - 1)
5. Select type of deep foundation required for the soil at a place and load carrying capacity of pile foundations. (PO - 1, 2,3, 10 & PSO - 1)

List of experiments to be covered:

1. To estimate the water content of soil using calcium carbide method
2. To estimate the swelling index and swell potential of clayey soil
3. To estimate the swelling pressure of clayey soil
4. To classify the given soil using dry sieve analysis
5. To classify the given soil using hydrometer analysis
6. To estimate the consolidation characteristics (loading)
7. To estimate the consolidation characteristics (swelling)
8. To estimate the consolidation settlement

9. To determine the compaction characteristics of amended soil with flyash
10. To determine the compaction characteristics of amended soil with GGBS
11. Demonstration of plate load test
12. Demonstration of standard penetration test

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course outcomes mapped
Internal test-I	30	CO1, CO2 & CO3
Internal test-II	30	CO3, CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Quiz/Assignment	10	CO1 & CO2
Laboratory record and internals	10	CO3, CO4 & CO5
Semester End Examination (SEE)	100 (Scale down to 50)	CO1, CO2, CO3, CO4 & CO5

ESTIMATION, COSTING AND VALUATION ENGINEERING	
Subject Code: CV72	Credits: 2:1:0
Pre requisites: - Nil	Contact Hours: 28L+14T
Course Coordinator: Dr. Nambiyanna B	

Course Content

Unit I

Introduction: Importance of Estimation in Civil Engineering. Different type of Estimates, Methods in Estimations, study of various drawings with estimates, Concept of measurement, Units of Measurement. Methods of taking out quantities and cost by centre line method and long wall and short wall method. Preparing of detailed and abstract of estimates for the building, flat and slopes roof.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations & Videos
- Links:https://www.youtube.com/watch?v=cIFOSxgim0&list=PLm_MSClsnw_m_pObRbV8yKtHEKGjKmQJSw
- https://www.youtube.com/watch?v=b4eYKOF_woY

Unit II

Estimates of components: Reinforced Cement Concrete (RCC) works in beams, column footings and roof slabs, Estimation of septic tank, manhole, and RCC slab culverts. Estimation of Industrial building with steel Truss, Estimation of framed structures, Estimation of Demolition repair works.

- Pedagogy/Course delivery tools:-Chalk and Talk
- Links:<https://www.youtube.com/watch?v=ewUdYOgvefQ&list=PLQctRCEprJbe3YAh3YorU-JFKvOTArxe>
- https://www.youtube.com/watch?v=r_R5LCjPobc&list=PLQctRCEprJbe3YAh3YorU-JFKvOTArxe&index=3

Unit III

Measurement of Earth Work for Roads: Methods for computation of Earthwork-cross sections- mid sections formula, trapezoidal and average end area or mean sectional area formula, promotional formula for different terrains. Estimation of road works-Water Bound Macadam (WBM), Bituminous mixes and cement concrete roads.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations & Videos
- Links:https://www.youtube.com/watch?v=EwPmV3V3kAc&list=PLLD1XKGt_abdmkc_71nBmXzRDQf5YqrHvu

https://www.youtube.com/watch?v=6JkdRBih0-I&list=PLLD1XKGtabdmkc_71nBmXzRDQf5YqrHvu&index=3
<https://www.youtube.com/watch?v=9WbTmgJ34l0>

Unit IV

Rate Analysis: Definition, and purpose, or importance working out quantities and rates for the following standard items of works-Earth works in different types of soils, cement concrete of different mixes, Brick masonry, stone masonry, plastering, flooring, painting and steel works, wooden works for Doors, windows and ventilator. Schedule of Rates (SR) rates as per Central Public Works Department (CPWD).

Valuation: Definitions – Various types of valuations – Valuation methods – Necessity – Capitalised value – Depreciation – Escalation – Valuation of land – Buildings – Calculation of Standard rent – Mortgage – Lease

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations & Videos
- Links:https://www.youtube.com/watch?v=EwPmV3V3kAc&list=PLLD1XKGtabdmkc_71nBmXzRDQf5YqrHvu
- <https://www.youtube.com/watch?v=Gd6-we7XR7Y&list=PLLD1XKGtabdkaATtw4WGxGD7gx81g5YG9>

Unit V

Specifications- Definition of specifications, objectives of writing specifications, Essentials of specification, general and detail specification of various items of works in buildings.

Contracts- Types of contract, essential of contracts agreement and document –legal aspects, penal provisions on breach of contract.

Tender- E.M.D, security deposit, tender from Tender notification procedures, Administrative Approval, Technical approval/sanction, Nominal muster roll, Measurement book- procedure for recording and checking measurements- stores and records, maintaining.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations & Videos
- Links:https://www.youtube.com/watch?v=AuLuxqoWGRk&list=PL_fJLDifMptNfnkzKKlXtlah6aaZLtNb
- https://www.youtube.com/watch?v=LkI-pZYaiwk&list=PL_fJLDifMptNfnkzKKlXtlah6aaZLtNb&index=7

Text Books:

1. Chakraborti N, “Estimating, costing, specification and valuation in Civil Engg” (2006).
2. Dutta B.N. “Estimating & Specification”, UBS Publishers and distributors, New Delhi.
3. D.N. Banerjee, Principles and Practices of Valuation, V Edition, Eastern Law House, 1998

Reference Books:

1. Basin P.L, ‘Quantity surveying’, S. Chand & Co, New Delhi.
2. Rangawala S.C, ‘Estimating & specification’ – Charotar publishing House, Anand.
3. Nanavati J, ‘Professional Practice for Civil Engineers’

Web links:

1. <https://nptel.ac.in/courses/105103093>
2. <https://www.slideshare.net/slideshow/estimation-costing-and-valuation-unit-1/257696131>
3. https://www.youtube.com/watch?v=EwPmV3V3kAc&list=PLLD1XKGtabdmkc_71nBmXzRDOQf5YqrHvu

Course Outcomes (COs):

At the end of the course, students will be able to

1. Estimate the quantities for buildings. (PO - 1,2,6,7,8,11 & PSO - 1)
2. Perform estimation and costing of RCC works. (PO - 1,2,3,4 6,7,8,9,11)
3. Compile earthwork estimation for roads. (PO - 2,3,4,6,9,11& PSO - 1)
4. Apply the method of working out unit rate analysis of different construction items and Evaluate valuation for building and land. (PO - 1,2,3,4,6,7,8,11 & PSO - 1)
5. Understand types of specifications. Create tender and contract documents. (PO - 1,2,3,4,9 & PSO - 3)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE) : 50 Marks		
Assessment tool	Marks	Course outcomes mapped
Internal test-I	30	CO1 & CO2
Internal test-II	30	CO3, CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Assignment	10	CO1 & CO2
Assignment/Mini project Work	10	CO3, CO4 & CO5
Semester End Examination (SEE)	100 (Scale down to 50)	CO1, CO2, CO3, CO4 & CO5

Note: Pattern of Semester End Examination (SEE) question paper for CV72: 55 marks of Part A with internal choice and 45 marks of Part B with Internal choice.

FUNDAMENTALS OF STRUCTURAL DYNAMICS & SEISMIC RESISTANT DESIGN	
Subject Code: CVE731	Credits: 3:0:0
Pre requisites: - Nil	Contact Hours: 42L
Course Coordinator: Dr. Basavanagowda G M	

Course Content

Unit I

Introduction and Free vibrations of SDF systems: Objectives, Types of Dynamic Analysis, Types of Dynamic forces, Typical Definitions in vibrations, Undamped and damped free vibrations with viscous damping, Definition of Logarithmic decrement.

- Pedagogy/Course: Chalk and Talk, Power point presentations &Videos delivery tools
- Links: <https://www.youtube.com/watch?v=ZUp3c5IMIk>
<https://www.youtube.com/watch?v=Zp9g0Xbv7G4>
<https://www.youtube.com/watch?v=YpiSZxDj7ws>

Unit II

Forced vibrations of SDF systems: Forced vibration response to harmonic excitations, Definition of Vibration isolation and Transmissibility, Evaluation of damping, Introduction to Duhamel integral only, Free vibrations of MDF systems: Formulation of equations of motion for MDOF (3 DOF), Free vibration analysis of systems using stiffness approach and introduction to forced vibration.

- Pedagogy/Course: Chalk and Talk, Power point presentations &Videos delivery tools
- Links: <https://www.youtube.com/watch?v=8nMcT4xlLPo>
<https://www.youtube.com/watch?v=XIEsGZ37vG0>
<https://www.youtube.com/watch?v=ILr0tZrdvB4>

Unit III

Engineering Seismology: Elastic rebound theory and Theory of plate tectonics, Seismic waves, Seismic zoning, Magnitude and intensity of Earthquakes, Introduction to Strong ground motion and Peak ground acceleration.

Response Spectra: Elastic design spectra, Tripartite plot, Use of response spectrum in earthquake resistant design, Energy dissipating devices.

- Pedagogy/Course : Chalk and Talk, Power point presentations &Videos delivery tools
- Links: <https://www.youtube.com/watch?v=A07t9usI0cI>
<https://www.youtube.com/watch?v=8crmiHjMxl8>
<https://www.youtube.com/watch?v=setphyUnUu4>

Unit IV

Conceptual design: Structural configuration for earthquake resistant design, Simplicity and symmetry, frames, shear walls and dual systems, effect of infill masonry on frames, soft and weak storeys, Ductility and energy absorption in buildings, Strong column - weak beam design, Base isolation.

Linear Earthquake Analysis: Seismic design requirements, Load combinations including earthquake loading, Introduction to Mathematical modelling, Methods of analysis - Seismic coefficient method, Response spectrum method, Earthquake resistant design methods.

- Pedagogy/Course : Chalk and Talk, Power point presentations & Videos delivery tools
- Links: <https://www.youtube.com/watch?v=6DtFNTvxHcI>
<https://www.youtube.com/watch?v=fefc4PeADB4>
<https://www.youtube.com/watch?v=bHNQlsGjCOY>

Unit V

Ductile design of RC and Masonry structures: Ductility and codal guidelines, (IS13920-2016) Design of beams and columns and introduction to: shear walls, Retrofitting, Behaviour of unreinforced and reinforced masonry walls during past earthquakes.

- Pedagogy/Course : Chalk and Talk, Power point presentations & Videos delivery tools
- Links: <https://www.youtube.com/watch?v=1E-nCYgo76M>
https://www.youtube.com/watch?v=fsFA0rrP6_U

Text Books:

1. Mario Paz, 'Structural Dynamics', CBS Publishers, New Delhi.
2. Madhujit Mukhopadhyay, 'Vibrations, Dynamics and Structural Systems', Oxford Publishers, New Delhi.
3. Pankaj Agarwal and Manish Shrikande, 'Earthquake Resistant Design of Structures', Prentice Hall of India Private Ltd, New Delhi.
4. Duggal S K, 'Earthquake Resistant Design of Structures', Oxford University Press, New Delhi.

Reference Books:

1. Anil K Chopra, 'Dynamics of Structures', Pearson Publications, New Delhi.
2. Dhamodharaswamy and Kavitha, 'Structural Dynamics and Earthquake Engineering', Prentice Hall of India, New Delhi.
3. Relevant Codes; IS456-2000, SP16, IS13920-2016, IS1893-2016

Web Links:

1. Link for Introduction and Free vibrations of SDF systems
<https://www.youtube.com/watch?v=1iEkUIKvT3w>
2. Link for Forced vibrations of SDF systems
https://www.youtube.com/watch?v=QP0q0G3EW_E&list=PLdvgbbrR9Lh-B_lZlIE0TSoEJ_mM3higs&index=1
3. Link for Conceptual design of structures
https://www.youtube.com/watch?v=iAwbw_nKero&list=PL0h14oMuZXQ6C8iwGm69CYE4M8Yd_ro0Q
4. Link for Ductile design of buildings
<https://www.youtube.com/watch?v=NIMkrKpR8ME>

Course Outcomes (COs):

At the end of the course, students will be able to

1. Apply the knowledge of basic science to know the behavior of single degree structural systems subjected to free vibrations with and without damping. (PO - 1, 2 & PSO - 1)
2. Analyze the SDOF/MDOF structural systems subjected to forced vibrations (PO1, 2 & PSO1)
3. Construct the response spectra. (PO - 1, 2, 8, 12 & PSO - 1,2 and 3)
4. Analyze the building for different earthquake loading. (PO - 1, 2, 8, 12 & PSO - 1,2 and 3).
5. Design the structures for ductility provisions. (PO - 1, 2, 8, 12 & PSO - 1,2 and 3)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE) : 50 Marks		
Assessment tool	Marks	Course outcomes mapped
Internal test-I	30	CO1, CO2 & CO3
Internal test-II	30	CO3, CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Quiz/Assignment	10	CO1 & CO2
Quiz/Assignment/Mini project Work	10	CO3, CO4 & CO5
Semester End Examination (SEE)	100 (Scale down to 50)	CO1, CO2, CO3, CO4 & CO5

AIR POLLUTION CONTROL TECHNOLOGIES	
Subject Code: CVE732	Credits: 3:0:0
Pre requisites: - Nil	Contact Hours: 42L
Course Coordinator: Dr. A Lavanya	

Course Content

Unit I

Introduction to Air Pollution: Definitions, classification and properties of air pollutants, primary and secondary air pollutants, sources of pollutants, concentrations of air pollutants and numerical calculations, air pollution episodes. Effects of air pollutants on human health, vegetation and on materials.

Air Quality Standards and Legislations: Air pollution control legislation, air quality criteria and standards, ambient air quality standards, stack emission standards, automobile emission standards, Air Act, industrial plant location.

- Pedagogy/Course delivery tools:-Chalk and talk, Power point presentation
- Links:https://www.youtube.com/watch?v=u142u-wJFwI&list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w&index=2
- https://youtu.be/StL9XX7qwCc?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w
- NPTEL Links: -<https://youtu.be/5dukz1UOtKA>
- <https://youtu.be/DAQapF-F4Vw>
- https://youtu.be/I7Z34WU257U?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w

Unit II

Meteorology: Temperature lapse rate & atmospheric stability, wind velocity profiles & turbulence, plume behaviour, measurement of meteorological variables, wind rose diagrams, pollution roses, Plume Rise, estimation of effective stack height and mixing depths. Development of air quality models - Gaussian dispersion model.

- Pedagogy/Course delivery tools:-Chalk and talk, Power point presentation, videos
- Links:https://youtu.be/_y1dLI3dSCM?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w
- https://youtu.be/rQjTM7AVK2k?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w
- NPTELLinks:https://youtu.be/-61Vl_G17oE?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w
- https://youtu.be/wsriuZzKJ1c?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w

Unit III

Air Sampling: Sampling procedures, classification of sampling methods, Basic consideration of air sampling, duration of sampling period, sampling methods, dust fall jar, high volume air samplers, Monitoring and analysis of air pollutants (PM_{2.5}, PM₁₀, SO_x, NO_x, CO, NH₃), Stack sampling techniques, isokinetic sampling, particulate sampling, gaseous sampling, smoke measurements.

- Pedagogy/Course delivery tools:-Chalk and talk, Power point presentation
- Links:https://youtu.be/uuDr0MgKUYy?list=PLLy_2iUCG87BwOQUBs7WSdMVWHDXByk-w
https://youtu.be/zBvgoi1T9mQ?list=PLLy_2iUCG87BwOQUBs7WSdMVWHDXByk-w
https://youtu.be/Vq_bD40UsmI
- NPTEL Links: -<https://youtu.be/tCSjMoIn7I8?list=RDLVtCSjMoIn7I8>

Unit IV

Air pollution control using equipment: Objectives, types of collection equipments, settling chambers, inertial separators, cyclones, multiples cyclones, design calculations, filters - fabric filters, bag house filters, Electrostatic precipitators- plate type precipitators, scrubbers– types of scrubbers, spray towers, venturi scrubbers, cyclone scrubbers, packed scrubbers, design calculations. (Working principle, advantages, disadvantages, applications and designs).

- Pedagogy/Course delivery tools:-Chalk and talk, Conventional water treatment plant visit, invited lectures from industry people, Power Point Presentation
- Links:https://youtu.be/9iXCsH5B6zA?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB
- https://youtu.be/bHxQHUGBJms?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB
- NPTELLinks:https://youtu.be/MOetu14J94o?list=PLLy_2iUCG87BwOQUBs7WSdMVWHDXByk-w
https://youtu.be/H7X9Jp3loY?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB

Unit V

Vehicular Emissions Control and current issues: Air pollution due to automobiles, standards and control methods. Indoor air pollution & control, odour pollution and control. Noise pollution & control.

Current Issues: Hazardous air pollutants, air pollution effects on climate change, global air pollution, air pollution mitigation and adaptation to climate change.

- Pedagogy/Course delivery tools:-Chalk and talk, invited lectures from industry people, Power point Presentation, video.
- Links:https://youtu.be/rdaW4pC59MM?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB
https://youtu.be/8IzOdaKGzKA?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB
- NPTELLinks:https://youtu.be/40QetqRZJaw?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w

Text Books:

1. Rao, M.N. and Rao, H.V.N. (1993) ‘Air Pollution’, Tata-McGraw-Hill Publishing Company Ltd. New Delhi, India.
2. Anjaneyulu Y. (2002) “Air Pollution and control Technologies”, Allied Publishers

Reference Books:

1. Rao. C.S, (1992) “Environmental Pollution Control Engineering”, Wiley Eastern Limited,
2. Gilbert M Masters, (2004), “Introduction to Environmental Engineering and Science” Second Edition, Pearson Education.
3. Mahajan. S. P, “Pollution Control in Process Industries”, Tata McGraw Hill Publishing Co., New Delhi.
4. Wark, K. and Warner, C.F., 1981. Air pollution: its origin and control. Harper and Row Publishers Inc., New York, USA.
5. Peavy, H.S. Rowe, D.R. and Tchobanoglous, G., 1985. Environmental Engineering. McGraw Hill International Editions, New York.
6. Theodore, L., 2008. Air Pollution Control Equipment Calculations. John Wiley & Sons Inc Publication, New Jersey.
7. Boubel, R.W., Fox, D.L., Turner, D.B. and Stern, A.C., 2005. Fundamentals of Air Pollution, 3rd Edition, Academic Press, New York.
8. De. Nevers, N.,2000. Air Pollution Control Engineering. McGraw Hill, Boston.

Web links and video Lectures (e- Resources):

1. https://www.youtube.com/watch?v=u142u-wJFwI&list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w&index=2
2. https://youtu.be/_y1dLI3dSCM?list=PLLy_2iUCG87BwOQUBS7WSdMVWHDXByk-w

3. https://youtu.be/uuDr0MgKUYY?list=PLLy_2iUCG87BwOQUBs7WSdMVWHDXByk
4. https://youtu.be/9iXCsh5B6zA?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB
5. https://youtu.be/rdaW4pC59MM?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB

Course Outcomes (COs):

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

1. Estimate emissions from industrial and road transport sources; (PO - 2,6,7,8 & PSO - 1)
2. Estimate air pollution concentrations as a function of emission, meteorology, topography and the built environment for a combination of road and industrial sources; (PO - 2,6,7 & PSO - 1)
3. Estimate health impact of changes in air pollution; (PO - 1,6,7 & PSO - 1)
4. Evaluate various transport policy options in terms of their impacts on emission, air quality and health; (PO - 1,2,3 & PSO - 1)
5. Disseminate emission and air quality results to a wider audience. (PO - 2,2,7 & PSO - 1)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE) : 50 Marks		
Assessment tool	Marks	Course outcomes mapped
Internal test-I	30	CO1, CO2 & CO3
Internal test-II	30	CO3, CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Quiz/Assignment	10	CO1 & CO2
Quiz/Assignment/Mini project Work	10	CO3, CO4 & CO5
Semester End Examination (SEE)	100 (Scale down to 50)	CO1, CO2, CO3, CO4 & CO5

FOUNDATION ENGINEERING	
Subject Code: CVE733	Credits: 3:0:0
Pre requisites: - Nil	Contact Hours: 42L
Course Coordinator: Dr. J Sumalatha	

Course Content

Unit I

Bearing Capacity and Settlement Analysis: Penetration tests and Plate load tests; Settlement Analysis; Bearing capacity of foundations on layered soils and sloping grounds; Foundations with tilted base.

Design of Isolated footings: Assessments of foundation loads; Choice of foundation types, Proportioning of footings; Structural design (limit state) of isolated footings; Design of eccentrically loaded footings.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -<https://www.youtube.com/watch?v=QuE4tEK-5iY>
- <https://www.youtube.com/watch?v=oYYsXvy1qd8>
- <https://www.youtube.com/watch?v=7rk5BF3WwTE>

Unit II

Combined Footings: Proportioning of combined footings - Rectangular, Trapezoidal and Strap footings using field test data; Structural design of combined footings; Raft foundations - Necessity; Types of rafts; Bearing capacity and settlement of rafts.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -<https://www.youtube.com/watch?v=R1kVyz3iWx8>
- https://www.youtube.com/watch?v=iQmXScf52_0

Unit III

Pile Foundations: Classification and Uses; Load carrying capacity of single pile using Static and Dynamic formulae; Pile load tests; Pull out resistance; Structural design of piles.

Pile groups: Group capacity of pile groups in different soils; efficiency of pile groups; Settlement of pile groups; Negative skin friction; Pile capacity from SPT and CPT values. Structural design of pile foundations and pile cap.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -<https://www.youtube.com/watch?v=f00mF3PvAH4>
- https://www.youtube.com/watch?v=p3tzvx9-E_I

Unit IV

Sheet Pile Structures: Cantilever sheet pile walls in granular and cohesive soils - Anchored bulk heads - Free earth support and fixed earth support methods - Anchors. Cofferdams – types and uses - cellular cofferdam.

Well foundations: Types of caissons; Bearing capacity and settlement; Design of well foundations; determination of scour depth; steining thickness; well sinking.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -https://www.youtube.com/watch?v=s_PJn6Ls99M
- <https://www.youtube.com/watch?v=sXRHerkmOU0>

Unit V

Foundations of Tower Structures: Loads on tower footings; design of Concrete pad and Chimney type footing in different soils; design of under reamed piles; Piled raft foundation.

Foundations on problematic soils: Foundation Failures - Types and causes of failures, Remedial measures, Shoring and Underpinning. Expansive soils - factors influencing swelling, problems and remedial measures; Principles of foundation design on expansive, collapsible and contaminated soils.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations &Videos
- Links: <https://www.youtube.com/watch?v=W5G2TwDWSnU>
<https://www.youtube.com/watch?v=Jg6YzOejeko>

Text Books:

1. Das, B.M., “Principles of Foundation Engineering”, 4th Edition, PWS Publishing, Singapore, 1999.
2. Bowles, J.E., “Foundation Analysis and Design”, 5th Edition, McGraw- Hill International, 2000.
3. W. C. Teng, “Foundation Design”, Prentice Hall of India Ltd.

Reference Books:

1. Murthy, V.N.S., “Soil Mechanics and Foundation Engineering”, 4th Edition, Sai Krupa Technical Consultants, 2000.
2. Venkataramah, C., “Geotechnical Engineering”, 5th Edition, New Age International Pvt. Ltd., 2009.
3. Swami Saran, “Analysis and Design of Substructures”, 2nd Edition, Oxford & IBH Publishing Company Pvt. Ltd., 2009.
4. Gopal Ranjan & ASR Rao, “Basic and Applied Soil Mechanics”, 3rd Edition, New Age International Pvt. Ltd, Publishers, 2002.

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=OyU2WgK7FzA>
2. <https://www.youtube.com/watch?v=7rk5BF3WwTE>
3. https://www.youtube.com/watch?v=X-qyU3j_RY
4. <https://www.youtube.com/watch?v=Ouwp85nKwqU>
5. <https://www.youtube.com/watch?v=PqbnvZa7PXg>
6. <https://www.youtube.com/watch?v=ji5OWENcD2c>
7. <https://www.youtube.com/watch?v=JBrNbeQYsE0>
8. <https://www.youtube.com/watch?v=0x3Na0Iunhk>
9. <https://www.youtube.com/watch?v=4dRzbUbuW1o>
10. https://www.youtube.com/watch?v=CC6LqIh_92c

Course Outcomes (COs):

At the end of the course, students will be able to

1. Predict the bearing capacity of soil and select suitable foundation based on site conditions. (PO - 1, 2,3, 12 & PSO - 1)
2. Differentiate the suitability of various combined footings and carry out the design for different soil conditions. (PO - 1, 2,3, 12 & PSO - 1)
3. Integrate the field test results with the structural design of pile foundations. (PO - 1, 2,3, 12 & PSO - 1)
4. Provide the sheet pile wall design and select the type of caisson required based on the soil properties at the site. (PO - 1, 2,3, 12 & PSO - 1)
5. Select the suitable foundation on problematic soil and suggest remedial measures against foundation failures. (PO - 1, 2,3, 12 & PSO - 1)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE) : 50 Marks		
Assessment tool	Marks	Course outcomes mapped
Internal test-I	30	CO1, CO2 & CO3
Internal test-II	30	CO3, CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Quiz/Assignment	10	CO1 & CO2
Quiz/Assignment/Mini project Work	10	CO3, CO4 & CO5
Semester End Examination (SEE)	100 (Scale down to 50)	CO1, CO2, CO3, CO4 & CO5

PAVEMENT DESIGN	
Subject Code: CVE734	Credits: 3:0:0
Pre requisites: - Nil	Contact Hours: 42L
Course Coordinator: Dr. Asha M Nair	

Course Content

Unit I

Pavement Design Parameters: Introduction, factors affecting design and performance of the pavements. Pavement composition. Parameters for the Pavement Analysis- Elastic Modulus, Poisson's ratio, Wheel Load, Wheel configuration, Tire Pressure & Temperature. Concepts of analysis of bituminous pavement structure and concrete pavement structure.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations & Videos
- Links: -<https://www.youtube.com/watch?v=jA6jXzmEv1E>
<https://www.youtube.com/watch?v=u0kpGeBZPww>
<https://www.youtube.com/watch?v=O-E2Tqka38g>

Unit II

Stresses and Deflections in Flexible Pavements: Stresses and deflections in homogenous masses, Assumptions and Limitations of Boussinesq's theory, Burmister theory and problems on above, wheel load stresses and various factors in traffic wheel load. ESWL [graphical method only] for multiple wheel loads, repeated loads and EWL factors.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations & Videos
- Links: -<https://www.youtube.com/watch?v=Mqd1eM6jm9k>
<https://www.youtube.com/watch?v=FTr65zNxeio>
<https://www.youtube.com/watch?v=QrIrBzi-yqE>

Unit III

Design Methods for Flexible pavements for Highways: Mc-Leod method, Kansas Method, California Resistance Value method & IRC Method-according to the IRC38-2018.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -<https://www.youtube.com/watch?v=wGFwGVHfE9c>
<https://www.youtube.com/watch?v=VX9p2XvtVuc>
<https://www.youtube.com/watch?v=BDvpbAmCbfbk>

Unit IV

Stresses in Rigid Pavements: Types of stresses and causes, factors influencing the stresses, general considerations in rigid pavement analysis, EWL, wheel load stresses, warping stresses, frictional stresses and combined stresses.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -<https://www.youtube.com/watch?v=UcVGsxyQITE>
- <https://www.youtube.com/watch?v=jTrPIb3Rq84>
- <https://www.youtube.com/watch?v=khX1xamGLPQ>

Unit V

Design of Cement Concrete pavement: Designing thickness of concrete pavement [IRC58, 2015]. Types of joints in cement concrete pavements and their functions. Joint spacing: design of joints, details of longitudinal joints, contraction joints and expansion joints, Design of pavements using recycled/alternate materials.

- Pedagogy/Course delivery tools:-Chalk and Talk, Power point presentations &Videos
- Links: -<https://www.youtube.com/watch?v=3LWxE006DA4>
- <https://www.youtube.com/watch?v=qRCLSDVZRr4>
- https://www.youtube.com/watch?v=dI_BCq8VRoA

Text books:

1. Yang H Huang, “Pavement Analysis and Design”, 2 Edition, Pearson India
2. Yoder E.J and Witczak, “Principles of Pavement Design”, Edition, John Wiley and sons.
3. Khanna.S.K and Justo.C.E.G, “Highway Engineering, NemChand Bros”, Roorkee.

Reference books:

1. IRC 37:2018 “Guidelines for the design of Flexible Pavements”, Third Revision.
2. IRC 58:2015 “Guidelines for the design of Plain Jointed Rigid Pavements for Highways”, Third Revision.

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=u0kpGeBZPww>
2. <https://www.youtube.com/watch?v=DU6LSmn-2Rw>
3. <https://youtu.be/uJntLOgEHD4>
4. <https://youtu.be/GxXONAINMBE>
5. <https://youtu.be/moYmN4rJ2-s>
6. https://youtu.be/pe7ycTC1W_M

Course Outcomes (COs):

At the end of the course, students will be able to

1. Explain pavement components in flexible and rigid pavement (PO - 1, 2 & PSO - 1)
2. Illustrate stresses and strains in flexible pavements & rigid pavements (PO - 1, 2, 3, PSO - 1)
3. Design the flexible pavement (PO - 1, 2, 3, 8 & PSO - 1, 3)
4. Determine stresses and strains in rigid pavements (PO -1, 2, 3, 8 & PSO - 1, 3)
5. Design the cement concrete pavements with different joints (PO - 1, 2, 3, 7, 8 & PSO - 1, 3)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE) : 50 Marks		
Assessment tool	Marks	Course outcomes mapped
Internal test-I	30	CO1, CO2 & CO3
Internal test-II	30	CO3, CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Quiz/Assignment	10	CO1 & CO2
Quiz/Assignment/Mini project Work	10	CO3, CO4 & CO5
Semester End Examination (SEE)	100 (Scale down to 50)	CO1, CO2, CO3, CO4 & CO5

DESIGN OF TALL STRUCTURES	
Subject Code: CVE735	Credits: 3:0:0
Pre requisites: - Nil	Contact Hours: 42L
Course Coordinator: Dr. D Santhosh	

Course Content

Unit I

Introduction: History, Advantages & disadvantages, Economics, Essential amenities, Lifts (elevator), Fire safety, Water supply, Drainage and garbage disposal, Miscellaneous services, Structural and foundation systems, Design criteria, Design philosophy, loading, Sequential loading, Materials, High performance Concrete, Fibre reinforced Concrete, Light weight Concrete, Design Mixes.

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint presentations, Videos
- Links: <https://youtu.be/3PPDQ3L64do?si=aYDy5gixt1hEKiTT>
- Links: <https://archive.nptel.ac.in/courses/124/105/124105015/>

Unit II

Loading and Movement: Gravity loading: Dead and Live load, methods of live load reduction, Impact, gravity loading, construction load. Wind loading: Static and Dynamic approach, Analytical and wind tunnel experimental method. Earthquake loading: Equivalent lateral force, Modal analysis, combinations of loading, working stress design, Limit state design, Plastic design.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://youtu.be/WkNz0mN08WY?si=zQKjqfgCPImM1WPA>
- Links: <https://youtu.be/AxIx-2KCpcU?si=gSlKo2FOCiHfhBwn>
- Links: <https://archive.nptel.ac.in/courses/124/105/124105015/>

Unit III

Behaviour of Various Structural Systems: Factors affecting growth, Height and Structural form- High rise behavior, Rigid frames, braced frames, in filled frames, shear walls, coupled shear walls, wall-frames, tubular, cores, outrigger- Braced and hybrid mega system.

- Pedagogy / Course delivery tools: Chalk and talk.
- Links: https://youtu.be/CuT7F_d05uw?si=tAq2nRXpxdCe-IDQ
- Links: <https://youtu.be/U4VzWd-gOO8?si=BmUBtZzc7iMgXwal>
- Links: <https://archive.nptel.ac.in/courses/124/105/124105015/>

Unit IV

Analysis and design: Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of building as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist, computerized general three dimensional analysis. Structural elements: Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow, Design for differential movement, creep and shrinkage effects, temperature effects and fire resistance.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://archive.nptel.ac.in/courses/124/105/124105015/>
- Links: <https://youtu.be/-qrDFxWfIPg?si=AaECynq2qV8ttedi>

Unit V

Stability of Tall Buildings: Overall buckling analysis of frames, wall- frames – Approximate methods, second order effects of gravity loading, P-Delta analysis, simultaneous first order and P-Delta analysis- Translational, Torsional instability, out of plane effects, stiffness of member in stability, effect of foundation rotation.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://archive.nptel.ac.in/courses/124/105/124105015/>
- Links: <https://youtu.be/zIWuyUyTsc8?si=hFM85CZQIOm-0B02>

Text Books:

1. **Taranath B.S.** “Analysis & Design of Tall Building”, McGraw-Hill Book Co,2011.
2. **Bryan S.S, and Alexcoull**, “Tall Building Structures, Analysis and Design”, John Wiley and Sons, Inc.,1991.

Reference Books:

1. **Wolfgang. S**, High Rise Building Structures, John Wiley & Sons, 1977.
2. **Peter Irwin, Roy. D**, Wind Tunnel testing of High Rise Buildings, Cottbus Technical Guides, Routledge.

Web links and Video Lectures (e-Resources):

1. <https://youtu.be/3PPDQ3L64do?si=aYDy5gixt1hEKiTT>
2. <https://youtu.be/WkNz0mN08WY?si=zQKjqfgCPlmM1WPA>
3. https://youtu.be/CuT7F_d05uw?si=tAq2nRXpxdCe-IDQ
4. <https://archive.nptel.ac.in/courses/124/105/124105015>
5. <https://youtu.be/zIWuyUyTsc8?si=hFM85CZQIOm-0B02>

Course Outcomes (COs):

At the end of the course, students will be able to

1. Evaluate essential amenities, structural systems, and design criteria for high-rise buildings. (PO - 1, 2, 3 & PSO - 1)
2. Analyze gravity, wind, and earthquake loads and apply appropriate design methodologies. (PO - 1, 2, 3, & PSO - 1)
3. Assess the behavior of different structural systems in high-rise buildings. (PO - 1, 2, 3, 5& PSO - 1)
4. Analyze and design structural elements for high-rise buildings. (PO - 1, 2, 3 & PSO - 1).
5. Conduct stability analysis for tall buildings, considering gravity loading and P-Delta effects. (PO - 1, 2, 3 & PSO - 1).

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course Outcomes replaced
Internal test-I	30	CO1 & CO2
Internal test-II	30	CO3, CO4, CO5
The average of the two internal tests shall be taken for 30 marks		
Other components		
Quiz/Assignment	10	CO1 & CO2
Quiz/Assignment	10	CO3 & CO4
Semester End Examination (SEE)	100 (Scale down to 50)	CO1, CO2, CO3, CO4, CO5.

COMPUTER AIDED DESIGN LABORATORY	
Subject Code: CVL74	Credits: 0:0:1
Pre requisites: - Nil	Contact Hours: 14P
Course Coordinator: Dr. B Suguna Rao	

Course Content

List of Experiments:

1. Chi-square test of goodness of fit. Curve fitting by the method of least square.
2. Linear correlation and regression multiple linear regression, Analysis of Variance.
3. Prepare the spread sheet for the given data and calculate the Quantity for RCC elements – Beam, Slab, Column using formula bar.
4. Prepare the Spread Sheet for the given plan and calculate the quantity and total amount using Formula bar. (Use separate column for rate and units).
5. Design and Analysis problems in Excel for Given Dimension of Masonry / RCC Dam-Top width, height of Dam, Height of Water, Specific Weight of masonry/Cement Concrete. Specific Weight of Water etc, Find the Base pressure and check the stability of the Dam.
6. Use of STAAD/ETABS Packages for analysis of propped cantilever, fixed beams, continuous beam.
7. Use of STAAD/ETABS packages for analysis of pin jointed frames single bay and multi bays.
8. Use of STAAD/ETABS packages for analysis of pin jointed frame, 2D rigid frame.
9. Use of STAAD/ETABS packages for analysis of 3D rigid frame and Multistory Frame structures.
10. Introduction to Microsoft project, Preparation of schedule for a project by using Microsoft project, Work breakdown Structure–Planning, Techniques-bar charts–preparation of network diagram – critical path method- program evaluation and review technique – lab components.

Text Books:

1. Computer aided design by C.S. Krishnamoorthy and S. Rajeev – Narosa publishing house.
2. Referral on Cad Laboratory, -by Jayaram & Rajendra Prasad, Sapna Publishers.

Reference Books:

1. Finite Element analysis– by C.S. Krishnamoorthy, Tata McGraw Hill publishers.
2. Project Management and Tools & Technologies – An overview - by Shailesh Mehta, Shroff Pub & Dist. Pvt. Ltd.
3. Analysis and Design of Structures- A Practical Guide to Modeling– by D. Trevor Jones, Bentley Publishers.

Web Links:

1. Link for Analysis of two storey multibay framed structures using STAAD Pro Software using IS1893:2016 subjected to lateral loads.
<https://www.youtube.com/watch?v=u1eRn9298wE>
2. Link for Modelling and analysis of 2BHK 3 storey commercial building using STAAD Pro software.
<https://www.youtube.com/watch?v=I756O-lKgYQ>
3. Link for Flexible and Rigid Footing
<https://www.youtube.com/watch?v=yDT571sM6xs>
4. Link for Winkler's spring elements.
<https://www.youtube.com/watch?v=nPu4vyVnNTs>
5. Link for Chi Square test
<https://www.youtube.com/watch?v=f53nXHoMXx4>
6. Link for stability analysis of Dam
<https://www.youtube.com/watch?v=zdLV42DbtNI>

Course Outcomes (COs):

At the end of the course, students will be able to

1. Apply statistical skills using soft computing tools to arrive at regression value and goodness to fit curve. (PO - 2, 3, 5, PSO - 1, 3)
2. To execute problems using spreadsheets for estimating the different components of building (foundation, column, beam, slab). (PO - 2, 3, 5 & PSO - 1, 3))
3. Apply the soft skill techniques to arrive at simulating engineering problems related to hydraulics. (PO - 2, 3, 5 & PSO - 1, 3))
4. To model and analyze different components of building (foundation, column, beam, and slab) using STAAD/ETABS software. (PO - 2, 3, 5 & PSO - 1, 3))
5. To execute engineering stages of project works using soft skill techniques (foundation, column, beam, slab). (PO - 2, 3, 5 & PSO - 1, 3))

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	Marks	Course Outcomes addressed
Weekly evaluation of laboratory Drawings and Files after the conduction of every experiment.	30	CO1, CO2, CO3, CO4 & CO5
Practical test	20	CO1, CO2, CO3, CO4 & CO5
Semester End Evaluation (SEE): 50 Marks		
Semester end examination	50	CO1, CO2, CO3, CO4 & CO5

DATA ANALYTICS AND MODELING LAB	
Subject Code: CVL75	Credits: 0:1:1
Pre requisites: - Nil	Contact Hours: 14T+14P
Course Coordinator: Dr. D Santhosh & Dr. Santhosh L G	

Course Content

Unit 1

Data Analytics with Excel

Tutorial component

Formatting of cell values based on data type, importing and exporting of the data, data transformation, nested loop condition, data visualization, matrix operations, Absolute vs Relative Reference, lookup function

Lab Component

1. Import of data, Fundamental Operation in Excel: Sorting, Filtering, Removing Duplicates and formatting based on data types, Sum, average, count, Count if, max and min, V lookup
2. Matrix operations: Addition, subtraction, multiplication of two matrices, determinant and inverse of a matrix
3. Centroid & Moment of Inertia: To determine the position of centroid & Moment of Inertia for a given plane Lamina.

Unit 2

Civil Engineering Applications with excel

Tutorial component

Use of formula for Civil Engineering problems, data visualization, use of charts and plots: XY scatter, linear plot, curve fit and estimation of R^2 , semi log plot, error bars in plots

Lab Component

4. S.F.D. and B.M.D. for Simply supported beam and Cantilever beam subjected to concentrated load, uniformly distributed load, uniformly varying load and point moment
5. Setting out of a Simple Curve
6. Charts and Plots: Types: XY scatter, linear plot, curve fit – determining R^2 of plots, combination plot /chart, semi log plot, error bars in plots.

Unit 3

Data transformation and visualization using Python

Tutorial component

Dataset import and export, various operations on the dataset creation, sorting, summarizing, updation, deletion, transposing of datasets. use of different functions using Google Colab.

Lab Component

7. Data Import, Data Export, Preparation of charts and Simple mathematical operations using Google Colab.

Unit 4

Introduction to Extended Three-Dimensional Analysis of Building Systems (ETABS)

Tutorial component

ETABS software interface, modelling environment, and basic workflow. Includes grid creation, material and section definition, load application, and basic analysis.

Lab Component

8. Modeling and Analysis of a Determinate 2D RC Frame.
9. Modeling and Analysis of an Indeterminate 2D Portal Frame. (Multiple Bays and Multi-Storey).

Unit 5

ETABS for RC Building Analysis and Design

Tutorial component

Structural modelling and design of RC buildings, analysis of trusses

Lab Component

10. 3D Modeling and Design of a Regular Single-Storey RC Building.
11. 3D Seismic Analysis and Design of a Regular and Irregular Multi-Storey RC Building.
12. Modeling and Analysis of a Steel Roof Truss Structure.

Text Books:

1. An Introduction to Excel for Civil Engineers, Gunthar Pangaribuan, Createspace Independent Publishing Platform
2. Step by Step Analysis and Design of High-Rise Building Using ETABS, Dr. Shailendrakumar Dubey, LAP LAMBERT Academic Publishing

Reference Books:

1. Machine Learning and Deep Learning using Python and Tensor Flow, Venkata Reddy Konasani, Mc Graw Hill
2. Python Course Material, D V Analytics
3. Data Scientist Course Material, D V Analytics

Web Links:

1. Introduction to Excel
<https://www.youtube.com/watch?v=AD2kQ9DKTNc>
2. Use of VLOOKUP
<https://www.youtube.com/watch?v=xIynD1gFOLo>
3. Matrices in Excel
<https://www.youtube.com/watch?v=OiGOIBbfrbg>
4. Use of IF loop in excel
<https://www.youtube.com/watch?v=hgkWSqAMcKc>
5. Python Basics
<https://www.youtube.com/watch?v=IAfKu5s2hrU>
6. Python with Colab
<https://www.youtube.com/watch?v=SuzwJ28mby4>
7. Coding in Colab
<https://www.youtube.com/watch?v=JwIaYnrM7Oc>
8. Link for analysis of pin jointed frame, 2D rigid frame using ETABS
<https://www.youtube.com/watch?v=DhwuRsrMmAY>
9. Link for analysis of pin jointed frames single bay and multi bays.
<https://www.youtube.com/watch?v=m2zCPy3QtHg>
10. Link for analysis of 3D rigid frame and Multistory Frame structures.
<https://www.youtube.com/watch?v=vVPRWca9L3g>

Course Outcomes (COs):

At the end of the course, students will be able to

1. Utilize Microsoft Excel for Matrix Operations and Moment of Inertia Calculations (PO - 1, 2, 3, 5 and 10 & PSO - 1, 3)
2. Apply Microsoft Excel to draw SFD and BMD, setting of curves and making graphical representations (PO - 1, 2, 3, 5 and 10 & PSO - 2, 3)
3. Make use of Google Colab for Data analysis using Python (PO - 1, 2, 3, 5 and 10 & PSO - 1, 2, 3)

4. To model and analyze 2D frames using ETABS. (PO – 1, 2, 3 and 5 & PSO - 1)
5. Analyze and design RC building using ETABS (PO - 1, 2, 3, 5 & PSO1).

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	Marks	Course Outcomes addressed
Weekly evaluation of laboratory Drawings and Files after the conduction of every experiment.	30	CO1, CO2, CO3, CO4 & CO5
Practical test	20	CO1, CO2, CO3, CO4 & CO5
Semester End Evaluation (SEE): 50 Marks		
Semester end examination	50	CO1, CO2, CO3, CO4 & CO5

VIII SEMESTER

PROJECT WORK	
Subject Code: CVP81	Credits: 0:0:12
Pre requisites: - Nil	Contact Hours: -
Course Coordinator: Dr Harish M L & Dr Lakshmikanth S M	

Course Content

Guidelines:

- The process for the project work begins in the 7th semester with students forming project group of four students.
- The execution of proposed methodology shall be carried out in consultation with faculty adviser.
- There will be three project reviews during the 8th semester.
- The group shall prepare and present during the reviews as per the departmental guidance.
- The CIE marks will be based on the presentations and assessment by the review committee and faculty adviser.
- First and second review shall carry 20 marks, third review shall carry 40 marks and faculty advisor will award 20 marks totalling to 100 marks, which will be scaled down to 50 marks.
- The preparation of presentations & project report shall be intimated to the students during 8th semester.

Course Outcomes (COs):

At the end of the course, students will be able to

1. Comprehend findings from literature and summarize the gaps (PO - 1,6,8,9,10, & PSO - 1, 2)
2. Formulate the objectives and methodology based on the literature gaps. (PO - 1,8,9,10, & PSO - 1, 2)
3. Conduct experiment/simulation/ field study as per the formulated methodology. (PO - 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 & 12, PSO - 1, 2)
4. Appraise and develop/ interpret the results obtained. (PO- 1,2,3,4,5,6,7,8,9,10,11&12, PSO - 1, 2)
5. Articulate the literature gaps, objectives, methodology, results and comprehended conclusions into a technical project report. (PO - 1, 2, 3, 4, 5, 6,

7, 8, 9, 10, 11 & 12, PSO - 1, 2, 3)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	Marks	Course Outcomes addressed
Presentation I	10	CO1, CO2, CO3, CO4 & CO5
Presentation II	10	CO1, CO2, CO3, CO4 & CO5
Presentation III	20	CO1, CO2, CO3, CO4 & CO5
Evaluation by Guide	10	CO1, CO2, CO3, CO4 & CO5
Semester End Evaluation (SEE): 50 Marks		
Semester end examination	50	CO1, CO2, CO3, CO4 & CO5

RESEARCH / INDUSTRIAL INTERNSHIP	
Subject Code: INT82	Credits: 0:0:5
Pre requisites: - Nil	Contact Hours: -
Course Coordinator: Dr. J Sumalatha	

Course Content

The student has to undergo internship or industrial training, for a minimum period of four weeks. During the 2nd week of training the students shall submit synopsis report of the training which will be evaluated for 40% of the total marks based on choice of the agency, type of training or and possible outcomes of the training or internship. The students shall submit a final report which is ratified by the agency which has provided the training. The students shall be evaluated based on the final report, presentation and viva-voce for 60% of marks. The students have to submit the certificate from the company indicating the period of training and certifying student's performance.

Course Outcomes (COs):

At the end of the course, students will be able to

1. Choose an industry based on the area of the interest.
2. Apply theoretical knowledge to analyze real world situations.
3. Develop practical skill and build professional connections
4. Illustrate communication skills and the ability to work in a team
5. Compile a report on the basis of practical learning

SUSTAINABLE BUILDING CONSTRUCTION TECHNOLOGY	
Subject Code: CVOE03	Credits: 3:0:0
Pre requisites: - Nil	Contact Hours: 42L
Course Coordinator: Smt. Lakshmi H S	

Course Content

Unit I

Introduction: Need for sustainable practices in construction- Impact of building industry on energy resources, natural resources and environment. Concept of Green Building and principles, Concept of Embodied energy and calculation. Life cycle assessment. Consideration while selecting material and design for longevity.

- Pedagogy / Course delivery tools:- Chalk and talk, PowerPoint presentations, Videos
- Links: -<https://www.youtube.com/watch?v=JOG4GwSPsY8>
<https://www.youtube.com/watch?v=wmoy27EZ8y0>
- NPTEL Links: -<https://archive.nptel.ac.in/courses/105/102/105102195/>

Unit II

Building materials: Conventional materials and Use of low energy materials - Base materials for RCC and Steel systems. Alternatives to structural systems and building materials. Smart materials. Low energy construction- low energy material, locally sourced material, recycled materials.

- Pedagogy/Course delivery tools:- Chalk and talk, Power point presentation
- Links: -<https://www.youtube.com/watch?v=bsQBSVJoV04> ,
<https://www.youtube.com/watch?v=bsQBSVJoV04&t=10s>
- NPTEL Links: -<https://archive.nptel.ac.in/courses/105/102/105102195/>

Unit III

Building Siting: Orientation of the building. Building form-surface to volume ratio. Use of natural light, solar heat and ventilation. Fenestration and shading. Effective cooling and heating systems-solar passive techniques of heating and cooling in a building design. Methods of minimizing load on Conventional Systems-Landscaping, water bodies.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: <https://www.youtube.com/watch?v=hRo9k100ye4>
<https://www.youtube.com/watch?v=wOb5RF14i6I>
- NPTEL Links: <https://archive.nptel.ac.in/courses/105/102/105102195/>

Unit IV

Building Finishes, Energy Efficient Systems and Certifications: Glazing and shading systems. Building finishes. Effective electrical systems - photovoltaic systems. Efficient HVAC systems. Efficient lighting system- efficient bulbs, occupancy sensor systems and light sensors. Efficient motors. GRIHA, LEED. Computation of energy demand of building and design of solar panel for given energy load.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://www.usgbc.org/articles/what-green-building-0>
<https://www.youtube.com/watch?v=uaHRsiIBnhs>
<https://youtu.be/MyIOtsx3wDs>
- NPTEL Links: <https://archive.nptel.ac.in/courses/105/102/105102195/>

Unit V

Water Conservation: Water efficient fixtures-flow restrictors, sensors, no water fixtures. Alternatives for secondary uses. Rain water harvesting, solar water heaters and solar cooking. Low flush toilets, grey water recycling. Onsite treatment. Ecofriendly toilets. Reducing irrigation water requirements. Vertical farming. Xeriscaping

- Pedagogy/Course delivery tools: -Chalk and talk, Power point presentation
- Links: -<https://www.youtube.com/watch?v=f-sRcVkZ9yg>
<https://www.youtube.com/watch?v=suYcri3Fzcl>
<https://www.youtube.com/watch?v=hCQHWimJFGM>
- NPTEL Links-<https://archive.nptel.ac.in/courses/105/102/10510219/>

Text Books:

1. Kibert, Charles J. Sustainable construction: green building design and delivery, Wiley, 2008. 2nd Edition

References:

1. Prof. Dr. Michael Bauer, Peter Möslé and Dr. Michael Schwarz (2010) “Green Building – Guidebook for Sustainable Architecture” Springer.
2. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison (2001) “Green Building Handbook” Volume 1-Spon Press.
3. Mili Majumdar, (2002) “Energy-efficient buildings in India” Tata Energy Research Institute.
4. TERI “Sustainable Building Design Manual- Volume I & II” Tata Energy Research Institute.

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=QohffVIj-TQ>
2. <https://www.youtube.com/watch?v=bsQBSVJoV04&t=15s>
3. <https://www.youtube.com/watch?v=nFBvLlFFqI>
4. <https://www.youtube.com/watch?v=WShyn98a8mY&list=PLXCfO3gR tpRw w b6wpfkArLRWIojsyiB&index=1>
5. <https://www.youtube.com/watch?v=3Ww2TP tU7o>

Course Outcomes (COs):

At the end of the course, students will be able

1. Demonstrate the knowledge of sustainable building concepts. (PO -1,4,6,7)
2. Analyze different alternative building materials based on specific climate and with environmentally responsibility. (PO -1,4,6,7,8,10, 12)
3. Demonstrate different sustainable building design techniques using passive techniques. (PO -1,4,6,7,8,9,10, 12)
4. Design the building reducing energy and resource consumption. (PO -1,4,6,7,8,9, 10,12)
5. Apply water conservation principles in buildings. (PO -1,4,6,7,8,10, 12)

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course out comes mapped
Internal Test-I	30	CO1, CO2 & CO3
Internal Test-II	30	CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Assignment – MCQ, Quiz, Group presentation	10	CO1, CO2, CO3
Presentation and Report	10	CO1, CO2, CO3, CO4 & CO5
Semester End Examination (SEE)	100(Scale down to 50)	CO1, CO2, CO3, CO4, CO5

ENVIRONMENTAL POLLUTION CONTROL TECHNOLOGIES	
Subject Code: CVOE04	Credits: 3:0:0
Pre requisites: - Nil	Contact Hours: 42L
Course Coordinator: Dr. A Lavanya	

Course Content

Unit I

Domestic Wastewater

Introduction, description of hydrologic cycle, various sources and types of wastewater. Management of wastewater within the building: different types of plumbing system- one pipe and two pipe systems. Conventional flow diagram of wastewater treatment. Concept of BOD and COD. BOD kinetics and problems, general standards for discharge of environmental pollutants. Working principles: Rotating biological contractor (RBC), moving bed biological reactor (MBBR).

- Pedagogy/Course delivery tools:-Chalk and talk, Power point presentation
- Links: -<https://www.youtube.com/watch?v=sBnrwhYKbEg>
<https://www.youtube.com/watch?v=z-59Og-CbgQ>
<https://www.youtube.com/watch?v=SPUa7A5hRCc>
- NPTEL Links: -<https://www.youtube.com/watch?v=4-SRMmqH2s4&t=8s>
<https://www.youtube.com/watch?v=TZ1A-6tHqTo>

Unit II

Industrial Wastewater

Introduction, water usage in Industry, Industrial wastewater treatment - Theories and Practices: Volume Reduction: classifying wastes; conserving wastewater; changing production to decrease wastes; reusing both industrial and municipal effluents as raw water supplies and eliminating batch or slug discharges of process wastes. Concentration Reduction: process changes, equipment modifications, segregation of wastes, equalization of wastes, by-product recovery and proportioning wastes. Pre-treatment of Industrial wastewater –Neutralization: Mixing of wastes and chemical treatment. Equalization and Proportioning: objectives and methods.

- Pedagogy/Course delivery tools:-Chalk and talk, Power point presentation, videos
- Links:<https://youtu.be/SRvRFY-c5U?list=PL4SPMn8HFBYBhLHBY8D7iCNek9sWGWPcX>
<https://youtu.be/QO5X0iaq2S8?list=PL4SPMn8HFBYBhLHBY8D7iCNek9sWGWPcX>

- NPTELLinks:https://youtu.be/8FjhsODW1q4?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB
- https://youtu.be/Ar04qG1P8Es?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB

Unit III

Solid Waste Management

Introduction, classification and characteristics of solid wastes, Stages in municipal solid waste management. Composting and its methods. Landfills: factors for landfill site selection, Landfill design approach, Leachate and gas collection system. Solid waste management in apartments. Waste to energy conversion approaches.

- Pedagogy/Course delivery tools:-Chalk and talk, Power point presentation
- Links: -<https://archive.nptel.ac.in/courses/105/103/105103205/>
<https://www.youtube.com/watch?v=Hi4zFTqzf7Q><https://www.youtube.com/watch?v=cjIacnNRLHE&t=10s>
- NPTEL Links: -<https://www.youtube.com/watch?v=ZHD BK5QDd54&t=3s>
https://www.youtube.com/watch?v=hu51ENxiR_M&t=1s

Unit IV

Air & Noise Pollution

Air & Noise pollution: Introduction, history of air pollution. Sources of air pollution and classification of air pollutants. Ambient air quality monitoring: dust fall jar, high volume air sampler and problems. Sources of noise pollution. Standards of noise recommended by Ministry of Environment and Forest. Preventive measures.

- Pedagogy/Course delivery tools:-Chalk and talk, Conventional water treatment plant visit, invited lectures from industry people, Power Point Presentation
- Links:https://www.youtube.com/watch?v=u142u-wJFwI&list=PLLy_2iUCG87BwOQUbS7WSdMVWHDXByk-w&index=2
https://youtu.be/StL9XX7qwCc?list=PLLy_2iUCG87BwOQUbS7WSdMVWHDXByk-w
- NPTEL Links: -<https://youtu.be/5dukz1UOtK>
<https://youtu.be/DAQapF-F4Vw>
https://youtu.be/I7Z34WU257U?list=PLLy_2iUCG87BwOQUbS7WSdMVWHDXByk-w

Unit V

Environmental Impact Assessment

Definition of EIA, need for EIA, EIS, FONSI, REIA, CEIA, step-by-step procedure for conducting EIA, limitations of EIA, methodologies of EIA: listing, Adhoc method,

Network method and Overlay method. Public participation in environmental decision making, objectives of public participation and public participation techniques. Practical consideration in preparing in EIA and EIS.

- Pedagogy/Course delivery tools:-Chalk and talk, invited lectures from industry people,Powerpoint Presentation, video.
- Links:https://youtu.be/8vymflfip2w?list=PLLy_2iUCG87CkrNdXME16BCptwGx1fl67
https://youtu.be/E_oRwSRdgcQ?list=PLLy_2iUCG87CkrNdXME16BCptwGx1fl67
https://www.youtube.com/watch?v=HlBYCtJ9_Cw
- NPTEL Links: -https://www.youtube.com/watch?v=WIqeZH_0jqQ
https://youtu.be/E_oRwSRdgcQ?list=PLLy_2iUCG87CkrNdXME16BCptwGx1fl67

Text Books:

1. Garg. S.K, “Sewage disposal and Air pollution engineering”, Khanna Publications, 2-019, ISBN-10: 9788174092304
2. Industrial Waste Treatment Contemporary Practice and Vision for the Future by Nelson Leonard Nemerow, Elsevier, 2007, ISBN-13: 978-0-12-372493-9.
3. George Tchobanoglous et.al., “Integrated Solid Waste Management”, Tata-McGraw-Hill, Inc. New York, 1993.
4. Rao, M.N and Rao, H.V.N. (1993) ‘Air Pollution’, Tata-McGraw-Hill Publishing Company Ltd., New Delhi, India.
5. Y. Anjaneyulu and Valli Manickam, “Environment Assessment Methodologies”, B.S Publications, Hyderabad, 2007.

Reference Books:

1. Rao.C.S, (1992) “Environmental Pollution Control Engineering”, Wiley Eastern Limited.
2. Gilbert M Masters, (2004), “Introduction to Environmental Engineering and Science” Second Edition. Pearson Education.
3. Mahajan.S.P, “Pollution Control in Process Industries”, Tata McGraw Hill Publishing Co., New Delhi.
4. A.D.Bhide and B.B.Sudareshan, “Solid waste management in Developing countries”, NEERI, Nagpur, 1983.
5. Larry W Canter, “Environmental Impact Assessment” –McGraw – Hill International Editions, 1996.
6. Pollution Control in Process Industries by S P Mahajan, McGraw Hill Education (2017), ISBN-13: 978-0074517727.

Web links and video Lectures (e- Resources):

1. <https://www.youtube.com/watch?v=4-SRMmqH2s4&t=8s>
2. <https://www.youtube.com/watch?v=TZlA-6tHgTo>
3. https://youtu.be/8FjhsODW1q4?list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB
4. <https://www.youtube.com/watch?v=ZHdBK5QDd54&t=3s>
5. https://youtu.be/I7Z34WU257U?list=PLLy_2iUCG87BwOQUbs7WSdMVWHDXByk-w
6. https://youtu.be/E_oRwSRdgcQ?list=PLLy_2iUCG87CkrNdXME16BCptwGx1fl67

Course Outcomes (COs):

At the end of the course, students will be able to

1. Identify the domestic wastewater sources and its treatment technologies. (PO - 1 & PSO - 1)
2. Identify the industrial wastewater control technologies. (PO - 1,2)
3. Identify municipal solid waste management techniques. (PO - 1,2)
4. Identify Air and noise pollution sources and control techniques. (PO - 1,2)
5. Describe the fundamental concepts of EIA and its methodologies, along with significance of public participation in EIA. (PO - 1,2).

Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course out comes mapped
Internal Test-I	30	CO1, CO2 & CO3
Internal Test-II	30	CO4 & CO5
Average of the two internal tests shall be taken for 30 marks		
Other components		
Assignment – MCQ, Quiz, Group presentation	10	CO1, CO2, CO3, CO4 & CO5
Assignment – MCQ, Quiz, Group presentation	10	CO1, CO2, CO3, CO4 & CO5
Semester End Examination (SEE)	100	CO1, CO2, CO3, CO4, CO5