

E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002



B.E.Civil Engineering

Third Year – Fifth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1702CE501	Structural Analysis I	3	2	-	4	40	60	100
1702CE502	Concrete Structures I	3	-	-	3	40	60	100
1702CE503	Concrete Technology	3	-	-	3	40	60	100
1702CE504	Geotechnical Engineering II	3	-	-	3	40	60	100
1703CE001	Remote Sensing And GIS	3	-	-	3	40	60	100
1703CE006	Solid Waste Management	3	-	-	3	40	60	100
Laboratory Course								
1702CE551	Computer Aided Building And Drawing Lab	-	-	4	2	40	60	100
1702CE552	Survey Camp*	-	-	-	1	100	-	100
1702CE553	Mini Project I	-	-	2	1	100	-	100
1704GE551	Life Skills: Aptitude I	-	-	2	1	100	-	100

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1702CE501	STRUCTURAL ANALYSIS I	L	T	P	C
		3	2	0	4

PREREQUISITE:

Solid Mechanics II

Course Objectives:

1. To understand the concept of analysis of indeterminate structures.
2. To Understand the methods of analysis of indeterminate trusses for external loads, lack of fit and thermal effects and also the influence line concept for indeterminate structure.
3. To study behavior of arches, Settlement and temperature effects.

Unit I INDETERMINATE FRAMES 12 Hours

Degree of static and kinematic indeterminacies for plane frames – analysis of indeterminate pin-jointed frames (Degree of statical indeterminacy up to two) – Energy and consistent deformation methods.

Unit II SLOPE DEFLECTION METHOD 12 Hours

Analysis of continuous beams - sinking of supports – rigid frames (with and without sway)

Unit III MOMENT DISTRIBUTION METHOD 12 Hours

Distribution and carryover of moments – Stiffness and carry over factors - Analysis of continuous beams - sinking of supports – Rigid frames (with and without sway).

Unit IV ARCHES 12 Hours

Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged arches, parabolic and circular arches – Settlement and temperature effects.

Unit V INFLUENCE LINES FOR INDETERMINATE BEAMS 12 Hours

Muller Breslau's principle– Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one)

Further Reading:

- Leet, K. M. and Uang, C-M. (2003). Fundamentals of Structural Analysis, Tata McGraw-Hill Publishing Company Limited, New Delhi, ISBN 0-07-058208-4
- Norris, C. H., Wilbur, J. B. and Utku, S. (1991). Elementary Structural Analysis, Tata McGraw-Hill Publishing Company Limited, New Delhi, ISBN 0-07-058116-9

REFERENCES:

1. Vaidyanadhan, R and Perumal, P, "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Laxmi Publications Pvt. Ltd, New Delhi, 2003.
2. L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw Hill Publications, New Delhi, 6th Edition, 2003.
3. Punmia, B.C, Ashok Kumar Jain and Arun Kumar Jain, " Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2004
4. Reddy. C.S., "Basic Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2013.
5. Bhavai Katti, S.S, "Structural Analysis – Vol. 1 & Vol. 2", Vikas Publishing Pvt Ltd., New Delhi, 2008
6. Wang C.K. , "Indeterminate Structural Analysis", Tata McGraw Hill Education Pvt. Ltd. New Delhi, 2010
7. Devadas Menon, "Structural Analysis", Narosa Publishing House, 2008
8. Ghali, A., Nebille and Brown. T.G., "Structural Analysis - A unified classical and matrix approach" Sixth Edition, SPON press, New York, 2013.
9. Gambhir. M.L., "Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt.Ltd., New Delhi, 2011.

1702CE502

CONCRETE STRUCTURES I

L	T	P	C
3	0	0	3

PREREQUISITE:

Solid Mechanics II

COURSE OBJECTIVES:

1. To develop an understanding on the basic concepts in the behavior and design of reinforced concrete systems and elements using working stress method.
2. To introduce the basic concepts and steps in the design of beams and slabs mainly in accordance with Limit state method.
3. To underline the design principles of RC members for shear, bond, and torsion.
4. To introduce the concepts in the design of RC Column design.
5. To give the knowledge in the concept of RC footings.

UNIT I FUNDAMENTALS

9 Hours

Design philosophies - Working stress method - Ultimate load method - Limit state method - Characteristic strength - Characteristic load - Design values - Partial safety factors - Codal provisions - Practical aspects of design - Design of flexural members and slabs by working stress method.

UNIT II LIMIT STATE DESIGN FOR FLEXURE

9 Hours

Analysis and design of One way and two way slabs – Singly and doubly reinforced rectangular and flanged beams - Cantilever beams - Standard method of detailing of RC beams and slabs.

UNIT III LIMIT STATE DESIGN FOR BOND, ANCHORAGE, SHEAR AND TORSION

9 Hours

Behavior of RC members in bond and anchorage – Curtailment of reinforcement - Design requirements as per code provision – Behavior of RC beams in shear and torsion - Design of RC members for combined bending, shear and torsion.

UNIT IV LIMIT STATE DESIGN OF COLUMNS

9 Hours

Columns – Assumptions – Effective length – Classification – Design guidelines – Axially loaded short columns with lateral ties and helical reinforcement – Columns subjected to uni-axial bending and biaxial bending – Slender columns - Standard method of detailing of RC columns.

UNIT V LIMIT STATE DESIGN OF FOOTING

9 Hours

Introduction and selection of footing under different site conditions - Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Combined footing - Standard method of detailing of RC footing.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. students can be able to design whole elements in a building
2. students can be able to select suitable footing type

REFERENCES:

1. B. C Punmia, Ashok. Kumar Jain, Arun Kumar Jain “Limit State Design of Reinforced Concrete”, Laxmi Publications (P) Ltd, New Delhi 2007.
2. Unnikrishna Pillai, S., Devdas Menon, “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd., New Delhi 2003.
3. Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd., New Delhi 2002.
4. Varghese, P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India, Pvt. Ltd., New Delhi 2002
5. Krishna Raju, N., “Design of Reinforced Concrete Structures”, CBS Publishers & Distributors, New Delhi, 2003.

1702CE503

CONCRETE TECHNOLOGY

L	T	P	C
3	0	0	3

PREREQUISITE:

Building Materials And Management

COURSE OBJECTIVES:

- 1.To impart knowledge of building materials used in construction
- 2.To train in various test for fresh and hardened concrete
- 3.To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes

Unit I CONSTITUENT MATERIALS

9 Hours

Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements- Water- Quality of water for use in concrete.

Unit II CHEMICAL AND MINERAL ADMIXTURES

9 Hours

Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties

Unit III PROPORTIONING OF CONCRETE MIX

9 Hours

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples

Unit IV FRESH AND HARDENED PROPERTIES OF CONCRETE

9 Hours

Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS-Stress-strain curve for concrete-Determination of Young's Modulus

Unit V SPECIAL CONCRETES

12 Hours

Light weight concretes - High strength concrete - Fibre reinforced concrete – Ferro cement - Ready mix concrete - SIFCON-Shotcrete - High performance concrete- Geopolymer Concrete.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1.http://classes.engr.oregonstate.edu/cce/winter2012/ce492/Modules/03_materials/03-2_body.html

2.The effects of aggregates characteristics on the performance of Portland cement concrete, research report ICAR –104-1F, International Center for Aggregates Research (http://www.icar.utexas.edu/reports/301_1F/ICAR%20301-F.pdf)

REFERENCES:

1. Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2007
2. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
3. Gambir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New

1702CE504

GEOTECHNICAL ENGINEERING II

L	T	P	C
3	0	0	3

PREREQUISITE:

Geotechnical Engineering I

COURSE OBJECTIVES:

1. Familiarize the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
2. Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
3. Familiarize the student with the procedures used for : a) bearing capacity estimation, b) load carrying capacity of pile, c) determining earth pressure and e) concept on stability of slope.

UNIT I SOIL EXPLORATION AND SITE INVESTIGATION

9 Hours

Introduction – Planning and stages in sub-surface exploration – depth and spacing of exploration – Methods of exploration – Test pit – Trenches – Geophysical methods: Seismic refraction and Electrical resistivity method –Boring : Auger boring, Shell and Auger, Wash boring and Rotary drilling – Types of soil sample: disturbed and undisturbed soil samples – Features of sampler affecting soil disturbance – standard penetration test – static and dynamic cone penetration test – bore log report

UNIT II SHALLOW FOUNDATION AND BEARING CAPACITY

9 Hours

Introduction – Bearing capacity- definition – types of shear failure – Bearing capacity of shallow foundation on homogeneous deposits - Methods: Terzaghi's ,Skempton's and BIS methods – Effect of water table on bearing capacity – Plate load test – Bearing capacity from in-situ tests - SPT, SCPT and plate load test methods of improving bearing capacity of soil.

UNIT III FOOTING, RAFT AND SETTLEMENT OF FOUNDATION

9 Hours

Types of foundation – contact pressure distribution below isolated footing – types and proportioning of combined footing – types and application of mat foundation – floating foundation – Settlement: total and differential settlements – causes and methods of minimizing settlement

UNIT IV DEEP FOUNDATION

9 Hours

Capacity of single pile in cohesion less and cohesive soil – static formula – dynamic formulae (Engineering News and Hileys) – Capacity from in-situ tests (SPT and SCPT) – Negative skin friction – Carrying capacity of Pile group – Pile load test – Under-reamed piles – Introduction to well foundation and Diaphragm wall.

UNIT V EARTH PRESSURE AND STABILITY OF SLOPES

9 Hours

Earth pressure in soils: active and passive states – Lateral earth pressure Rankine's theory – stratified soil – Cullman's Graphical method –Slopes – Infinite and finite slopes – types of failure – causes of failure – Procedure for slip circle method and method of slices.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

To select suitable foundation for various soil condition.

REFERENCES:

1. Bowles .J.E, "Foundation analysis and design", McGraw Hill, 2001.
2. Murthy .V.N.S, "Textbook of Soil Mechanics and Foundation Engineering",CBS Publishers and Distributors, New Delhi, 2009.
3. Arora .K.R, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2011.
- 4.Punmia .B.C, "Soil Mechanics and Foundations Engineering", Laxmi Publications Pvt.Ltd. New Delhi, 2005.
- 5.Das .B.M, "Principles of Foundation Engineering" (Fifth edition), Thomson Books, 2010

1703CE001	REMOTE SENSING AND GIS	L	T	P	C
		3	0	0	3

PREREQUISITE:

Surveying II

COURSE OBJECTIVES:

1. To introduce the students to the basic concepts and principles of various components of remote sensing
2. To provide an exposure to GIS and its practical applications in civil engineering.
3. To learn the importance of monitoring and modeling using GIS

UNIT I EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL 9 Hours

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein's 74 Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT II PLATFORMS AND SENSORS 9 Hours

Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors.

UNIT III IMAGE INTERPRETATION AND ANALYSIS 9 Hours

Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9 Hours

Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non- spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

UNIT V DATA ENTRY, STORAGE AND ANALYSIS 9Hours

Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System. Monitoring and Modeling using GIS.

Total: 45 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

How to prepare data for GIS and RS

Civil engineering application for various fields

REFERENCES:

1. Lo. C.P. and A.K.W. Yeung, "Concepts and Techniques of Geographic Information Systems", Prentice Hall of India Pvt. Ltd., New Delhi, 2002
2. Peter A. Burrough, Rachael A. McDonnell, " Principles of GIS", Oxford University Press, 2000
3. Ian Heywood "An Introduction to GIS", Pearson Education Asia, 2000

1703CE006	SOLID WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

PREREQUISITE:

Environmental Science & Engineering

COURSE OBJECTIVES:

- To study the Sources and types of municipal solid wastes
- To impart the knowledge of On-site Processing, collection and transfer of solid waste.
- To acquire the knowledge of Off –site Processing and waste disposal management.

Unit I SOURCES AND TYPES OF MUNICIPAL SOLID WASTES 8 Hours

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes- characteristics – methods of sampling and characterization- Effects of improper disposal of solid wastes – public health effects- Principle of solid waste management – social & economic aspects - Public awareness- Role of NGOs- Legislation.

Unit II ON-SITE STORAGE & PROCESSING 8 Hours

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

Unit III COLLECTION AND TRANSFER 8 Hours

Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

Unit IV OFF-SITE PROCESSING 12 Hours

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

Unit V DISPOSAL 9 Hours

Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

Total: 45 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

- They can categorize the types of wastes
- They can choose the disposal units

REFERENCES:

Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000

R.E.Landreth and P.A.Rebers, Municipal Solid Wastes – problems and Solutions, Lewis Publishers, 1997.

Bhide A.D. and Sundaresan, B.B., Solid Waste Management in Developing Countries, INSDOC, 1993

1702CE551	COMPUTER AIDED BUILDING AND DRAWING LAB	L	T	P	C
		0	0	4	2

PREREQUISITE :

Engineering graphics

COURSE OBJECTIVES:

1. To develop skills in manual and AutoCAD drafting of building plans, elevation and sections
2. To understand the Functional Planning and architectural design of buildings and introduction to building physics.
3. To prepare detailed working drawing for doors, windows, etc.

LIST OF EXPERIMENTS:

1. Functional planning – Introduction to anthropometrics and ergonomics – Occupancy classification of Buildings –Essentials of National Building Code – Essentials of Building and development rules – Introduction to green building.
2. Building Physics : Sun's movement and building: Sun control devices –Exposed walls and Openings
3. Lighting and acoustics
4. Introduction to AutoCAD – Draw and modify tools- Dimensioning-Layers- Blocks-Printing- Two dimensional drawing 3D commands
5. Door, Windows, Ventilators.
6. Foundation, Staircase
7. Residential buildings – Plan, Section, Elevations
8. Public buildings like office, dispensary, post office, bank etc
9. Industrial buildings

TOTAL:45 HOURS

ADDITIONAL EXPERIMENTS/ INNOVATIVE EXPERIMENTS:

1. Commercial building like sky scrapers
2. Domed structures

REFERENCES:

1. Sikka V. B., A Course in Civil Engineering Drawing, 4th Edition, S.K. Kataria and Sons, 1998.
2. George Omura, "Mastering in AUTOCAD 2002", BPB Publications, 2002
3. Verma.B.P., "Civil Engineering Drawing and House Planning", Khanna Publishers, 1989.
4. A Guide to building information modeling for Owners, Managers, Designers, Engineers, and Contractors, John Wiley and Sons. Inc., 2008.
5. Marimuthu V.M., Murugesan R. and Padmini S., "Civil Engineering Drawing-I", Pratheeba Publishers, 2008.

1702CE552

SURVEY CAMP

L	T	P	C
0	0	4	1

PREREQUISITE :

Surveying I&II

COURSE OBJECTIVES:

1. Two weeks Survey Camp will be conducted during summer vacation in the following activities using Theodolite, cross staff, leveling staff, tapes, plane table and total station. The camp must involve work on a large area of not less than 400 hectares. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plots.

LIST OF EXPERIMENTS:

1. Triangulation
2. Trilateration
3. Rectangulation
4. Alignment of Road survey
5. Contouring (hill survey)

TOTAL : 45 HOURS

REFERENCES:

1. Kanetkar T.P., Surveying and Levelling, Vols. I and II, United Book Corporation, Pune, 1994
2. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992.
3. Punmia B.C. Surveying, Vols. I, II and III, Laxmi Publications, 1989

1702CE553

MINI PROJECT 1

0 0 2 1

Aim: To carry out a thematic design project in one of the specializations of civil Engineering

Course Objectives:

To carry out a project this will make the students aware of the different facets of civil engineering

List of areas

1. Structural Engineering
2. Geotechnical Engineering
3. Water Resources Engineering

Course outcomes:

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

Structural Engineering

1. Prepare a structural lay out from architectural drawings Calculation loads Design of representative structural elements like slab, beam, columns, foundation etc.
2. Carry out testing in Strength of materials / concrete / structural labs
3. Learn any software and solving a problem using that.

Geotechnical Engineering

1. Collect samples of soil and identification of their types Collection of literature on types of foundation Presentation of soil improvement techniques
2. Learn any software and solving a problem using that.

Water Resources And Environmental Engineering

1. Carry out population survey and working out water requirement. Preparation of a schematic diagram of water / wastewater treatment plants Assessment of quality of water / sewage by experiments Design of dock gates

1704GE551

LIFE SKILLS: APTITUDE – I

L	T	P	C
0	0	2	1

PREREQUISITE :

Technical English – I
Technical English – II

COURSE OBJECTIVES:

1. To brush up problem solving skill and to improve intellectual skill of the students
2. To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors
3. To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
4. To enhance analytical ability of students
5. To augment logical and critical thinking of Student

Unit I Introduction to Number System, Basic Shortcuts of addition, Multiplication, Division 6 Hours

Classification of numbers – Types of Numbers - Divisibility rules - Finding the units digit - Finding remainders in divisions involving higher powers - LCM and HCF Models - Fractions and Digits – Square, Square roots – Cube, Cube roots – Shortcuts of addition, multiplication, Division.

Unit II Ratio and proportion, Averages 6 Hours

Definition of Ratio - Properties of Ratios - Comparison of Ratios - Problems on Ratios - Compound Ratio - Problems on Proportion, Mean proportional and Continued Proportion Definition of Average - Rules of Average - Problems on Average - Problems on Weighted Average - Finding average using assumed mean method.

Unit III Percentages, Profit And Loss 6 Hours

Introduction Percentage - Converting a percentage into decimals - Converting a Decimal into a percentage - Percentage equivalent of fractions - Problems on percentages - Problems on Profit and Loss percentage- Relation between Cost Price and Selling price - Discount and Marked Price - Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling Price.

Unit IV Coding and decoding, Direction sense 6 Hours

Coding using same set of letters - Coding using different set of letters - Coding into a number - Problems on R-model - Solving problems by drawing the paths - Finding the net distance travelled - Finding the direction - Problems on clocks - Problems on shadows - Problems on direction sense using symbols and notations.

Unit V Number and letter series Number and Letter Analogies, Odd man out 6 Hours

Difference series - Product series - Squares series - Cubes series - Alternate series - Combination series - Miscellaneous series - Place values of letters - Definition of Analogy - Problems on number analogy - Problems on letter analogy - Problems on verbal analogy - Problems on number Odd man out - Problems on letter Odd man out - Problems on verbal Odd man out

Total: 30 Hours

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

REFERENCES:

1. Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, 'A modern approach to Logical reasoning', revised edition, S.Chand publication, 2017.
4. R S Agarwal, 'Quantitative Aptitude for Competitive Examinations' revised edition, S.Chand publication, 2017.
5. Rajesh Verma, "Fast Track Objective Arithmetic", 3rd edition, Arihant publication, 2018.
6. B.S. Sijwali and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihant publication, 2014.