Effective from Session: 2016							
Course Code	**DCE-401**	**Title of the Course**	**Soil mechanics and foundation Engineering**	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**03**	**01**	**00**	
Pre-Requisite	**DCE-401**	**Co-requisite**	NA				
Course Objectives	This course is aimed at teaching students to apply scientific and mathematical principles to solve problems related to soil and foundations. The courses also help students develop the skills and knowledge needed to design and construct foundations.						

Course Outcomes	
CO1	Understand the theory and practice of soil mechanics
CO2	Learn how to use modern equipment for soil mechanics and foundation engineering
CO3	Develop the ability to solve problems related to soil
CO4	Learn how to design foundations using systematic methods
CO5	Understand how soil behaves under different foundation types

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	**Introduction and engineering properties of soil**	**Definition of soil Mechanics and foundation** engineering. Soil formation - different kinds of soils and soil structures. Fundamental Definitions and their Relationships Graphical representation of soils as a three-phase system. Definitions of moisture content unit weight of soil mass such as bulk density, saturated density, submerged density and dry density, specific gravity, mass specific gravity, void ratio, porosity and degree of saturation, percentage air voids and their content, density index. Relationships between various terms stated above. Consistency limits Liquid limit, Plastic limit, Shrinkage limit, Plasticity index, Consistency index. Grain size analysis - Sieve and Hydrometer analysis, C.C. and C.U.	8	CO1
2	**Soil Classification and Permeability**	Particle size classification - M.I.T., and I.S., U.S. bureau of soils and U.S. P.R.A. Textural classification chart, brief description of plasticity chart. I.S. soil classification. Permeability of Soils Definition of Permeability. Interpretation of Darcy's law, definition of discharge, velocity and seepage velocity and coefficient of percolation. Factors affecting permeability. Laboratory methods of falling head and constant head, field methods of pumping-out and pumping-in tests.	10	CO2
3	**Soil Compaction**	Definition of Compaction. Standard & modified Proctor compaction test. Different methods of compaction. Factors affecting compaction. Brief description of field compaction methods. Compacting equipments and field control. Indian Standards. Consolidation Definition of consolidation and its importance on foundation settlement. Difference between consolidation and compaction.	6	CO3
4	**Shear Strength Earth Pressure**	Definition of shear strength. Definition of Cohesive & non cohesive soil with reference to c and O (phy) soil. Coulomb's equation. Shear box and unconfined compression tests. Earth Pressure and Retaining Structures Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall. Relation between movement of wall and earth pressure Ka and Kb by Rankin's Method. Simple earth pressure calculations without surcharge.	8	CO4
5	**Shallow and Deep Foundations**	Definitions of shallow and deep foundations Application of Terzaghi's bearing capacity formulae for different types of foundations. Factors affecting depth of shallow foundation Plate load test for shallow foundations Ground Improvement Techniques Concept of stabilization, materials used, advantages of lime & cement as stabilizing agents. Strength of stabilized soil. Deep compaction - Heavy tamping, Explosion, Grouting, Reinforcement. Soil Exploration and sampling Methods of exploration Types of soil samples and samplers	8	CO5

References Books:

1. "Public Health Engg. - S.K. Garg
2. "Public Health Engg. - Rangwala

e-Learning Source:

1. **https://archive.nptel.ac.in/courses/105/105/105105201/**

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3		1										
CO2	2	3			2			2						
CO3	2	3			2			2			2			
CO4	2	3		1	1	2								
CO5	2	3				1	1							

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2016							
Course Code	DCE-402	**Title of the Course**	CIVIL ENGINEERING DRAWING-I	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	
Pre-Requisite	DCE-402	**Co-requisite**	NA				
Course Objectives	1. To understand different types of Civil Engineering symbols. 2. To know about different measurement given by BIS.						

Course Outcomes	
CO1	Interpret conventional sign, symbols and working drawings of various Civil Engineering structures.
CO2	Prepare a detailed drawing for residential and public buildings.
CO3	Explain Building byelaws and Principles of Planning for residential and public buildings.
CO4	Use software to prepare detailed drawing of residential and public buildings.
CO5	To enable students to create detailed plans, cross-sections, and pipe joint drawings for water supply and sewerage systems.

UnitNo.	**Title of the Unit**		**Contact Hrs.**	**Mapped CO**
UNIT-I	**Symbol**	Symbols and conventions of materials and fittings used in Civil Engineering works Symbols & conventions of electrical fittings	4	CO-1
UNIT-II	**Foundations, Doors & Windows**	**Foundations, details** of a spread foundation for an external and internal masonry wall with basement showing necessary damp proofing arrangements. **Doors & Windows:**1. Doors: Elevation, sectional plan, sectional side Elevation of ledged braced and battened door, glazed door and flushed door with wire gauge shutter, partly Paneled and glazed door, fully paneled door. **Windows:**1. Elevation, sectional plan, sectional side elevation of fully glazed window and fully paneled window with Fan light 2. elevation, sectional plan and sectional side, elevation of a glazed steel window. Roofs: King post and Queen post roof trusses with roof Covering and support details on wall. Section through RCC and RB flat roof showing details regarding arrangements for water proofing, drainage and heat insulation Details Of reinforcement need not to be shown. **Floors:**1. Detailed cross section of the following types of Concrete flooring as per IS:2571-1970 (a) Concrete floor finish over ground floor (b)Terrazzo floor finish over ground floor (c) Concrete floor finish with structured slab (d)Terrazzo floor finish structured slab (e)Terrazzo little floor finish over ground.	10	CO-2
UNIT-III	**Building Plan-I**	Working drawing of a two roomed building with kitchen and bath having pitched roof. Working drawing of a three roomed building from a given line plan and given data.	10	CO-3
UNIT-IV	**Staircase**	Working drawing of a three bedroom double storied flat roofed residential building. Staircase: (a) Details of dog legged stairs (Wooden & RCC). b. Plans of remaining type of stairs. c. Details plan and section of an inspection chamber and manhole. d. Detailed plan and cross section of a domestic septic and soak pit for 10 users as per IS:2470Part I.	6	CO-4
UNIT-V	**Building Plan-II**	Detailed plan and cross section of bathroom, kitchen and W.C. connections. Detailed drawing of pipe joints commonly used in water supply and sewerage system. Two Room building working drawing with AutoCAD Three Room building working drawing with AutoCAD (Plate No. 14 & 15 should be prepared by AutoCAD Also)	10	CO-5

. References Books:

1. Civil Engineering Drawing" – Gurucharan Singh

e-Learning Source:

1. https://www.youtube.com/watch?v=qgWfNKK3bag&list=PLyTjtAH-y1X9EbNWlZsrVCDwVwzQiYmZs

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1		3						2		2	2	1	
CO2		3					2				3		2
CO3		3					2				3	1	
CO4		3					2	2		3			3
CO5		3					2	1			2		2

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2016							
Course Code	DCE-403	**Title of the Course**	SURVEYING-I	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	
Pre-Requisite	DCE-403	**Co-requisite**	NA				
Course Objectives	1. Students will gain knowledge of various surveying methods, including chain, compass surveying, and leveling. 2. Insight in Using Surveying Instruments.						

Course Outcomes	
CO1	Handle various survey instruments for a particular survey work.
CO2	Carryout various Civil Engineering survey works.
CO3	Collect and analyze survey data for preparing drawings and maps.
CO4	Do different methods and their procedure for levelling.
CO5	Students will learn the principles, construction, and practical applications of minor surveying instruments such as Abney's level etc

UnitNo.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT-I	**Surveying**	Concept of surveying, purpose of surveying, Measurements linear and angular, units of measurement, instruments used for taking these measurements. Classification of survey based on instruments. Basic principles of surveying.	6	CO-1
UNIT-II	**Chain Surveying**	Purpose of chain surveying, Principles of chain surveying. Equipment used in chain surveying Viz. chains, tapes, ranging rods, arrows, pegs, cross staffs, Indian optical square their construction and uses. Different operations in chain surveying: Ranging (direct/indirect), offset (perpendicular/oblique), chaining (flat and sloping ground), conducting chain survey over an area. Recording the field data, plotting the chain survey, conventional sign. Obstacles in chain surveying. (a) Errors in chain surveying. (b) Correction for erroneous length of chain, simple problems. Testing and adjustment of chain.	8	CO-1 CO-2
UNIT-III	**Compass Surveying**	Purpose of compass surveying. Construction and working of prismatic compass. Use of prismatic Compass, Method of setting and taking observations. Concept of following:(a) Meridian - Magnetic, true and arbitrary. (b) Bearing- Magnetic, true and arbitrary. (c) Whole circle bearing and reduced Bearing, (d) Fore and back bearing. (e) Magnetic dip and declination Local attraction-causes, detection, errors and correction. Problems on local attraction, magnetic declination and calculation of included angles in a compass traverse. Concept of a traverse-Open and closed traverse. Traversing with a prismatic compass. Checks for an open and closed Traverse. Plotting of a traverse - By included and deflection angles. Concept of closing error. Adjustment of Traverse graphically by proportionate method. Errors in compass surveying. Testing and adjustment of a prismatic compass. Use of surveyor's compass and its construction details, comparison with prismatic compass.	8	CO-3
UNIT-IV	**Levelling**	Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and benchmarks. Principle and construction of dumpy, I.O.P. (tilting) levels. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Levelling staff (i) single piece (ii) folding (iii) sop with (iv) invar precision staff. Temporary adjustment: setting up and levelling, adjusting for parallax of Dumpy and I.O.P. level. Differential levelling, concept of back sight, fore sight, intermediate sight, station, change point, height of instrument. Level book and reduction of levels by (a) Height of collimation method and (b) Rise and fall method. Arithmetical checks. Problem on reduction of levels. Fly levelling, check levelling and profile levelling (L-section and X-section) Errors in levelling, and precautions to minimize them and permissible limits. Reciprocal levelling. Difficulties in levelling. Concept of curvature and Refraction. Testing and adjustment of dumpy and IOP level. Numerical problems.	10	CO-4
UNIT-V	**Minor Instruments**	**Minor Instruments:** Principal construction and uses of the following minor instruments: (a) Abney's level (b) Tangent clinometer (c) Ceylone Ghat Tracer(d) Pentagraph (e) Planimeter	8	CO-5

References Books:

1. "Surveying" Vol. I & II – Arora R. – Khanna Pub., Delhi
2. "Surveying" Vol. I & II – Arora K.P. – Standard Book House, Delhi
3. "Surveying" Vol. I & II. –B.C. Punmia

e-Learning Source:

1. https://www.youtube.com/watch?v=Uh7LMnqcgLg&list=PLCYhGkOwO39hxuhBKcH3Q3XoE7TqzFyAb
2. https://www.youtube.com/watch?v=p1SUNySoWhE&pp=ygUfQ29tcGFzcyBzdXJ2ZXlpbmcgYW5kIExldmVsbGluZw%3D%3D
3. https://www.youtube.com/watch?v=rmdxOaQ5wqE&pp=ygUdbWlub3IgaW5zdHJ1bWVudCBpbiBzdXJ2ZXlpbmc%3D

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1		2						2		2			2
CO2		3					2					2	
CO3		3					2	2					3
CO4		3					2	1		3		1	
CO5		3					2	2					2

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2016							
Course Code	DCE-404	**Title of the Course**	PUBLIC HEALTH ENGINEERING-II	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	
Pre-Requisite	DCE-404	**Co-requisite**	NA				
Course Objectives	1. To understand different types of sewage disposal and different types of sewers and lying of sewer and their joint. 2. To understand about rural sanitation and sewage composition and different terms associated with sewage disposal.						

Course Outcomes	
CO1	To know the basic knowledge about wastewater.
CO2	To know different techniques for treatment of wastewater.
CO3	To know the sanitation system and disposal of the sewage.
CO4	To know about drains and sewer sections.
CO5	Understanding of Sewage Composition, Characteristics and principles of sewage treatment

UnitNo.	**Title of the Unit**		**Contact Hrs.**	**Mapped CO**
UNIT-I	**Waste and Sewage**	**Waste:** Dry, semiliquid, liquid, Necessity of systematic collection and disposal of waste. Brief description of Sewage disposal system. Conservancy and water carriage system, their advantages and disadvantages. **Quantity of Sewage:** Sewage: Domestic, industrial and storm water. Volume of domestic sewage (DWF), variability of flow, limiting velocities in sewers. Use of table as per I: S 1742-1983 to determine relationship between gradient, diameter, discharge and velocity.	8	CO-1
UNIT-II	**Sewerage Systems**	**Types of sewerage systems**: separate, combined and partially separate. Sewers: Stone ware, cast iron, concrete and masonry sewers their sizes and joints. Appurtenances: (Location, function and construction) manholes, drop manhole, lamp hole catch basin, inverted syphon, flushing tanks, ventilating shafts and storm water flows. Laying of sewers: Setting out alignment of sewer. Excavation, checking the gradient with the help of boning rods, preparation of bedding, handling, lowering, laying and jointing, testing and backfilling. Construction of surface drains and different sections required.	8	CO-2 CO-3
UNIT-III	**Building Drainage**	Aims of building drainage and its requirements. General layout of sanitary fittings and house drainage arrangement for a building (single and multistoried) as per IS 1742-1983. Different sanitary fittings and their Installation. Traps, seal in traps, causes of breaking of seal, precautions taken, Gulley, Intercepting and Grease traps. Testing of house drainage.	8	CO-3
UNIT-IV	**Rural Sanitation**	**Drainage:** Topography, alignment of lanes and bye lanes, storm water, natural passage, development of drains, alignment, size and gradient. Phase Programme. Disposal of night soil and village latrines: Collection and disposal of garbage and refuse. Septic tanks, chess pools/soak pit (design of septic tank, soak pit/cess pools), privy pit and bore hole latrines. Biogas plant, constructional details, uses and maintenance. Guidelines for future development of village. Maintenance: Inspection of mains, cleaning and flushing of sewers. Precautions during cleaning, maintenance of traps, cleaning of house drainage line. Tools and equipment needed for maintenance	6	CO-4
UNIT-V	**Sewage Disposal**	**Sewage Disposal**: General composition of sewage, importance & method of determination of O.D., B.O.D. and C.O.D. Disposal methods. Land disposal, disposal by dilution and disposal in sea. Merits and demerits. Nuisance due to disposal, self-purification of streams, conditions of disposal. **Sewage Treatment**: Meaning and principle of primary and secondary treatment, constructional details of screening chamber, grit chamber, clarifier, trickling filters, secondary clarifiers/aeration tank. Sludge treatment, sludge digestion, sludge drying; sludge disposal. Oxidation ponds.	10	CO-5

References Books:

1. Public Health Engg. – S.K. Garg
2. Public Health Engg. - Rangwal

e-Learning Source:

1. https://www.youtube.com/watch?v=MsrmjuwV7SY&pp=ygUjZGlmZnJlbnQgVHlwZXMgb2Ygd2FzdGUgYW5kIHNld2FnZSA%3D
2. https://www.youtube.com/watch?v=mpmiimIgUoM&list=PLZvSSwzLFnRBBIe04q7rB2NSKSk4roAHU
3. https://www.youtube.com/watch?v=w3b62C8EAVY&pp=ygU8ZGlmZnJlbnQgbWV0aG9kcyBvZiBzZXdnZSB0cmVhdG1lbnQgYW5kIHNld2VyIGFwcHVydGVuYW5jZXMg

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1		2	3	2	3		2	2	2		1	
CO2	2			3	2	3	2	2	2	2		2	2
CO3	1		2	3	2	3	2	2	2	2		1	
CO4	2		2	3	2	3	2	2	2	2			3
CO5		2	2	3	2	3		2	2	2			2

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2016							
Course Code	DCE-405	**Title of the Course**	BUILDING CONSTRUCTION AND MAINTENANCE ENGG.-II	**L**	**T**	**P**	**C**
Year	III	**Semester**	VI	**3**	**1**	**0**	**-**
Pre-Requisite	DCE-405	**Co-requisite**	NA				
Course Objectives	To develop the knowledge of construction.						

Course Outcomes	
CO1	Students are able to understand the property, use, advantage and disadvantage of different material used in construction.
CO2	Identify the components of building and differentiate various types of building materials depending on its function.
CO3	Students are able to understand construction procedure of different components.
CO4	Students will Learn Details and Structure of all Parts and Components of the Building.
CO5	To be able to understand the responsibilities of engineer in civil engineering projects

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT - I	**Damp Proofing**	Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance. Damage to heat insulating materials, Damage to stored articles and health. Types of dampness-moisture penetrating the building from outside e.g. rainwater, surface Water, ground moisture. Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering work etc. Moisture which originates in the building itself i.e. water in kitchen and bath rooms etc. Damp proofing materials and their specifications rich concrete and mortar, bitumen, bitumen mastic. Methods of damp proofing basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, W.C. & Kitchen, Damp Proofing for roofs and window sills. Plinth Protection and Aprons..	8	CO-1
UNIT - II	**Floors & Roofs**	**Ground floors:** Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose. Types of floor finishes-cast in situ concrete flooring (monolithic, bonded) Terrazzo tile flooring. Terrazzo flooring, Timber flooring. Description with sketches of the methods of construction of the floors and their specifications. Floor polishing equipment. **Upper floors:** Flooring on RCC Slab. Flooring on R.B. Slab. Glossary of terms for pitched roofs-batten, eaves, barge, facial board, gable hip, lap, purlin, rafter, rag bolt, valley, ridge. Pitched roof, steel trusses, fink truss, arched trusses, and North light truss. Roof coverings for pitched Roofs-Asbestos sheeting, big six, Trafford sheets, Mangalore tiles, method of arranging and fixing to the battens, rafters, purlins-both steel and wooden. Drainage arrangement for pitched roofs. Concept of Flat roofs, RCC, RB, Coffer & folded slabs. Drainage arrangements for flat roofs.	8	CO-2
UNIT - III	**Stairs and staircase**	Glossary of terms: Stair case winders landing, strings, newel, baluster, riser, tread, width of staircase, hand rail, nosing. Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc. Various types of layout-straight flight, dog legged, open well, quarter turn, half turn, (Newel and geometrical staircase). Bifurcated stair, spiral stair.	6	CO-3
UNIT -IV	**Surface Finishes**	Plastering-Classification according to use and finishes like grit finish, rough cast, pebble dashed, plain plaster etc. Dubbing, Proportion of mortars used for different plasters, preparation of mortars, techniques of plastering and curing. Pointing-Different types of pointing, mortar used and method of pointing. Painting-preparation and application of paints on wooden, steel and plastered wall surfaces. White washing, color washing and distempering. Application of cement and plastic paints. Commonly used water repellants for exterior surfaces, their names and application. Ventilation and Air Conditioning Natural and Artificial Ventilation. Requirements of comfort conditions, temperature control, mechanical ventilation, plenum system, exhaust system, air filter of different types, and principle of Air Conditioning Plant (no construction detail). Fire Fighting Causes of fire, spread of fire, firefighting equipment and different method of firefighting, sprinklers, fire regulations & requirement. Fire insurance. Indian Standard.	8	CO-4
UNIT -V	**Principles of Maintenance**	Definition, of maintenance, decay and deterioration of building/building components. Sources and causes of deterioration and decay in building. Factors influencing the decision to carry out maintenance of building. Maintenance Practice Defects, causes and repairs in structural elements of buildings such as (i) Foundation (ii) Walls (iii) Floors (iv) Roof (v) Components such a doors, windows and ventilators etc.	10	CO-5

References Books:

1.Building Construction" – B.C. Punmia

e-Learning Source:

1. **https://youtu.be/g7_hFWwdw6c?si=IpavYu2B8tgc9HJo**

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	2	-	-	-	1	-	-	-	3	-
CO2	-	2	2	-	3	1	-	-	-	-	-	2	-
CO3	1	2	3	-	-	2	-	1	-	-	-	-	3
CO4	3	3	-	-	-	-	-	-	3	1	-	-	1
CO5	2	-	2	-	-	-	-	-	3	3	2	-	2

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD

Effective from Session: 2016							
Course Code	DCE-406	**Title of the Course**	CONCRETE TECHNOLOGY-II	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**3**	**1**	**0**	
Pre-Requisite	DCE-406	**Co-requisite**	NA				
Course Objectives	To provide foundational knowledge and practical insights into the design, materials, and operations of formwork and concrete practices. The course emphasizes the significance of quality control, precautions during construction, and specialized techniques for handling, curing, and maintaining concrete under varying environmental conditions.						

Course Outcomes	
CO1	Know the Basic properties of ingredients of concrete.
CO2	Know about the workability and strength of Concrete.
CO3	Know the different types of concrete mix design.
CO4	Know about the concreting techniques.

UnitNo.	Title of the Unit		Contact Hrs.	Mapped CO
UNIT-I	**Form Work**	Form Work: Concept of factors affecting the design of form work (shuttering and staging) Materials used for form work. Sketches of form work for column, beams slabs. Stripping time for form work as per IS (No problems on the design of form work). Removal of formwork.	6	CO-1
UNIT-II	**Cement, aggregate, & Batching**	Precautions to be taken before, during and after RCC Construction. (vii) Special type of formwork Concrete Operations: Storing Cement: Storing of cement in the warehouse. Storing of cement at site. Effect of storage on strength of cement. Aggregate: Storing of aggregate on site for maintaining uniformity of moisture and cleanliness. Batching: Batching of cement. Batching of aggregate: Batching by volume, using gauge box, selection of proper gauge box, Batching by weight-spring balances and by batching machines. Measurement of water. Mixing Hand mixing Machine mixing-types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers, mixing of water. Maintenance and care of machines. Transportation of Concrete: Transportation with and situations of use of the following- pans, wheele barrows, truck mixers, chutes, belt conveyors, pumps, tower cranes. Placement of Concrete: Prior preparation before placement; when put on natural soil, rocky base, specially prepared sub-base (brick soling and water bound macadam base), hardened concrete base, checking of form work, checking provision for joints. (b) Placement of concrete precautions to be taken. (vi) Compaction: (a) Hand compaction-pavement, narrow and deep members. (b) Machine compaction-types of vibrators (internal screed vibrators and form vibrators) Method of handling screed vibratiors and immersion vibratiors. Suitability of concrete mixes for compaction with vibrators. Selection of suitable vibrators for various situations. (vii) Finishing concrete slabs-screeding, floating, and trowelling. (viii) Curing Object of curing, Method of curing, shading concrete works, covering surfaces with hessian, gunny bags, sprinkling of water, ponding method and membrane curing, steam curing. Recommended duration for curing. (ix) Jointing Location of construction joints, treatment of construction joint before the concrete is poured, concreting at these joints. Expansion joints in concrete in buildings-their importance and location.	14	CO-2
UNIT-III	**Properties of Concrete**	Properties of Concrete: (i) Properties in plastic stage: (a) Workability (b) Segregation. (c) Bleeding. (ii) Properties of hardened concrete: (a) Strength. Characteristic strength (b) Durability Impermeability. Dimensional changes. (iii) Admixture (uses and effect) Accelerators and retarders. Air entraining agents. Water reduces and set controlling agents.	6	CO-3
UNIT-IV	**Quality Control at site**	Quality Control at site: Control tests on cement, aggregate water and concrete. Concept of quality control. Hot Weather Concreting: Effect of high temperature on concrete strength with reference to mass concreting, cooling of concrete materials, precautions before, during and after concreting, Use of retarders. Cold Weather Concreting: Effect of low temperature on concrete strength, Heating of concrete materials. Precaution before, during and after concrete. Use of accelerators	8	CO-1
UNIT-V	**Repair and Maintenance**	Repair and Maintenance Method of repairing by grouting new and old concrete work for cracks and holes. Repairs underwater. Special types of concrete General idea of special types of concrete, High strength concrete, fiber reinforced concrete, polymer concrete, and ferrocement concrete. ready-mix concrete.	6	CO-2

References Books:

1. "Concrete Technology" Theory & Practice – Shetty M.S. – S. Chand & Co. Ltd.

e-Learning Source:

1. https://www.youtube.com/watch?v=cx5gPKp9QEc&list=PLbMVogVj5nJQU7M0LdA77p_XaaWBJniNc

PO-PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 14	PSO 1	PSO 2	PSO 3
CO1		3		2		2			1		2				
CO2	2	3			1				2		2		1		2
CO3	2	3	2						1		2			2	
CO4		3	2	1	1	2					2				3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2016							
Course Code	DCE-451	**Title of the Course**	Soil Mechanics Lab	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**0**	**0**	**3**	
Pre-Requisite	DCE-451	**Co-requisite**	NA				
Course Objectives	The objective of a Soil Mechanics lab course is to equip students with practical knowledge and skills to determine the physical and engineering properties of soils for geotechnical analysis and design.						

Course Outcomes	
CO1	Determination of moisture content and specific gravity of soil particles by different method.
CO2	Determination of soil particles size and its liquid limit and plastic limit.
CO3	Analysis of Shear strength of sand by Shear test.
CO4	Experiment related to civil engineering materials using different tools and their application

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Experiment No.1	Determination of moisture content by oven drying method	3	CO1
2	Experiment No.2	Determination of specific gravity of soil particles by specific gravity bottle/pycnometer	3	CO1
3	Experiment No.3	Determination of soil particles size distribution by sieving	3	CO1
4	Experiment No.4	Determination of liquid limit and plastic limit of soil	3	CO2
5	Experiment No.5	Determination of permeability by constant Head Permeameter and falling head permeameter.	3	CO2
6	Experiment No.6	Shear strength of sand by Direct Shear test.	3	CO3
7	Experiment No.7	Unconfined compression test	3	CO3
8	Experiment No.8	Standard Proctor compaction text.	3	CO3
9	Experiment No.9	Determination of field density of soil by sand replacement and core cutter methods.	3	CO4
10	Experiment No.10	Demonstration of Standard Penetration Test.	3	CO4

References Books:

1. Lab Manual

e-Learning Source:

1. https://youtu.be/hNNilk-OKaw?si=xxzuMZYFLkoa-T_4

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2			3					1	2		1	
CO2	1			3					3	2	3		
CO3	2			2					1	3	3		1
CO4	2			3					1	3			2

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**

Effective from Session: 2016							
Course Code	DCE-453	**Title of the Course**	Surveying – I Lab	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**0**	**0**	**3**	
Pre-Requisite	DCE-453	**Co-requisite**	NA				
Course Objectives	The objective of the Survey Lab is to equip students with practical skills and knowledge in the use of modern surveying instruments and techniques.						

Course Outcomes	
CO1	Measuring angles between the lines meeting at a point by prismatic compass.
CO2	To find the difference of level between two distant points by taking staff readings on different stations from the single setting.
CO3	To find the difference of level between two points by taking at least four change points.
CO4	Taking offsets and setting out right angles with cross staff and Indian optical square.

Unit No.	Title of the Unit		Contact Hrs.	Mapped CO
1	Experiment No.1	**Chain Surveying** (a) Ranging a line. (b) Chaining a line and recording in the field book. (c) Testing and adjustment of chain.	3	CO5
2	Experiment No.2	(a) Chaining of a line involving reciprocal ranging. (b)Taking offsets and setting out right angles with cross staff and Indian optical square.	3	CO1
3	Experiment No.3	Chain survey of a small area.	3	CO1
4	Experiment No.4	Chaining a line involving obstacles in ranging.	3	CO2
5	Experiment No.5	**Compass Survey** (a) Setting the compass and taking observations. (b) Measuring angles between the lines meeting at a point by prismatic compass.	3	CO2
6	Experiment No.6	Traversing with the prismatic compass and chain of a closed traverse. (Recording and plotting by included angles) Plate II. Setting a regular Pentagon of given side & bearing	3	CO3
7	Experiment No.7	Traversing with the Prismatic compass and chain of a closed and open traverse (Recording And plotting by deflection angles) .	3	CO3
8	Experiment No.8	Determination of local attraction at a station by taking fore and back bearing.	3	CO3
9	Experiment No.9	To find true bearing of a line at a place.	3	CO3
10	Experiment No.10	**Levelling:** To find the difference of level between two distant points by taking staff readings on different stations from the single setting	3	CO3
11	Experiment No.11	To find the difference of level between two points by taking at least four change points.	3	CO4
12	Experiment No.12	Longitudinal sectioning of a road.	3	CO4
13	Experiment No.13	Cross-sectioning of a road.	3	CO4
14	Experiment No.14	Setting a gradient by IOP level	3	CO4
15	Experiment No.15	**Minor Instrument:** Setting and checking grades with Abney's level. Setting and checking grades with Ceylone Ghat Tracer	3	CO5
16	Experiment No.16	1Finding heights by Indian Pattern Clinometer (Tangent Clinometer)	3	CO5
17	Experiment No.17	Use of plani-meter for computing areas.	3	CO5
18	Experiment No.18	Enlargement/ reduction of a plan by the use of pentagraph.	3	CO5

References Books:

1. Lab Manual

e-Learning Source:

1. https://youtu.be/Ik7wKksW11k?si=pgTddNv7-UKhx5ZO

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2			3					2	1				
CO2	1			3		1						1		2
CO3	2			2	2				3		1		2	
CO4	2			3		1		3				2		3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD

Effective from Session: 2016							
Course Code	DCE-454	**Title of the Course**	Public Health Engineering Lab	**L**	**T**	**P**	**C**
Year	II	**Semester**	IV	**0**	**0**	**3**	
Pre-Requisite	DCE-454	**Co-requisite**	NA				
Course Objectives	The objective of the Soil Mechanics Lab is to provide students with practical knowledge and hands-on experience in determining the physical and engineering properties of soils.						

Course Outcomes	
CO1	To impart students with strong knowledge of water drinking standards for public health.
CO2	Analyze various physio-chemical and biological parameters of water in case of quality requirements.
CO3	At the end of the course students will be able to assess complete water quality assessment for EIA &domestic supplies.
CO4	Students will suggest various types of treatment methods required to purify raw water with different contaminants.

Unit No.	**Title of the Unit**		**Contact Hrs.**	**Mapped CO**
1	Experiment No.1	To determine pH value of water sample.	3	CO1
2	Experiment No.2	To determine dissolved and suspended solids in water.	3	CO1
3	Experiment No.3	To determine turbidity of water.	3	CO1
4	Experiment No.4	To calculate Oxygen Demand (OD), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD)	3	CO2
5	Experiment No.5	To determine residual chlorine in water sample.	3	CO2
6	Experiment No.6	To perform Jar Test for Coagulants.	3	CO3
7	Experiment No.7	To collect samples of water from shallow & deep wells.	3	CO3
8	Experiment No.8	To perform chlorine demand test.	3	CO3
9	Experiment No.9	To determine the hardness of water.	3	CO4
10	Experiment No.10	To determine available chlorine in bleaching powder.	3	CO4
11.	Experiment No.11	To perform field test for the detection of intermediate pollution in drinking water by OT test.	3	CO2
12.	Experiment No.12	To visit and write specific report for the following. (Any three) a. Water treatment plant for moderate town (say Population 1lacs) b. Sewage treatment plant for 5 lac to 10 lac population c. Sewage disposal work d. Construction site for layout of water supply & sewerage system. e. Industrial effluent treatment plant	3	CO4

References Books:

1. Lab Manual

e-Learning Source:

1. https://youtu.be/tnff9TANWbM?si=hW7nie_iYPTIKwWD

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1		1	1	3	3	3	1	3	1	1	3			
CO2		1	1	3	2	3	1	3	1	1	3	1		2
CO3		1	1	3	3	3	1	2	1	1	3		2	
CO4		1	1	3	3	3	1	3	2	1	3	2		3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	**Sign & Seal of HoD**