Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

Program: Civil Engineering

Syllabus for
Semester III and IV of B. Tech
(W.E.F. AY 2017-18)

Government College of Engineering Karad
Second Year B. Tech.
CE301: Engineering Mathematics-III

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4+1 = 5	**TA**	10
		ESE	60

Course Objectives:

1. The basic necessity is to study Mathematical methodologies and models.
2. To develop mathematical skills and enhance logical thinking power of students.
3. To solve differential equations and their applications.
4. To enhance the knowledge of numerical methods in engineering applications.
5. To learn vector calculus this would enable students to find engineering solutions for given situations.
6. To understand calculus of complex functions in civil engineering.

Course Contents

		Hours
Unit I	**Linear Differential Equations** Linear Differential Equations with constant coefficients, definition, Complementary function and Particular integral, method of variation of Parameters, Homogeneous differential equations, Applications of Linear Differential Equations with constant coefficients: Cantilever, Strut and Beam.	**8**
Unit II	**Series Solution of Differential Equations and Special Functions** Series solution when x = 0 is an ordinary point. Frobenius method, Bessel's equation. Recurrence formulae for$J_n(x)$ Generating Function for $J_n(x)$. Equations reducible to Bessel's equation. Orthogonality of Bessel function; Legendre's equation, Generating function for$P_n(x)$. Recurrence formulae for $P_n(x)$. Rodrigues's formula,	**8**
Unit III	**Partial Differential Equations and its Application** Solution of partial differential equations, Linear equation of the first order, Homogeneous linear equations with constant coefficients, Rules for finding complementary function and particular integral, Non-homogeneous linear equation, Application of Partial differential equations, The method of separation of variables, The Wave Equation. Fourier Series solution of wave equation. One dimensional heat flow equation, Fourier Series solution of heat equation, The Laplace equation in two dimensional heat flow (Steady State).	**9**

Unit IV **Numerical Methods** **9**

Numerical differentiation: using Newton's forward, backward interpolation formulae, Stirling's formula, Interpolation with unequal intervals, Lagrange's formula, Newton's divided difference formula,
Numerical Integration: Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rule, Weddle's rule.

Unit V **Calculus of Complex Functions** **8**

Functions of complex variable, Analytic function, necessary and sufficient conditions for f (z) to be analytic (without proof), Cauchy-Riemann equations in polar coordinates. Milne- Thomson method to determine analytic function f (z). Harmonic function, Complex integration, Cauchy's theorem and Cauchy's integral formula (without proof)

Unit VI **Vector Calculus** **8**

Differentiation of vectors, Gradient of scalar point function and Directional derivative, Divergence of vector point function and Solenoidal vector fields. Curl of a vector point function and Irrotational vectors.

Course Outcome (CO):

1 Students will understand Mathematical methodologies and models.
2 Students will be able to develop mathematical skills and enhance logical thinking power of students.
3 Students will be able to solve differential equations and their applications.
4 Students will be able to enhance the knowledge of numerical methods in engineering applications.
5 Students will be able to learnvector calculus this would enable students to find engineering solutions for given situations.
6 Students will be able to understand calculus of complex functions in engineering.

Text Books:

1 A Text Book of Applied Mathematics (Vol. I & II) by P.N. Wartikar and J.N.Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2 Advanced Engineering Mathematics (8^{th} Edition) by Erwin Kreyszing, Wiley Eastern Ltd. Mumbai.
3 Advanced Engineering Mathematics by Peter O Neil Cengage Publications
4 Advanced Engineering Mathematics by Merle C Potter Oxford University Press

References:

1. Higher Engineering Mathematics by B.S.Grewal, Khanna Publication, New Delhi. (Edition 2011)
2. Higher Engineering Mathematics by H.K. Dass &Er. Rajnish Verma (2^{nd} revised edition 2012) S.Chand Publication, New Delhi.
3. Higher Engineering Mathematics by B.V.Ramana, Tata McGraw-Hill Publishers, New Delhi.
4. A Text Book of Engineering Mathematics, By Bali & Goyal (8^{th} Edition) ,Laxmi Publication, New Delhi.
5. Mathematical Methods of Science and Engineering (Aided with MATLAB) by Kanti B. Datta, Centage Learning.

Useful Links:

1. http://www.nptel.iitm.ac.in
2. www.ocw.mit.edu

Mapping of CO and PO

Course Outcomes	Program Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
1	√	√	√	√		√		√	√	√	√
2	√	√	√	√	√	√	√	√	√	√	√
3	√	√	√	√	√	√	√	√	√	√	√
4	√	√	√	√		√		√		√	√
5	√	√	√	√		√		√		√	√
6	√	√	√	√		√		√		√	√

Government College of Engineering Karad.
Second Year B. Tech
CE302: Strength of Materials

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	3+1 =4	**TA**	10
		ESE	60

Course Objectives:

1. Student will able to understand the effect of external action on elastic body.
2. Student will understand the different engineering properties of the materials.
3. Student will able to analyse the stress, strain and deformation of elastic bodies under external actions.
4. Student will able to compute design forces.

Course Contents

		Hours
Unit I	Engineering properties of different materials, St.Venant's principle, simple stress and strain, Hooke's law, elastic behaviour of the body under external actions , composite sections under axial loading, temperature stresses , elastic constants , normal stresses and strains in three dimensions .	**9**
Unit II	Analysis of statically determinate beams shear force and bending moment diagrams, virtual work approach for computation of shear force and bending moment.	**9**
Unit III	Analysis of circular shafts subjected to torsion, power transmitted. Analysis of thin walled cylinders.	**7**
Unit IV	Theory of Simple Bending,Bending Stresses in beams,Pure Bending, Application of flexure Formula, Composite Beam or Flitched Beam.	**8**
Unit V	Shear stress distribution in beams, Maximum Shear Stress, Average Shear Stress, Shear Stress Distribution Diagrams for various beam cross sections.	**7**
Unit VI	Strain energy due to different types of actions, impact loading. Strain energy method for deflection of determinate beams and trusses	**8**

Course Outcome (CO):

1 Student understands the response of elastic body for external actions
2 The different engineering properties and behaviour of the materials are understood by the student.
3 Student computes the design forces.

Text Books:

1 Mechanics of Structure" (Vol. I and II) - Junnarkar S.B. and Advi, Charotar Publication.
2 Strength of Materials - Bhavikatti S.S., New Age Publications.
3 Strength of Materials- R.K.Rajput., S.Chand Publications.
4 Strength of Materials – Suchita. Hirde, EP Publications
5 Strength of Materials" -S Ramamrutham, DhanapatRai Publications.
6 Strength of Materials" R.K.Bansal., Laxmi Publications.
7 Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli.

References:

1 Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
2 Mechanics of Material" –F. Beer and R. Johnston, Mc-Graw Hill, Higher Education.
3 Mechanics of Material, SI version- Timothy A. Philpot. Wiley publication.
4 Mechanics of Materials, R. C. Hibbeler, Pearson Prentice Hall

Useful Links:

1 http://www.nptel.iitm.ac.in
2 www.ocw.mit.edu

Mapping of CO and PO

Course Outcomes	Program Outcomes										
	a	b	C	d	e	F	g	H	i	j	k
1	√	√	√	√		√		√		√	√
2	√	√	√	√		√		√		√	√
3	√	√	√	√		√		√		√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE303: Building Construction and Technology

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	3+1 = 4	**TA**	10
		ESE	60

Course Objectives:

1. To study properties and suitability of various building materials
2. To study and draw the different building components.
3. To Study planning and designing of buildings as per SP-7
4. To Study various building services and their designing.

Course Contents

		Hours
Unit I	**Engineering properties and use of building materials**	**6**

Stones – Requirements of good building stone, uses of building stones.

Bricks – Manufacturing, Types (clay bricks, fly ash, cellular light weight concrete brick, aerated cement concrete brick or autoclave brick) and Engineering Properties.

Aggregates - Fine Aggregates and coarse aggregates - Origin, types, particle size and shape, mechanical and physical properties, artificial sand.

Timber – Natural and Artificial wood and their application in Civil Engineering.

Steel – Standard structural sections, steel as reinforcement. High Yield Strength Steel and high tensile steel, uses of steel in Building Construction.

Cement- types. Tiles - Ceramic, Vitrified, Natural Stone, Paving Blocks etc.

Miscellaneous – Aluminum, Glass, Plastic, Admixtures: chemical (plasticizer and super plasticizers), Minerals (fly ash, micro-silica).

Unit II **Components of Building and Techniques-I** **9**

Basic requirements of a building as a whole: strength and stability, Dimensional stability, comfort and convenience, damp prevention, water-proofing techniques, heat insulation, day lighting and ventilation. Sound insulation and anti-termite treatment.

Building components and their basic requirements: Foundations, plinth, walls and columns in superstructure, floors, doors and windows, sills, lintels and weather sheds,roofs, steps and stairs, utility fixtures.

Foundations: Types and their suitability (Stepped, isolated, combined, strip, raft, strap or cantilever, pile.)

Stone masonry – Random Rubble, Un-coursed Rubble, Coursed Rubble and Ashlar Masonry.

Brickwork and Brick Bonds - English, Flemish, Rat trap bond (one brick thick). Composite masonry, various partition walls, brick, Aluminum and timberFormwork: materials (wooden, steel and Aluminum).

Unit III **Components of Building and Techniques-II** **8**

Arches: Arches and their stability consideration, technical terms in arches, types of arches, methods of construction.

Lintel: Necessity, Materials: wood, stone, brick, steel, R.C.C. and reinforced brick lintels.

Doors – Classification, Teak wood Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening.

Windows - Classification, Teakwood Glazed Windows, Aluminum Glazed Windows, Steel Windows, fixtures and fastening.

Stairs: Technical terms, requirements of a good stair, uses, types, materials for construction. Design of stairs (Dog Legged, quarter turn and Open Well), Ramps, lifts and escalator.

Roofs and Roof coverings: Terms used. Roof and their selection, pitched roofs and their types, Steel Trusses types and their suitability, roof covering, material, details, fixtures Mangalore tiles, A. C., G. I. and Pre-coated sheets, concept of proflex (truss less) roof and their selection. Concrete Flooring (Tremix Flooring)

Construction of upper floors: R.C.C. slabs, R.C.C. beams and slab. Flat slab floor. Water proofing: materials, methods and systems.

Unit IV **Building Planning** **8**

Site Selection criteria, Principles of Building planning. Significance Sun path diagram. Wind Diagram, Orientation, Factors affecting and criteria under Indian condition.

Building Planning Byelaws and regulations as per SP-7, 1983 National Building code of India group 1 to 5.

Planning of Residential Building (Bungalows, Row Bungalows, Apartments and Twin Bungalows) Procedure of Building Permission, significance of commencement, plinth

Completion or occupancy certificate.

Low cost Housing-Materials and Methods (conceptual introduction only) Maintenance, Repairs, Rehabilitation of Structures. (Conceptual introduction only), Concept of green building and rating.

Unit V **Building Services** **7**

Plumbing system, Various Materials for system like A-PVC, C-PVC, GI, and HDPE.

Various types of traps, Fittings, Chambers, Need of Septic Tank, Concept of Plumbing and

Drainage plan, introduction to rainwater harvesting and Equipment. Concept of rain water Gutters. Rainwater outlet and Down Take Systems.

Electrification: - Concealed and Open Wiring, Requirements and Location of various points, Concept of Earthing.

Fire resistance in building: Fire protection precautions, confining of fire, fire hazards, Characteristics of fire resisting materials, building materials and their resistance to fire.

Unit VI **Building Ventilation and Finishing** **7**

Ventilation: - Definition and necessity of Ventilation, functional requirement, various system and section criteria.

Air conditioning: - Purpose, Classification, Principles, Systems and Various Components of the same.

Thermal Insulation: - General concept, Materials, Methods.

Introduction to Acoustics: Absorption of sound, various materials, conditions for good acoustics.

Sound Insulation and methods of noise control. Paints: Different types and application methods. Plastering, Pointing and various techniques. Wall cladding, skirting, dado work with various materials. Miscellaneous finishes such as POP, Gypsum plaster.

Course Outcome (CO):

1 Student will able to understand properties and suitability of various building materials
2 Student will understand and able to draw the different building components.
3 Student will able to plan and design of buildings as per SP-7
4 Student will able to understand various building services and their designing.

Text Books:

1 Building Design by Shah, Kale, Patki. Tata Mc-Graw Hill Publications. (Edition 2015)
2 Building Design by Bindra & Arora –S.Chand.(Edition 2008)
3 Building Construction and materials by Chowdhari Dhanpat Rai Publication. (Edition 2014)

List of submission:

1 Tutorial on each unit

References:

1 National Building code SP-7. (Edition 2005)

2 Civil Engineering Materials - Technical Teacher's Training Institute, Chandigarh

Useful Links:

http://www.autodesk.com/ tutorials and training files

Mapping of CO and PO

PO→ / CO↓	a	b	C	d	e	f	g	h	i	j	k
1		√	√		√	√				√	√
2	√	√	√	√	√	√		√	√	√	√
3	√	√	√		√				√	√	√
4	√	√	√	√	√	√		√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE304: Fluid Mechanics-I

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60

Course Objectives:

1. Student will able to understand principles of fluid under static condition
2. Student will understand the Kinematics of fluid flow –law of conservation of mass, continuity equations and inter relationship of stream and velocity potential function
3. Student will able to understand the Dynamics of fluid flow -Energy equation and its applications in real life problems
4. Student will able to understand the Flow through Pipes, Laminar and turbulent flows, major and minor losses in pipes
5. Student will study concept of Boundary layerand Drag and Lift theory

Course Contents

		Hours
Unit I	**Introduction: Properties of Fluids** Scope and importance of Fluid Mechanics, Physical Properties of fluids (density, Specific weight, specific volume, sp. Gravity), Viscosity-Newton's law of viscosity, Newtonian and Non-Newtonian fluids. Compressibility, Surface tension and Capillarity, Ideal fluid, Real Fluid **Fluid Statics:** Pressure, Pascal's Law, Hydrostatic Law, pressure measurement devices–piezometer, manometers, Mechanical gauges. Forces on Plane and Curved Surfaces, Centre of pressure and pressure diagram, buoyancy, Metacentre, Stability of Submerged and floating bodies.	**14**
Unit II	**Fluid Kinematics:** Concept of control volume, Velocity and acceleration of fluid Particle, Classification of fluid flow – (Steady- Unsteady, Uniform-	**7**

Non-uniform, Rotational-irrotational, turbulent – laminar, one, two and three dimensional flow, Compressible-incompressible flow). Streamlines, Equipotential lines, Stream Function and Velocity Potential, Flow Net- (Properties, Drawing methods, and engineering applications). Continuity equation – (differential & integral form)

Unit III **Fluid Dynamics:** **8**

Forces acting on fluid in motion, Euler's equation along a streamline, Bernoulli's Theorem limitations, Applications -Pitot Tube, Venturimeter, Orifice meter, Orifices and Mouthpieces, Concept of HGL & TEL., Notches and weirs and their types, discharge measurement, end contraction, velocity of approach

Unit IV **Flow through pipes - I:** **7**

Darcy - Wiesbach Equation, Hazen-William formula, factors affecting friction, Minor Losses in pipes, Concept of equivalent length of pipe for different pipe fittings, Equivalent diameter of pipes, and Hydraulic Power transmission by pipe.

Pipes in parallel, Series, Siphon, two and three reservoir problems, Water hammer in pipes- Rigid and Elastic Water Column Theory. Surge Tanks - (Function, location and Uses)

Unit V **Flow through pipes - II:** **5**

A. Laminar flow Reynolds's Experiment, Coutte & Hazen Poisulle's Equation for viscous flow between parallel plates and circular pipes.

B. Turbulent flow

Velocity distribution and Shear stresses in turbulent flow, Prandtl mixing length theory, Nikuradse's Experiment, Introduction to Moody's Chart.

Unit VI **Boundary layer theory and Flow around submerged bodies:** **5**

Concept, Boundary layer along thin plate- Characteristics, Laminar, Turbulent Boundary Layer, laminar sub layer, Various Thicknesses- Nominal, displacement, Momentum, Energy. Hydraulically smooth and Rough boundaries, Separation of Boundary layer, control of separation, Introduction to Drag and Lift on submerged bodies (like Flat plates, Sphere, Cylinder, aerofoil), stokes law, Drag and Lift coefficients.

Course Outcome (CO):

1. Students will develop the ability to understand the various fluid properties in fluid mechanics.
2. Students will develop the ability to use of different instruments for measuring of pressure and discharge. And solve the pipe flow problems.
3. Students will develop the ability to apply the knowledge for basic equations of fluid mechanics.
4. Students will develop the ability to identify the different characteristics and type of flow in fluid mechanics.
5. Students will develop the basic ability to learn about fluid kinematics and dynamics.

Text Books :

1. Fluid Mechanics – A.K. Jain – Khanna Pub., Delhi, (Edition 2009)
2. Fluid Mechanics – Hydraulic & Hydraulic Mechanics -Modi / Seth – Standard book House, Delhi, (Edition 2010)
3. Fluid Mechanics – S. Nagrathanam – Khanna Pub., Delhi, (Edition 2012)
4. Elementary Fluid Mechanics – H. Rouse – Toppan C. Ltd. Tokyo, (Edition 2010)
5. Fluid Mechanics – Garde-Mirajgaonkar – Nemchand & Bros., Roorkee, (Edition 2004)
6. Fluid Mechanics – Shames - McGraw-Hill International Book Co., Auckland, (Edition 2009)
7. Fluid Mechanics – S. Ranmamurtham, Dhanpat Rai & sons, New Delhi, (Edition 2009)
8. Fluid Mechanics and Hydraulic Machines – Dr. R.K.Bansal, Laxmi Publications, New Delhi, (Edition 2013)

Reference Books:

1. Fluid Mechanics – Streeter and Wylie, McGraw-Hill International Book Co., Auckland, (Edition 2000)
2. Fluid mechanics – John F. Douglas et.al., Pearson Education Co., Delhi (International Edition) (Edition 2002)
3. Fluid Mechanics (SI Version) – Fox, Mc Donald and Pritchard, Wiley India Pvt. Ltd. New Delhi, (Edition 2015)
4. Fluid Mechanics (SI Version) – Munson, Okiishi, Huebsch and Rothmayer, Wiley India Pvt. Ltd. New Delhi, (Edition 2015)

Useful Links

1. http://www.nptel.iitm.ac.in/ S.Mohan
2. www.ocw.mit.edu

Mapping of Course Outcomes to Program Outcomes

Course Outcomes	Program Outcomes										
	a	b	C	d	e	F	g	H	i	j	k
1	√	√	√	√		√		√	√		√
2	√	√	√	√		√	√	√	√		√
3	√	√	√	√	√			√	√		√
4	√	√	√	√		√	√	√	√		√
5		√				√			√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE305: Surveying-I

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1Hr/week	**CT2**	15
Total Credits	3+1 = 4	**TA**	10
		ESE	60

Course Objectives:

1. To understand construction and permanent adjustment of Dumpy level, Tilting & Auto level.
2. To understand the Contouring Methods and application of contour maps
3. To understand Plane Table Survey
4. To understand the use of Theodolite and trigonometric levelling
5. To understand the Theodolite Traversing

Course Contents

		Hours
Unit I	**Leveling and Contouring** Types, components and use of levels, Types of levelling, objectives and applications, Adjustments of dumpy and tilting level, Sensitivity of bubble tube, Corrections – curvature and refraction Contouring – methods and applications.	**7**
Unit II	**Areas and volume** Introduction, Types of Planimeter (Mechanical and digital), Instrumental method of finding area, Work out problems. Formula for calculation of cross sectional area and volume. Work out problems. Applications of Trapezoidal and Simpsons rule, Capacity contouring.	**7**
Unit III	**Plane Table Surveying** Principle, accessories, Orientation, significance and adjustments Methods-Radiation, Intersection, Resection, Traversing and applications of plane table Survey. Two Point Problem and Three Point Problem (Graphical method, Mechanical method and method of trial and error method), and applications. Errors and precautions, Advantages and Disadvantages	**7**

Unit IV **Theodolite** **8**

Transit Theodolite - Temporary adjustments. Vernier theodolite – components, uses and adjustments. Measurement of horizontal, vertical, deflection angle and magnetic bearing of line. Measurement of horizontal Distance by stadia method. Applications – Trigonometrical leveling. Permanent adjustments of theodolite. Introduction to modern theodolite Wild T-2, Wild T-3 Precision theodolite.

Theodolite Traversing-Introduction, Definition, Objectives, Method of traversing (Included angle, Deflection angle and Magnetic Bearing method. Balancing of traverses (Bowditch's Rule, Transit Rule and Third Rule.). Procedure for traverse Survey with theodolite, Gale's Traverse table. Omitted measurements

Unit V **Total Station** **5**

Introduction to survey by total station, Handling of total station, Field Practice /observations, data acquisition.

Field data Downloading and Processing.

Unit VI **Applications** **6**

Usage of minor instruments (Clinometer, Box Sextant, Cylone Ghat Tracer, Abney Level, Hand Level) for different surveys.

Hydrographic survey (Rain Gauging, River Gauging and Marine Survey) Tunnel survey. Reconnaissance, preliminary and detailed survey for road and railway projects

Course Outcome (CO):

1 The students will be able to perform levelling practices.
2 The students will have knowledge of contouring methods and its applications.
3 The students will be able to perform plane table survey
4 The students will have knowledge of theodolite traversing and total station.

Text Books:

1 Surveying and Levelling Vol. I and II - T.P Kanetkar and S.V. Kulkarni, Pune Vidhyarthi Griha Prakashan. (Edition 2008)
2 Surveying Vol., I, II and III - Dr. B.C. Punmia, Laxmi Publishers, New Delhi. (Edition 2005)
3 Surveying Vol., I and II - S. K. Duggal, Tata McGraw Hill, New Delhi. (Edition 2007)

References:

1. Surveying and Levelling - R. Agor, Khanna Publishers, New Delhi. (Edition 1980)
2. Surveying and Levelling - N.N. Basak, Tata Mcgraw Hill, New Delhi. (Edition 2001)
3. Surveying Vol., I, II and III - Dr. K.R. Arora, Standard Book House, New Delhi. (Edition 2000)
4. Plane surveying – David Clark. (Edition 2001)

Useful Links:

1 http://www.nptel.iitk.ac.in/BharatLohani
2 www.ocw.mit.edu

Mapping of Course Outcomes to Program Outcomes

course outcomes			program outcomes								
	a	b	c	d	e	f	g	h	i	j	k
1	√	√	√	√	√			√			√
2	√	√	√	√	√	√		√			√
3	√	√	√	√	√			√	√		√
4	√	√	√	√	√	√	√	√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech
CE306: Surveying-I Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	50
Total Credits	1	**ESE**	25

Course Objectives:

1 To understand different levelling techniques by using levelling instruments.
2 To understand the ability to handle Theodolite and Total Station.
3 To study handling of minor instruments
4 To understand methods of Plane Table Survey

Course Contents

Experiment 1	Study of Reciprocal Levelling
Experiment 2	Determination of Reduced level by using auto Level and Tilting Level.
Experiment 3	Determination of Reduced level by using Total station.
Experiment 4	Study of different components of Transit Theodolite
Experiment 5	Measurement of Horizontal Angle by Various Methods
Experiment 6	Measurement of Magnetic Bearing and Vertical Angle by Theodolite
Experiment 8	To Study Minor Instruments (Any three) Clinometer, Box Sextant, Cylone Ghat Tracer, Abney Level, Hand Level
Experiment 9	Study of any two methods of Plane Table Survey (namely, Radiation, Intersection, Traversing and Intersection)
Experiment 10	Study of Two-Point problem or Three-point problem.
PROJECT -1	Project work: Block Contouring
PROJECT -2	Project work: Theodolite Traversing

List of Submission

1 Total number of Experiments
2 Project Visit Report

Course Outcome(CO):

1 Student will able to carry out preliminary surveying in the field of civil engineering.
2 Student will gain the ability to measure differences in elevation, draw and utilize contour maps.
3 Student will able to use various conventional and modern instruments involved in surveying with respect to utility and precision.

Mapping of CO and PO

	a	b	c	d	e	f	g	h	i	j	k
1	√	√	√	√	√			√			√
2	√	√	√	√	√	√		√			√
3	√	√	√	√	√			√	√		√
4	√	√	√	√	√	√	√	√	√	√	√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Project 1	Project 2	CA
Assembling	√	√	√	√	√	√	√	√	√	√	√	√	12
Testing		√			√	√		√			√	√	6
Observing	√	√	√	√	√	√	√	√	√	√	√	√	12
Analyzing	√	√	√	√			√	√	√		√	√	9
Interpreting	√	√	√	√	√	√	√	√	√	√	√	√	12
Designing											√	√	2
Creating											√	√	2
Deducing conclusions		√	√		√	√	√		√				6

Government College of Engineering Karad
Second Year B. Tech
CE307: Strength of Materials Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25
		Total	50

Course Objectives:

1. Students should learn different Properties of Materials
2. Students should learn testing of different materials for construction.
3. Students should understand behaviour of materials under load.
4. They should be introduced with different equipment and machines for testing
5. Students should learn failure pattern of materials and building elements when loaded.

Course Contents

Student has to perform total eight experiments. Practical No. 1 is compulsory

Experiment 1 Study of Universal Testing Machine.

Experiment 2 Water absorption test and compression test on burnt clay bricks.

Experiment 3 Compression test on timber.

Experiment 4 Tensile test on Mild steel bar and TMT steel bar

Experiment 5 Bending test on Mild steel bar and Timber Beam

Experiment 6 Direct shear test on Mild steel bar.

Experiment 7 Hardness test on different metals such as Iron, Copper, Bronze and Aluminium.

Experiment 8 Torsion test on Mild steel bar

Experiment 9 Flexure test on Mosaic Tiles.

Experiment 10 Izod Impact Test on metal specimens

List of Submission:

1 Total number of practical
2 Total number of Tutorials

Additional Information
Course Outcome(CO):

1 Learned various tools and equipment used in laboratory.
2 Learned and verified material properties in Lab.
3 Students can understand behaviour of elastic bodies under load.
4 Students can plot different curves from testing results.
5 Student can compute the design forces.

Mapping of CO and PO

PO→ / CO ↓	a	b	c	d	e	f	g	h	i	j	k
1					√			√		√	
2			√		√			√		√	
3		√						√		√	
4			√		√			√		√	
5		√			√			√		√	
6		√			√			√		√	
7		√						√		√	

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	CA
Assembling	√	√	-	-	√	√		-	5
Testing	-	-	-	-	√	√	-	-	5
Observing	√	√		√	√	√	√	√	10
Analyzing	-	√	√	√	√	√	√	√	10
Interpreting	√	-	√	-	√	√	√	-	10
Designing	-	-	-	-	-	-	-	-	0
Creating	-	√	-	-	-	-	-	-	5
Deducing conclusions	-	-	-	-	√	√	-	-	5

Government College of Engineering Karad
Second Year B. Tech
CE308: Fluid Mechanics-I Laboratory

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25
		Total	50

Course Objectives:

1. Student will able to understand principles of fluid flow, measurement of pressure and laws of buoyancy and floatation
2. Student will understand the Kinematics of fluid flow –continuity equations
3. Student will able to understand the Dynamics of fluid flow –Energy equation and its applications
4. Student will able to understand the Flow through Pipes, Laminar and turbulent flows, major and minor losses in pipes

Course Contents
At least SIX experiments from the following

Experiment 1 Determination of meta-centric heights

Experiment 2 Verification of Bernoulli's Theorem

Experiment 3 Calibration of Venturimeter

Experiment 4 Calibration of orifice meter

Experiment 5 Determination of coefficients of an orifice

Experiment 6 Measurement of discharge using mouthpiece.

Experiment 7 Study of factors affecting coefficient of friction for pipe flow
(at least for two different materials and two different diameters)

Experiment 8 Determination of loss of head due to i) Sudden expansion, ii) contraction iii) elbow iv) bend v) Globe Valve etc.
*(*At least Two minor losses)

Experiment 9 Visualization of Laminar and Turbulent flow using Reynold's Apparatus and determination its sample value

List of Submission:

1 Total number of Practical

Course Outcome(CO):

1 Learned various tools and equipment's used in laboratory.
2 Learned and verified the fluid motion equations in Lab.
3 Students can understand behaviour of fluid flow rate under various conditions
4 Students can plot the graphical results and its comparison with experimental results.

Mapping of CO and PO

PO→ / CO↓	a	b	c	d	e	f	g	h	i	j	k
1					√			√		√	
2			√		√			√		√	
3		√						√		√	
4			√		√			√		√	

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	CA
Assembling	√	√	√	√	√	√	√	√	-	5
Testing		√	√	√	√	√	√	√	-	5
Observing	√	√	√	√	√	√	√	√	√	10
Analyzing		√	√	√	√	√	√	√	√	10
Interpreting	√	√	√	√	√	√	√	√	-	10
Designing	-	-	-	-	-	-	-	-	-	0
Creating										5
Deducing conclusions		√	√	√	√	√	√	√	-	5

Government College of Engineering Karad
Second Year B. Tech.
CC 301: Environmental Studies

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Laboratory	-	**CT2**	15
Total Credits	0 (Audit)	**TA**	10
		ESE	60

Course Objectives:

1. To learn key concepts from Economic and Social analysis as they pertain to design and evaluation of environmental policies and institutions.
2. To learn concepts and methods from ecological and physical sciences and their applications in environmental problem solving.
3. To study the ethical, cross cultural and historical context of environmental issues and the links between human and natural systems.

Course Contents

		Hours
Unit I	**Natural Resources and Associated Problems:** Nature of Environmental Studies**:** Definition, scope and importance. Multidisciplinary nature of environmental studies Need for public awareness. a) Environment resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems. e) Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.	**8**
Unit II	**Ecosystems:** Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristics features,	**6**

structure and function of the following ecosystem :-
a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit III **Biodiversity and its conservation :** **6**

Introduction- Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega- diversity nation. Western Ghat as a biodiversity region. Hot-spot of biodiversity. Threats to biodiversity habitat loss, poaching of wildlife, man- wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit IV **Environmental Pollution:** **6**

Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution.

Unit V **Social Issue and Environment:**

Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, Social Environment, sustainability nuclear accidents and holocaust. Wasteland exclamation. **8**
Consumerism and waste products.

Unit VI **Environmental Protection :** **8**

From Unsustainable to Sustainable development. Environmental Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Population Growth and Human Health, Human Rights, Environment Impact Assessment, Green Tribunals.

Field Work :

Visit to a local area to document environmental assets-
river/Forest/Grassland/Hill/Mountain.
OR
Visit to a local polluted site - Urban / Rural / Industrial /Agricultural.
OR
Study of common plants, insects, birds.

OR

Study of simple ecosystems - ponds, river, hill slopes, *etc*.

Course Outcome:

1. Students will explain key concepts from Economic, and Social analysis as they pertain to design and evaluation of environmental policies and institutions.
2. Student will appreciate concepts and methods from ecological and physical sciences and their applications in environmental problem solving.
3. Student will appreciate the ethical, cross cultural and historical context of environmental issues and the links between human and natural systems.
4. Student will reflect critically about their roles and identities as citizens, consumers, environmental actors in a complex and interconnected world.

Text Books:

1. Text Book of Environmental Studies by Dr. P.D. Raut from Shivaji University. (Edition 2013)
2. Concise Environmental Studies by Dr. Madhukar Bachulkar, B.V. Kulkarni, Sharvil A. Shah. R.K. Publications. (Edition 2014)
3. Miller T.G. Jr., Environmental Science. Wadsworth Publications Co. (Edition 2007)
4. Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science. (Edition 2012)
5. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno- Science Publications. (Edition 2010)

References:

1. Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner. (Edition 2011)
2. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (Edition 2008)
3. Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p (Edition 2010)
4. De A.K., Environmental Chemistry, Wiley Wastern Ltd. (Edition 2014)
5. Down to Earth , Centre for Science and Environment , New Delhi. (Edition 2011)
6. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Media. (Edition 2014)
7. The Water (Prevention and Control of Pollution) Act, 1974
8. The Air (Prevention and Control of Pollution) Act, 1981
9. The Environment (Protection) Act, 1986
10. Hazardous Wastes (Management and Handling) Rules, 1989
11. The Forest (Conservation) Act, 1980

12 The Wildlife Protection Act, 1972

13 The National Environment Tribunal Act, 1995

14 The Noise Pollution Act, 1974

Mapping of CO and PO

	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1		√	√	√	√	√	√		√	√	√	√		
CO2	√		√	√	√	√	√		√		√			
CO3		√		√	√	√	√		√	√	√	√		
CO4	√	√	√	√	√	√	√			√		√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE401: Concrete Technology

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Practical	2Hr/week	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60

Course Objectives:

1 To understand various properties of ingredients and their role in concreting.
2 To understand properties of fresh and hardened concrete.
3 To do work with modern tools with mix design software's.
4 To acquire innovative skills like non-destructive testing and accelerated curing so that they can optimize the cost of infrastructure and they should be contributing towards economy of nation.
5 To understand various stages of concreting and precautions required during concreting.
6 To acquire knowledge regarding behaviour of concrete so as to able to work as project manager on various infrastructure projects.

Course Content

Hours

Unit I **Ingredients of Concrete** **9**

a) Cement: Physical properties of cement such as fineness, consistency test, Initial and final setting time, soundness, compressive strength, specific gravity. Hydration of cement, chemical compounds of cement. Grades of cement, Types of cement- Ordinary Portland, Portland pozzolana, Rapid Hardening Portland Cement, Quicksetting cement, Sulphur resisting cement, Super sulphated cement, Expansive cement, Rediset cement, High strength cement, High Alumina, Low heat, White, Coloured, Oil well, Hydrophobic cement.

b) Aggregates: Physical properties such as sieve analysis and fineness modulus, specific gravity and water absorption, silt content, Bulking of sand, Bulk density, moisture content, Flakiness index, Elongation index. Mechanical properties such as Crushing, Impact and Abrasion value, Alkali – Aggregate reaction, grading of Aggregate, Artificial and recycled aggregate.

c) Water: Specifications of water as per IS 456 – 2000.

Unit II **Fresh Concrete** **8**

Fresh Concrete: Batching, Mixing, Transportation, placing of concrete including pumping and compaction techniques for good quality concrete, Workability of concrete and methods of measuring workability, Factors affecting workability, Segregation and bleeding, Curing of concrete, Different methods of curing, Temperature effects on fresh concrete.

Admixtures: Types of admixtures, Plasticizers and super plasticizers and their effects on workability, Air entraining agents, Retarders, their effects on proportion of concrete, Pozzolanic admixtures, Fly ash, fly ash on fresh concrete, Silica flume, Metalaolim, Ground Granulated Blast Furnace Slag.

Unit III **Hardened Concrete& Durability Concrete** **8**

Hardened Concrete: Strength of concrete, w/c ratio, Gel-space ratio, Effect of maximum size of aggregate, Factors affecting strength of concrete, Characteristic strength - compressive, tensile and flexure strength, Relation between compressive & tensile strength. Modulus of elasticity, Relation between modulus of elasticity & strength, Creep and shrinkage of concrete.

Durability Concrete: Strength and durability relationship, effect of w/c on durability, different exposure condition as per IS 456 minimum and maximum cement content, effect of permeability, sulphate attack, methods of controlling sulphate attack. Durability of concrete in sea water, Test on hardened concrete - flexural strength, comparison of cube test and cylinder test, Schmidt's rebound hammer, Ultrasonic pulse velocity method

Unit IV **Concrete Mix Design** **5**

Nominal Mix Concrete, Objectives of mix design, Factors governing mix design, Methods of expressing proportions, statistically quality control. Mix design , ACI 211.1-91 method, IS code method as per 10262 & 456, Mix design of fly ash concrete by IS 10262 – 2009.

Unit V **Special Concrete** **5**

Light weight concrete, no-fines concrete, high density concrete, fiber reinforced concrete, self compacting concrete, high strength concrete, high performance concrete, manufacturing of ready mix concrete, cold weather concreting, hot weather concreting, pavement quality concrete.

Unit VI **Non Destructive Testing** **5**

Schmidt's rebound hammer – Mechanical & digital, Ultrasonic pulse velocity method, techniques of measuring & factors affecting the measurement of pulse velocity, Corrosion meter, Cover meter and core cutter.

Course Outcome (CO):

1 Student will be able to understand various properties of ingredients and their role in concreting.
2 Student will be able to understand properties of fresh and hardened concrete.
3 Student will be able to do work with modern tools with mix design software's.
4 Student will be able to acquire innovative skills like non-destructive testing and accelerated curing so that they can optimize the cost of infrastructure and they should be contribute towards economy of nation.
5 Student will be able to understand various stages of concreting and precautions required during concreting
6 Student will be able to acquire knowledge regarding behaviour of concrete so as to able to work as project manager on various infrastructure projects.

Text Books:

1 Concrete Technology M. S. Shetty S. Chand & Company Ltd, New Delhi
2 Concrete Technology M. L. Gambhir Tata McGraw-Hill publishing Company Ltd, New Delhi
3 Concrete Technology A. M. Neville Pearson Education, New Delhi
4 Concrete Technology Orchard Asia publication, New Delhi
5 Limit State Design of reinforced concrete P.C.Varghese Prentice Hall, New Delhi
6 Concrete Technology Handoo, Puri& Kaila SatyaPrakashan, New Delhi
7 Concrete Technology R. S. Varshnay New Chand &Brathers, New Delhi
8 Concrete Technology K. T. Krishnaswamy DhanpatRai Publication, New Delhi
9 Concrete Technology V. N. Vazirani Khanna Publication, New Delhi

References:

1. IS: 456, 2000, Indian Standard Plain and Reinforced Concret
2. IS: 10262,2009, Recommended guidelines for Concrete Mix Design

Useful Links:

1 nptel.iitk.ac.in
2 www.myeducationkey.com
3 www.bis.org.in

Mapping of Course Outcomes to Program Outcomes

Course Outcomes	Program Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
1	√			√				√			
2	√							√			
3	√		√	√			√	√			√
4	√		√	√			√	√			
5	√	√						√			
6	√	√		√	√		√	√		√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE402: Surveying-II

Teaching Scheme		Examination Scheme	
Lectures	3 Hrs/week	**CT1**	15
Practical	2Hr/week	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60

Course Objectives:

1. To study the principles of advanced surveying instruments.
2. To study the formulation of triangulation stations and to study Tacheometry.
3. To understand Geographical Information Systems (GIS) and Global Positioning Systems (GPS).
4. To study aerial photogrammetry.

Course Contents

		Hours
Unit I	**Measurement of distances and elevations** Measurement of distances and elevations. Tacheometry – principles, suitability, methods. Stadia diaphragm, Stadia formulae. Tacheometric contouring Electronic distance measurements – principle, construction and use of Geodimeter, Tellurometer, Distomat and Total station	**8**
Unit II	**Geodetic Surveying** Triangulation Principle and Classification, system, Selection of station, Base line. Measurement, correction and use of sub tense bar, Signals, satellite station, reduction to center, spherical excess, angular observations, Trilateration.	**6**
Unit III	**Field Astronomy** Definition of Astronomical terms, Field Astronomy. Terms, co-ordinate systems, Spherical Trigonometry and spherical triangle. Properties of spherical triangle and formulae in Spherical Trigonometry. True bearing by observation on the sun and pole star.	**5**
Unit IV	**Curves** Significance of curves and curve setting, Type of horizontal curve, elements of simple, compound, transition and combined curve, setting out of simple curve by linear and angular methods. Vertical curves – types, lengths of vertical curves	**8**

Unit V **Photogrammetry** **6**

Introduction, Basic Principles, Definitions, Types of photogrammetric (Aerial camera and Stereoscopic vision). Types of photographs. Photogrammetry – scale of vertical photographs, flight planning and mosaic. Stereoscopy and interpretations

Unit VI **Modern methods of surveying** **7**

Remote sensing – Definition, relevance, types, electromagnetic radiation and spectrum, energy sources and its characteristics, image acquisition and image interpretation, applications to civil engineering
GPS – basic principles, GPS segments, receivers, applications in survey
GIS – Terminology, advantages, basic components of GIS, data types, GIS analysis, applications of GIS software. RADAR/LIDAR surveying.

Course Outcome (CO):

1 Student will be able to adopt the principles of advanced surveying instruments.
2 Student will be able to formulate Surveying problems.
3 Student will be able to understand modern Surveying Techniques
4 Student will be able to interpret spatial images.

Text Books:

1 Surveying and Levelling Vol. I and II - T.P Kanetkar and S.V. Kulkarni, Pune VidhyarthiGriha Pune. (Edition 2005)
2 Surveying Vol., I, II and III - Dr. B.C. Punmia, Laxmi Publishers, New Delhi. (Edition 2008)
3 Surveying Vol., I and II - S. K. Duggal, Tata Mcgraw Hill, New Delhi. (Edition 2001)

References:

1 Surveying and Levelling - R. Agor, Khanna Publishers, New Delhi (Edition 2000)
2 Surveying and Levelling - N.N. Basak, Tata Mcgraw Hill, New Delhi. (Edition 2014)
3 Surveying Vol., I, II and III - Dr. K.R. Arora, Standard Book House, New Delhi. (Edition 2001)

Useful Links:

1 http://www.nptel.iitr.ac.in/S.K.Ghosh
2 www.ocw.mit.edu

Mapping of Course Outcomes to Program Outcomes

course outcomes			program outcomes								
	a	b	c	d	e	f	g	h	i	j	k
1	✓	✓	✓	✓	✓		✓	✓		✓	
2	✓	✓	✓	✓		✓		✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
4	✓	✓	✓	✓		✓		✓	✓		✓

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE403: Geotechnical Engineering

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60

Course Objectives:

1 To introduce about physical and engineering properties of soil.
2 To study concepts of permeability, compaction and consolidation and its application.
3 To study stress distribution of soil under different load condition.
4 To study shear strength and earth pressure, its type and applications

Course Syllabus

Unit 1 **Properties of Soil:** **7**

Introduction to Soil Mechanics, formation of soil & soil structure, three phase soil system, weight volume relationships, detail index properties of soil -methods of determination and its significance, particle size and shape, classification of soil – I.S., MIT & textural, soil consistency, field identification of soils.

Unit 2 **Permeability and Seepage:** **5**

Capillary water. Darcy's law, Factors affecting permeability, Determination of permeability by constant head and falling head method as per IS - 2720, field test as per IS – 5529 (part I) - pumping in test and pumping out test. Permeability of layered soils, Seepage forces, General flow equation (Laplace equation). Flow net construction and applications, Concept of effective neutral & total stress in soil mass. Anisotropic soil conditions, quick sand condition. Uplift pressure, exit gradient, failure due to piping.

Unit 3 **Compaction and Consolidation** **5**

Soil compaction phenomenon. Factors affecting compaction, Dry density and moisture content relationship. Zero air voids line. Effect of compaction on soil structure, Standard Proctor test and Modified Proctor test as per IS – 2720. Field compaction equipment and methods, Field control of compaction

Spring analogy, Terzaghi's theory of one dimensional consolidation, Lab consolidation test; cc cv, mv and av Determination of coefficient of consolidation-square root of time fitting method and logarithm of time

fitting method. Rate of settlement, normally consolidated and over consolidated soils, Determination of pre consolidation pressure

Unit 4: Stress Distribution in Soil: **5**

Boussinesq theory- point load, line load, strip load, pressure distribution diagram on a horizontal and vertical plane, pressure bulb, Westergaard's theory, equivalent point load method, Newmark chart, contact pressure, approximate stress distribution method.

Unit 5: Shear Strength: **6**

Concept of shear, Coulomb's theory and failure envelope, Principle stress, stress analysis (Total stress approach and effective stress approach), representation of stresses on Mohr's circle for different types of soil such as cohesive and cohesionless, saturated and partly saturated soil etc. Application of shear stress parameters in the field

Unconsolidated undrained, consolidated undrained and consolidated drained, type of test -box shear test, triaxial compression test with pore pressure and volume change measurement, unconfined compression test, vane shear test.

Unit 6: Earth Pressure: **5**

Concept, Area of application, earth pressure at rest, active and passive condition. Rankines and Coulomb's theory of earth pressure, Graphical Solution-Trial wedge methods, Culman's method – Rebhan's construction and modification

Text Books:

1 Text Book of Soil Mechanics in Theory and Practice, Alam Singh, Asian Publishing House, Bombay, Edition 2008
2 Soil Mechanics and Foundation Engineering-V. N. S. Murthy., U. B. S. Publishers and distributors New Delhi, Edition 2011
3 Geotechnical Engineering, P. Purushottam Raj,Tata Mcgraw Hill Company Ltd. New Delhi, Edition 2012

Reference Books:

1 Soil Mechanics and Foundations, B. C. Punmia ,Laxmi Publications (P) Ltd. New Delhi, Edition 2015
2 Soil mechanics-Terzaghi and Peak,John Willey and Sons, New-York, Edition 1994
3 Soil Mechanics and Foundation Engineering, K.R. Arora,Standard Publishers Distributors, Delhi, Edition 2011
4 Geotechnical Engineering, B. J. Kasamalkar,Pune Vidyarthi Griha Prakashan Pune, Edition 2010

Course Outcomes (COs):

1. Understand physical and engineering properties of soil.
2. Solve problems of permeability, seepage, compaction and consolidation with different methods
3. Solve problem of stress distribution of soil under different load condition
4. Determine shear strength and earth pressure with different methods.

Mapping of Course Outcomes to Program Outcomes

Course Outcomes	Program Outcomes										
	a	b	C	d	e	f	g	h	i	j	k
1	√		√	√	√	√	√		√	√	√
2	√	√	√	√	√	√	√	√	√	√	√
3	√	√	√	√	√	√	√	√	√	√	√
4	√	√	√	√	√	√	√	√	√	√	√

Government College of Engineering Karad.
Second Year B. Tech
CE404: Engineering Geology

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60

Course Objectives:

1. To Understand the Earth System
2. To study fundamental geomorphic and dynamic processes on the Earth.
3. To know about the material present i.e. Mineral and rocks.
4. To understand Structural deformations and impacts.
5. To study about Earthquakes, its causes, effects and zones
6. To know subsurface exploration methods.
7. To know groundwater availability and domains: recharge
8. To Study techniques for site selection for Projects.

Course Contents

Unit I **Physical Geology** **Hours 10**

Branches of Geology useful to civil engineering, importance of geological studies in various civil engineering projects.
Internal structure of the Earth and use of seismic waves in understanding the interior of the earth, Concept of Continental Drift and Plate tectonics.

Agents modifying the earth's surface, study of weathering and its significance in engineering properties of rocks like strength, water tightness and durability etc.

Brief study of geological action of river, wind, glacier, ground water and the related land forms created by them.

Earthquake - Earthquake waves, construction and working of seismograph, Earthquake zones of India, elastic rebound theory Preventive measures for structures constructed in Earthquake prone areas. Tsunamis- Causes, effects, prediction and preventative measures.

Unit II **Petrology** **10**

Identification of minerals with the help of physical properties, Rock forming minerals, Megascopic identification of primary and secondary minerals, study of common ore minerals.

Study of igneous, sedimentary and metamorphic rocks, distinguishing

properties among these three rocks to identify them in fields.
Igneous Petrology- Mode of formation, Texture and structure, Classifications, study of common occurring igneous rocks.
Sedimentary Petrology - Mode of formation, Textures, structure, classification and study of commonly occurring sedimentary rocks. Agents of Transportation. Welding and Cementation. Digenesis of sedimentary rocks.
Metamorphic Petrology - Mode of formation, agents and types of metamorphism, metamorphic minerals, rock cleavage, structures and textures of metamorphic rocks, classification and study of commonly occurring metamorphic rocks.

Unit III **Structural Geology and Stratigraphy** **10**

Structural elements of rocks, dip, strike, outcrop patterns unconformities, outliers and inliers, Concordant and Discordant modes of occurrence of Igneous rocks. Study of joints. Faults and folds, importance of structural elements in engineering operations.

General principles of Stratigraphy, Geological time scale, Physiographic divisions of India and their characteristics. Stratigraphy of Maharashtra

Unit IV **Geological Investigation** **10**

Preliminary Geological Investigation and their importance to achieve safety and economy of the projects supporting dams and tunnel projects ,methods of surface and subsurface investigations, excavations-Trial pit, trenches etc.

Core Drilling - Geological logging, Inclined Drill holes. Electrical Resistivity method, Seismic method and their applications.
Use of Aerial photographs, Satellite imageries in civil engineering projects.

Strengths, stability, water tightness over the foundation rocks and its physical characters against geological structures at dam sites, favourable and unfavourable conditions for locating dam sites.
Precautions over the unfavourable geological structures like faults , dykes , joints, unfavourable dips on dam sites and giving treatments, structural and erosional valleys. Case Histories
Geological conditions suitable and unsuitable for reservoir site. Conditions likely to cause leakage through reservoir rims. Case Studies.

Unit V **Groundwater Geology** **08**

Importance of geological considerations while choosing tunnel sites and alignments of the tunnel, safe and unsafe geological and structural conditions, Difficulties during tunnelling and methods to overcome the difficulties. Case Studies.
Sources, zones, water table, unconfined and Perched water tables. Factors controlling water bearing capacity of rocks, Pervious and Impervious rocks, Cone of depression and its use in Civil engineering. Geological work of

groundwater, Artesian well.
Springs seepage sites and geological structures. Different types of rocks as source of ground water.
Methods of artificial recharge of ground water, geology of percolation tank.

Unit VI Applications **08**

Types, causes and preventive measures for landslides, Stability of Slopes. Landslides in Deccan region (Western Ghats) and Himalaya. Case Studies.
Requirements of good building stones and its geological factors, controlling properties, consideration of common rocks as building stones, study of different building stones from various formations of Indian Peninsula.
Rock Mass classification and Rating (RMR) and Rock Quality Designation (RQD).

Course Outcome (CO):

1 Student will generate global vision of Earth processes.
2 Student will identify the subsurface material
3 Student will know reasons of phenomena like Earthquakes and Tsunamis.
4 Student will know about groundwater availability zones and groundwater management.
5 Student will know megascopic and mechanical properties of rocks.
6 Student will know field procedures of subsurface explorations.
7 Student will generate subsurface profiles and map structures.
8 Student will know considerations for site selection for engineering projects.

Text Books:

1 Text book of Engineering and General Geology by Parbin Singh, S. K. Kataria and Sons.
2 Text book of Engineering Geology by N. Chenna, Kesavulu, Mc-Millan.
3 Fundamentals of Engineering Geology by F. G. Bell, BS Publication
4 A geology for Engineers by F. G. H. Blyth and M. H. de Freitas, Elsevier
5 Physical Geography by Dr. Savindra Singh, Prayag Pustak Bhavan

List of submission:

1 Tutorial on each unit

References:

1 Groundwater Hydrology by Todd, D. K., John wiley and sons, New York
2 Structural Geology by Billings, M. P., Prentice Hall of India Pvt Ltd
3 Rutley's Elements of Mineralogy by Read, H. H., CBS Publishers
4 Principles of Petrology by Tyrell, G. W., B.I Publications
5 Geology of India Vol.-I&II, M. Ramakrishnan and R. Vaidyanathan, Geological society of India, Bangalore.

Mapping of CO and PO

PO→ CO ↓	a	b	c	d	e	f	g	h	i	j	k
1		√									
2		√									
3	√	√	√	√							
4	√	√	√	√							
5	√	√	√	√		√					
6			√	√				√			
7				√	√						√
8				√		√					

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE405: Fluid Mechanics-II

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Practical	-	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60

Course Objectives:

1. Student will be able to understand the flow in open channels, Depth energy relationship, Specific energy, Specific force, and Specific discharge.
2. Student will be able to understand the Gradually and rapidly flow and its applications.
3. Student will carry out the applications of dimensional and model analysis and basics of model studies and its applications
4. Student will understand the Impulse momentum principle, Impact of jet, and working principles of fluid machines.

Course Contents

		Hours
Unit I	**(a) Uniform flow in open channel** Introduction, Difference between pipe flow and open channel flow, Types of open channels, Types of flows in open channel, Geometric elements, Velocity distribution, Measurement of velocity- (Pitot lube, current meter) **(b) Steady & Uniform Flow** Chezy's & Manning's formula, Rougosity coefficient, Uniform Flow computations, hydraulically efficient section (Rectangular, Triangular, Trapezoidal) **(c) Depth energy relationship in open channel flow** Specific energy (definition & diagram, Critical, Sub-critical, Super-critical flow), Specific force, Specific discharge- (definition & diagram)	**6**
Unit II	**(a) Gradually varied flow (GVF)** Definition, Classification of channel Slopes, Dynamic equation of G.V.F. (Assumption and derivation), Classification of GVF profiles-examples, direct step method of Computation of GVF profiles **(b) Rapidly varied flow (RVF)** Definition, examples, Hydraulic jump- Phenomenon, relation of conjugate depths, Parameters, Uses, Types of Hydraulic jump. Hydraulic jump as an energy dissipater	**5**

Unit III **Dimensional analysis & Model studies** **5**

Dimensions & Dimensional homogeneity, Importance & use of Dimension analysis, Buckingham's pie theorem- Statement & application, Non-dimensional numbers & their Significance. Hydraulic similitude- Importance & use. Geometric, Kinematic & dynamic Similarities, Froude's & Reynolds's model law, Scale ratios, applications.

Distorted model studies, slope, force and material distortion

Unit IV **Impact of Jet** **4**

Impulse momentum principle, Impact of jet on Vanes-flat, curved (stationary and, moving), Inlet & outlet velocity triangles, Series of flat and curved vanes mounted on wheel.

Unit V **Hydraulic Turbines** **5**

Introduction to Hydraulic machinery, Importance of hydro-power, Classification of turbines, description, Typical dimensions and working principle of Pelton, Francis & Kaplan turbine (Detailed design need not to be dealt with), Unit quantities, Specific speed, Performance Characteristics, Selection of type of turbine, description & function of Draft tube, Thoma's cavitation number.

Unit VI **Hydraulic Pumps** **5**

Classification, Component parts, working of centrifugal pump, Performance Characteristics, Selection of pump, Common pump troubles & remedies, Introduction to different types of pumps such as reciprocating, multi-stage, Jet, Air lift, Submersible pump.

Course Outcome (CO):

1 Students will develop the ability to determine efficient section of channel
2 Students will develop the ability to study, uniform flow in open channel
3 Students will study applications of dimensional and model analysis with help of non-dimensional force ratios.
4 Students will develop the ability to study turbines and pumps

Text Books:

1 Fluid Mechanics – A.K. Jain – Khanna Pub., Delhi, (Edition 2009)
2 Fluid Mechanic – Hydraulic & Hydraulic Mechanics -Modi/Seth– Standard book House, Delhi ,(Edition 2010)
3 Fluid Mechanics – S. Nagrathanam – Khanna Pub., Delhi, (Edition 2012)
4 Elementary Fluid Mechanics – H. Rouse – Toppan C. Ltd. Tokyo, (Edition2010)
5 Fluid Mechanics – Garde-Mirajgaonkar – Nemchand & Bros., Roorkee, (Edition 2004)
6 Fluid Mechanics – Shames - McGraw-Hill International Book Co.,

Auckland,
(Edition 200)
7 Fluid Mechanics – S. Ranmamurtham, Dhanpat Rai & sons, New Delhi, (Edition 2009)
8 Fluid Mechanics and Hydraulic Machines – Dr. R.K.Bansal, Laxmi Publications, New Delhi, (Edition 2013)

Reference Books:

1 Fluid Mechanics – Streeter and Wylie, McGraw-Hill International Book Co., Auckland, (Edition 2000)
2 Fluid mechanics – John F. Douglas et.al., Pearson Education Co., Delhi (International Edition) (Edition 2002)
3 Flow in open channel – V. T. Chaw - McGraw-Hill International Book Co., Auckland (Edition 1962)
4 Flow in open channel - K. Subramanyam – Tata McGraw-Hill Pub. Co., Delhi (Edition 2007)
5 Fluid Mechanics (SI Version) – Fox, Mc Donald and Pritchard, Wiley India Pvt. Ltd. New Delhi. (Edition 2015)
6 Fluid Mechanics (SI Version) – Munson, Okiishi, Huebsch and Rothmayer, Wiley India Pvt. Ltd. New Delhi. (Edition 2015)

Useful Links

1 http://www.nptel.iitm.ac.in/S.Mohan
2 www.ocw.mit.edu

Mapping of Course Outcomes to Program Outcomes

Course Outcomes	Program Outcomes										
	a	b	C	d	e	F	g	H	i	j	k
1	√	√	√	√		√		√	√		√
2	√	√	√	√		√	√	√	√		√
3	√	√	√	√	√			√	√		√
4	√	√	√	√		√	√	√	√		√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyze	3	3	2	12
Evaluate	3	3	2	12
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering Karad.
Second Year B. Tech
CE406: Surveying-II Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives:

1. To understand levelling techniques by using Tacheometer.
2. To understand to Setting out simple curves on field
3. To understand use of various modern instruments of Remote sensing
4. To understand the applications of Total Station

Course Contents

Experiment 1 To determine Constants of Tacheometer.

Experiment 2 To determine linear distance and elevation by Fixed Hair Method of Tacheometer

Experiment 3 To determine area of polygon by Tacheometer.

Experiment 4 To determine gradient of line by Tacheometer.

Experiment 5 To Setting Out Simple Curve by any one method of Survey (namely, Deflection Angle Method or Rankine's Method).

Experiment 6 To Study Mirror Stereoscope.

Experiment 7 To Study GPS.

PROJECT -1 Road project – at least 500m /cannel alignment of at least 1km.

PROJECT -2 Radial contouring by total station.

List of Submission

1. Total number of Experiments
2. Project Visit Report

Additional Information

Course Outcome(CO):

1 Student will able to measure geometrical parameter of field by Tacheometer.
2 Student will able to carry out alignment of Civil Engineering Projects
3 Student will able to operate GPS.
4 Student will able to use various conventional and modern instruments involved in surveying with respect to utility and precision

Mapping of Course Outcomes to Program Outcomes

course outcomes			Program outcomes								
	a	b	c	d	e	f	g	h	i	j	k
1	✓	✓	✓	✓	✓		✓	✓		✓	
2	✓	✓	✓	✓		✓		✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
4	✓	✓	✓	✓		✓		✓	✓		✓

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	CA
Assembling/ Understanding	√					√					1
Testing	√	√	√	√	√	√	√	√	√	√	5
Observing	√	√	√	√	√	√	√	√	√	√	5
Analyzing		√				√	√	√	√	√	2
Interpreting	√	√	√	√	√	√	√	√	√	√	5
Designing							√	√			1
Creating								√			1
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	5

Government College of Engineering Karad
Second Year B. Tech
CE407: Engineering Geology Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**TA/CA**	50

Total Credits = 1

Course Objectives:

1. To study physical properties of theminerals.
2. To study Identification of minerals and rocks.
3. To study Study of Geological maps and Profiles.
4. To Study core samples, RQD and Rock mass rating problems

Course Contents

Experiment 1 Study of physical properties of the minerals and Identification of minerals (Rock forming minerals and Ore Minerals)

Experiment 2 Identification of rocks-
Igneous Rocks like Granite and its varieties, Syenite, Pegmatite, Basalt and its varieties, Gabbro, Dolerite, Pumice etc.
Sedimentary Rocks like Conglomerate, Breccia, Sandstone and its varieties, Shales, Limestones, Laterites.
Metamorphic Rocks like Mica Schists, Hornblende Schists, Slate, Phyllite, Granite Gneiss, Augen gneiss, Marbles and Quartzite.

Experiment 3 Study of Geological maps and profiles. Three point and Dip and strike problems.

Experiment 4 To Solve Rock Mass Rating(RMR) and RQD problems and to study Electrical Resistivity Survey.

Experiment 5 Study tour to the places of Engineering geological importance

References:

1. Rutley's Elements of Mineralogy by Read, H. H., CBS Publishers
2. Structural Geology by Billings, M. P., Prentice Hall of India Pvt Ltd
3. Laboratory Manual of Geology by Sen, A. K., Modern Book Agency Pvt Ltd Kolkata

Course Outcome(CO):

1 Student will be able to identify various minerals
2 Student will be able to identify various rocks.
3 Student will be able to understand and draw geological sections.
4 Student will be able to understand rock quality.

Mapping of CO and PO

PO→ / CO↓	a	b	c	d	e	f	g	h	i	j	k
CO1	√	√						√			
CO2	√							√			
CO3		√	√	√	√			√			
CO4	√	√		√	√			√			

Assessment Pattern

Skill Level	Exp. 1	Pra. 2	Pra. 3	Pra. 4	Pra. 5	CA
Observing	√	√	√		√	5
Analysing	√	√	√	√	√	5
Interpreting	√	√	√	√	√	5
Designing			√			5
Creating			√	√		5

Government College of Engineering Karad.
Second Year B. Tech
CE408: Concrete Technology Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives:

1. To understand various properties of ingredients and their role in concreting.
2. To understand properties of fresh and hardened concrete.
3. To understand to worked out mix design by using modern tools and mix design software's.
4. To understand the applications of non-destructive testing and interpretation results

Course Contents

Experiment 1 **Testing of cement**: Consistency, fineness, setting time, Specific Gravity, Soundness and strength.

Experiment 2 **Testing of fine aggregate**: Specific Gravity, sieve analysis and zoning, bulking of fine aggregate, bulk density, silt content.

Experiment 3 **Testing of coarse aggregate**: Specific Gravity, sieve analysis, bulk density, flakiness index, elongation index, water absorption & moisture content, soundness of aggregate

Experiment 4 **Concrete Mix design** by ACI 211.1-91 method, IS code method as per 10262-2009 & 456-2000.

Experiment 5 **Tests on Fresh Concrete** - Workability tests – Slump cone test, compaction factor test, Vee-bee consistometer test.

Experiment 6 **Tests on Hardened Concrete**- compressive strength, flexural strength, split tensile strength.

Experiment 7 **Effects of Admixture** - Accelerator, Retarder, Plasticizer & Super Plasticizer.

Experiment 8 **Non-destructive Testing** –Rebound Hammer test, Ultrasonic Pulse Velocity test, Cover meter.

List of Submission

1 Total number of Experiments

Course Outcome(CO):

1 Student will carry out various properties of ingredients and understand their role in concreting.
2 Student will understand various properties of fresh and hardened concrete
3 Student will work outmix design by using modern tools and mix design software's
4 Student will use non-destructive testing machine and interpretation results.

Mapping of Course Outcomes to Program Outcomes

course outcomes			Program outcomes								
	a	b	c	d	e	f	g	h	i	j	k
1	✓	✓	✓	✓	✓		✓	✓		✓	
2	✓	✓	✓	✓		✓		✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
4	✓	✓	✓	✓		✓		✓	✓		✓

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	CA
Assembling	√	√	√	√	√			√	1
Testing	√	√	√	√	√	√	√	√	5
Observing	√	√	√	√	√	√	√	√	5
Analyzing				√			√	√	2
Interpreting	√	√	√	√	√	√	√	√	5
Designing	-	-	-	√	-	-	-	√	1
Creating	-	-	-	√	√	-	√	√	1
Deducing conclusions	√	√	√	√	√	√	√	√	5

Government College of Engineering Karad
Second Year B. Tech
CE409: Fluid Mechanics-II Laboratory

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	50
Total Credits	**1**	**ESE**	
		Total	50

Course Objectives:

1. Student will be able to understand the fluid flow in open channels Uniform Flow Depth energy relationship in open channel flow: Specific energy
2. Student will be able to understand the rapidly flow and its applications through computations and measurement of flow in open channels through notches and weirs.
3. Student will understand the Impulse momentum principle, Impact of jet on Vanes-flat, curved (stationary only)
4. Student will understand working principle of turbine, and pumps

Course Contents
At least Seven experiments from the following

Experiment 1 Determination of Chezy's and Manning's constants

Experiment 2 Study of specific energy diagram for different discharges

Experiment 3 Study of hydraulic jump

Experiment 4 Calibration of V notch / Rectangular notch.

Experiment 5 Calibration of a given weir (Sharp crested, or Broad crested or ogee)

Experiment 6 Study of Impact of jet

Experiment 7 Study of turbine (Francis or Kaplan) [only Efficiency is expected]

Experiment8 Study of centrifugal pump [only Efficiency is expected]

Experiment9 Study of charts for selection of pumps

List of Submission

1 Total number of Practical (Term Work only)

Course Outcome(CO):

1 Student will understand the fluid flow in open channels Uniform Flow Depth energy relationship in open channel flow: Specific energy
2 Student will understand the rapidly flow and its applications through computations and measurement of flow in open channels through notches and weirs.
3 Student will understand the Impulse momentum principle, Impact of jet on Vanes-flat, curved (stationary only)
4 Student will understand working principle of turbine, and pumps

Mapping of CO and PO

PO→ CO↓	a	b	c	d	e	f	g	h	i	j	k
CO1					√			√		√	
CO2			√		√			√		√	
CO3		√						√		√	
CO4			√		√			√		√	

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	CA
Assembling	√	√	√	√	√	√	√	√		5
Testing		√	√	√	√	√	√	√		5
Observing	√	√	√	√	√	√	√	√	√	10
Analyzing		√	√	√	√	√	√	√	√	10
Interpreting	√	√	√	√	√	√	√	√		10
Designing										0
Creating										5
Deducing conclusions		√	√	√	√	√	√	√		5

Government College of Engineering Karad
Second Year B. Tech
CE410: Geotechnical Engineering – I Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**TA/CA**	25
Practical Oral		**ESE**	25
Total Credits	1	Total	50

Course Objectives

1. To introduce about physical and engineering properties of soil.
2. To study concepts of permeability, compaction and consolidation and its application.
3. To study stress distribution of soil under different load condition.
4. To study shear strength and earth pressure, its type and applications
5. To study earth pressure concept at different condition and its application.

Course Contents
At least Seven experiments from the following

Experiment 1 Specific gravity determination by pycnometer / density bottle

Experiment 2 Particle size Distribution-Mechanical sieve analysis, wet sieve analysis

Experiment 3 Determination of consistency limits and its use in soil classification

Experiment 4 Field density test by core cutter, sand replacement method

Experiment5 Determination of co-efficient of permeability by constant head and by variable head method.

Experiment 6 Standard Proctor test/ Modified Proctor test.

Experiment 7 Direct shear test

Experiment 8 Unconfined Compression Test

Experiment 9 Triaxial test.

Experiment 10 One dimensional consolidation test

Experiment 11 Exercise on Earth Pressure distribution diagram.

Text Books:

1 Text Book of Soil Mechanics in Theory and Practice, Alam Singh, Asian Publishing House, Bombay, Edition 2008
2 Soil Mechanics and Foundation Engineering-V. N. S. Murthy.,U. B. S. Publishers and distributors New Delhi, Edition 2011
3 Geotechnical Engineering, P. Purushottam Raj, Tata Mcgraw Hill Company Ltd. New Delhi, Edition 2012

Reference Books:

1 Soil Mechanics and Foundations, B. C. Punmia ,Laxmi Publications (P) Ltd. New Delhi, Edition 2015
2 Soil mechanics-Terzaghi and Peak,John Willey and Sons, New-York, Edition 1994
3 Soil Mechanics and Foundation Engineering, K.R. Arora,Standard Publishers Distributors, Delhi, Edition 2011
4 Geotechnical Engineering, B. J. Kasamalkar,Pune Vidyarthi Griha Prakashan Pune, Edition 2010

Course Outcomes (COs):

1 Understand physical and engineering properties of soil.
2 Solve problems of permeability, seepage, compaction and consolidation with different methods
3 Solve problem of stress distribution of soil under different load condition
4 Determine shear strength and earth pressure with different methods

Mapping of Course Outcomes to Program Outcomes

Course Outcomes	Program Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
1	√		√	√	√	√	√		√	√	√
2	√	√	√	√	√	√	√	√	√	√	√
3	√	√	√	√	√	√	√	√	√	√	√
4	√	√	√	√	√	√	√	√	√	√	√

Government College of Engineering Karad.
Second Year B. Tech
HS002: General Proficiency-II

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CA**	50
Practical	2 Hrs/week		
Total Credits	3		

Course Objectives:

1. To introspect, develop a thorough understanding of oneself by identifying one's strengths & weakness
2. To map one's competence /employability skills & improve upon as per the same
3. To improve one's intrapersonal & interpersonal communication by mastering the art of listening & assert oneself while communicating for developing harmonious relationships
4. To identify latent talents and sharpen them into effective tools for success in career
5. To apply practical knowledge for self-development focusing upon various skill sets as per industry requirement
6. To live up to the popular saying "the first impression is the last impression", the focus is on building a pleasing personality leading to positive branding of oneself
7. To keep oneself abreast with the social & professional etiquette by working on power dressing, elegant presentation & one's brand management
8. To map one's competence /employability skills & improve upon as per the same

Course Contents
Section I - Language Skills
Duration – 15 hrs

Unit I **Domain: Letter Writing**

The domain letter writing is transacted based on the theme material possession. There are five modules under this domain. Each module has a specific outcome. Each module is dealt with the help of a linguistic tool that is interaction

Module 1 **Duration: 3 hrs**

Objective: Produce & role play a conversation

A trigger (picture/Image/video/ Audio/ Script) is used to initiate interaction through this the class arrives at a common theme. Understands the features of conversation & role play it.

- To read the text critically

- To track one's own reading process.
- To come out with graphical organisers.
- Constructing multiple texts from the given.

Module 2 **Duration: 3 hrs**

Objective: Reading an article

Based on the trigger (picture/Image/video/ Audio/ Script) related to the theme to process reading. Through this learners understand how to read a text effectively & understand the sensory perceptions and emotions involved. At the end of this process the learners come out with graphical organizers and there by construct multiple texts out of it.

Module 3 **Duration: 3 hrs**

Objective: Write a letter

To read the different forms of letter and identify the various features of a letter. Make the learners understand the correct way of writing letters through group editing.

Module 4 **Duration: 3 hrs**

Objective: Reading a news report

Based on the trigger (picture/Image/video/ Audio/ Script) related to the theme a text is given to process reading. The text given here is a news report. Through this learners understand the features of news report, learn to read a text critically & track their own reading process. At the end of this process the learners come out with graphical organizers and there by construct multiple texts out of it.

Module 5 **Duration: 3 hrs**

Objective: Writing a news report

Based on the trigger (picture/Image/video/ Audio/ Script) write a news report keeping all the features of a news report in mind. To present a news report orally and edit a news report.

Section II - Soft Skills

Duration – 24hrs

Unit II **Self-Awareness** **Duration – 6 hrs**

The module self-awareness has three different topics that are**:**

- Personality Assessment
- Competency Mapping
- Self-Concept

This capsule focuses on the following:

- To introspect & develop a thorough understanding of one's personality.
- To Identifying the key traits in oneself comprising of attitude skill & knowledge

- To correlate the trait in oneself with the employability skill required for success
- To identify one's strength& weakness

To move from an imaginary self-concept to real self-concept

Unit III Communication Skill Duration – 6 hrs

The module communication skills has two different topics that are**:**

- Interpersonal Behavioral Styles
- Assertive Communication

This capsule focuses on the following:

- Being able to listen and use other appropriate communication techniques including an appreciation of non-verbal communication.
- To identify different behavioral styles & assert ones communication according to style.

Unit IV Self-Management Duration – 6 hrs

The module self-management has two different topics that are**:**

- Response Able Behavior
- Beginning with End in Mind

This capsule focuses on the following:

- To develop skills and techniques to cope with daily challenges
- To gain practical solutions for day-to-day issues
- To set career goals to improve one's wellbeing and quality of life
- To understand how to calculate percentage of any numbers
- To understand how to calculate percentage of any numbers
- To develop and implement an action plan

Unit V Image Management Duration – 6 hrs

The module Image Management has two different topics that are**:**

- Presentation Skills
- Grooming and Etiquette

This capsule focuses on the following:

- To make the first impression always the best impression.
- To understand & follow the social norms in public.
- To know the importance of personal hygiene & grooming

Section III - Aptitude Skills

Duration-21 hrs

Unit VI **Basic concept 1** **Duration – 3 hrs**

The module basic concepts 1 has two different topics that are**:**

- Percentages
- Profit and loss

This module focuses on the following:

- To understand how to calculate percentage of any numbers
- To understand how to calculate percentage of any numbers
- To improve upon calculations
- To understand when & how to calculate profit% & loss%

Unit VII **Basic concept 2** **Duration – 3 hrs**

The module basic concept 2 has two different topics that are**:**

- Time and work

This module focuses on the following:

- To understand how to calculate efficiencies of the person's
- To understand when to take positive or negative work

Unit VIII **Basic concept 3** **Duration – 3 hrs**

The module basic concepts 2 has two different topics that are**:**

- Time and distance
- Problems on trains

This module focuses on the following:

- To understand how to calculate Speed or Distance or Time when two unknown's are given
- To understand how to calculate Relative speed
- To understand how to calculate length of the train or bridge or platform

Unit IX **Reasoning 1** **Duration – 3 hrs**

The module reasoning 1 has the following topic:

- Puzzle test

This module focuses on the following:

- To understand & analyze the given information

Unit X **Reasoning 2** **Duration – 3 hrs**

The module reasoning 2 has two different topics that are**:**

- Directions sense
- Blood relations

This capsule focuses on the following:

- To understand how to calculate the direction and distance
- To understand how to say proper relations

Unit XI Reasoning 3 Duration – 3 hrs

The module reasoning 3 has the following topic**:**

- Coding & decoding

This capsule focuses on the following:

- To understand how to start depending on the different types of coding

Unit XII Reasoning 4 Duration – 3 hrs

The module reasoning 4 has the following topic**:**

- Number series
- Oddman out

This capsule focuses on the following:

- To understand how to calculate the series depending on the information
- To understand how to pick right answer from the given information

Course Outcome (CO):

1. To understanding of one's personality.
2. To Identifying the key traits in oneself comprising of attitude skill & knowledge
3. To correlate the trait in oneself with the employability skill required for success
4. To move from an imaginary self-concept to real self-concept
5. To identify different behavioral styles & assert ones communication according to style.
6. To set career goals to improve one's wellbeing and quality of life
7. To be responsible for ones actions
8. To make the first impression always the best impression.